Appendix A

SANTA ROSA NUTRIENT OFFSET POLICY

California Regional Water Quality Control Board
North Coast Region
Bob Anderson, Chairman

Linda S. Adams
Secretary for
Environmental Protection

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Arnold
Schwarzenegger
Governor

July 30, 2008

Mr. Miles Ferris
Director of Utilities
City of Santa Rosa
69 Stony Circle
Santa Rosa, CA 95401

Dear Mr. Ferris:

Subject: Transmittal of Resolution No. R1-2008-0061 Approving the Santa Rosa Nutrient Offset Program for the Santa Rosa Subregional Water Reclamation System

File: Santa Rosa Subregional Water Reclamation System

On July 24, 2008, the Regional Water Board adopted Resolution No. R1-2008-0063 Approving the Santa Rosa Nutrient Offset Program for the Santa Rosa Subregional Water Reclamation System, with staff revisions. Enclosed is a copy of the Resolution for your records.

You may e-mail staff engineer Charles Reed at creed@waterboards.ca.gov if you have questions.

Sincerely,

Catherine Kuhlman

Catherine Kuhlman
Executive Officer

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Enclosure

Certified Return Receipt Request

California Regional Water Quality Control Board
North Coast Region

RESOLUTION NO. R1-2008-0061
Approving
Santa Rosa Nutrient Offset Program
for the

City of Santa Rosa
Santa Rosa Subregional Water Reclamation Facility
Sonoma County

FINDINGS

The California Regional Water Quality Control Board, North Coast Region, (hereinafter Regional Water Board) finds that:

1. The City of Santa Rosa owns and operates the Santa Rosa Subregional Water Reclamation Facility (the "Facility"), a publicly owned treatment works. The Facility seasonally discharges into the Laguna de Santa Rosa and its tributaries. The Laguna de Santa Rosa is 303(d) listed for, among other constituents, low dissolved oxygen, nitrogen, and phosphorus.

2. The Regional Water Board adopted a renewed National Pollutant Discharge Elimination System ("NPDES") Permit for the City's Facility, Order No. R1-2006-0045, CA0022764, ("Permit") on September 20, 2006.

3. The Permit imposed the following final effluent limitations for nitrogen and phosphorous based on the Water Quality Control Plan's narrative water quality objective for biostimulatory substances:

   "The Regional Board plans to develop and adopt total maximum daily loads (TMDLs) for nitrogen and phosphorus which will specify wasteload allocations (WLAs) for point sources and load allocations (LA) for non-point sources, as appropriate. Following the adoption of these TMDLs by the Regional Water Board, this Order will be issued with final WQBELs based on applicable WLAs. Alternatively, in the absence of a TMDL, at the end of the compliance schedule authorized by this Order, the final effluent limitation for nitrogen and phosphorus will be zero, or no net loading."

See Permit at Effluent Limitations section IV.A.1.g.

4. Footnote 5 to Effluent Limitations section IV.A.1.g.states:
   "A 'no net loading' effluent limit may be met by: 1) reducing the effluent concentration below detectable levels through source control and/or treatment; 2) reducing loads through recycling/reclamation; and/or 3) reducing loads elsewhere in the watershed by an amount at least equal to the amount discharged (and of equivalent bioavailability) through an approved offset program."

5. Regional Water Board and City staff prepared the Santa Rosa Nutrient Offset Program ("Nutrient Offset Program"), attached hereto as Attachment 1, to qualify as the offset program referenced in footnote 5 to Effluent Limitations section IV.A.1.g. that the City can implement to comply with Effluent Limitations section IV.A.1.g. of the Permit.

6. The City of Santa Rosa has undertaken significant steps to reduce nitrogen concentrations in its effluent and to reduce nutrient loading to the Laguna de Santa Rosa. Activities currently underway or completed include improvements to its activated sludge treatment process to achieve partial denitrification, increased water recycling, increased diversion of effluent to the Geysers Steamfields, and development and implementation of programs involving source control, water conservation, biosolids application management and storm water control. The Nutrient Offset Program will provide a framework for achieving additional nutrient load reductions during the interim period before the nutrient TMDL for the Laguna de Santa Rosa is implemented.

7. The Nutrient Offset Program is designed to encourage the City to undertake nutrient reduction projects that improve habitat and ecosystem conditions, and to encourage the City to undertake nutrient reduction projects that reduce or eliminate non-point source or other discharges not currently subject to waste discharge requirements, waiver, or other permits. However, the Nutrient Offset Program prohibits the City from continuing to receive nutrient reduction credits for a project that later becomes subject to additional regulatory controls imposed by the Regional Water Board. The Offset Program shall in no way diminish the force and effect of any current or future controls on non-point source or other discharges imposed by the Regional Water Board. Non-point source or other discharges in violation of prohibitions or water quality standards remain subject to enforcement under the Water Code.

8. To ensure that no nutrient reduction project will overlap with best management practice activities required by the NPDES permit for the City's municipal separate storm water system ("MS4 Permit"), under the Nutrient Offset Program, the Executive Officer shall not approve project proposals for storm water best management practice activities that are required by the City's current MS4 Permit (Order No. R1-2003-0062, NPDES Permit CA0025054) or the renewed MS4 Permit (scheduled for adoption in late 2008).

9. The Nutrient Offset Program is consistent with the federal and state anti-degradation policies. The discharge to be offset is an existing point source, not a new discharge, and any source reduction efforts through the offset program most certainly will improve the receiving waters. To account for any uncertainties in granting reduction credits, all projects proposals must include an appropriate Margin of Safety (MOS), which can be described numerically, or by spatial and temporal aspects of a given proposal. The Executive Officer retains discretion to request reasonable modifications to the nutrient reduction credit ratio of a specific proposal or deny the proposal. In addition, the Executive Officer shall ensure

that any banked credits are distributed in a balanced manner to satisfy the no-net loading function, both spatially and temporally. In accepting credits proposed in the City's annual report, the first being submitted prior to the discharge season in 2011-2012, the Executive Officer shall ensure that the City's proposal distributes any banked credits in a manner that maximizes the benefit to water quality.

10. No CEQA documentation is required at this time. The program implements provisions of the NPDES permit, which are statutorily exempt from CEQA under Water Code section 13389. Individual proposals must comply with CEQA as explicitly provided for on page 3 of the Program. In the absence of specific proposals, any environmental analysis would be too remote and speculative to analyze. Moreover, because Regional Water Board staff maintains discretion to disapprove any proposal, the Program does not commit the Regional Water Board to any implementation. The Regional Water Board's approval of the Offset Program is a decision to establish procedural rules on how an individual proposal might be approved, and is independent of any proposal that might be approved and have an environmental effect. (See Cal. Code Regs., tit. 14, §15061(b)(3).)

11. Regional Water Board staff recommends Regional Water Board approval of the Santa Rosa Nutrient Offset Program.

RESOLUTION

THEREFORE, it is hereby resolved that:

The Regional Water Board approves the Santa Rosa Nutrient Offset Program, attached hereto as Attachment 1, as the approved offset program referenced in footnote 5 to Effluent Limitations section IV.A.1.g. of the Permit, that the City of Santa Rosa can implement to comply with Effluent Limitations section IV.A.1.g. of the Permit.

CERTIFICATION

I, Catherine E. Kuhlman, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, North Coast Region, on July 24, 2008.

Catherine Kuhlman

Catherine E. Kuhlman
Executive Officer

ATTACHMENT 1

To

RESOLUTION NO. R1-2008-0061
Approving the Santa Rosa Nutrient Offset Program for the Santa Rosa Subregional Water Reclamation System

SANTA ROSA NUTRIENT OFFSET PROGRAM

Program Framework
Key elements of the Santa Rosa Nutrient Offset Program include the following:

- **City's nutrient load to be offset**. The City would identify the anticipated total annual discharge and average total N and P concentrations to be offset when the load limit goes into effect (currently scheduled to take effect before the 2011-12 discharge season) as a basis for sizing initial nutrient control project(s). This would be calculated using the water balance model estimate of the average year recycled water discharge, which would be based on the most recent average dry weather flow estimate and average year reuse capacity at the time the estimate is complete. The actual load would be calculated using the actual discharge volume and the average nutrient concentration during discharge periods. The actual load would be used as described below to determine compliance with the no net loading provision.

- **Nutrient reduction credits to be gained by performance of selected removal/reduction actions**. The nutrient reduction quantity from removal/reduction actions implemented by the City to control source of nutrients to the Laguna other than its recycled water discharge shall be calculated using one of the two following approaches:

    - Direct measurement of nutrient reduction. The City shall receive 1 pound of nutrient reduction credit for each pound of nutrient reduced that would have been discharged to the Laguna de Santa Rosa resulting from nutrient removal/reduction actions amenable to direct measurement. A plan for measuring or estimating the nutrient quantity control would be proposed for each nutrient control project as described in the *Program Implementation* section below.

    - Estimated nutrient reduction. The effectiveness of some nutrient removal/ reduction actions are not amenable to direct measurement. For nutrient removal/reduction actions not amenable to direct measurement, the City shall receive nutrient reduction credit calculated based on the median effectiveness estimate in literature or other lines of study or evidence for project most similar to the City's proposed actions. For example, if literature values from relevant studies indicate a particular pasture management method reduces nutrient loss

by 9, 10, 12, 20, and 25 percent respectively (as reported in five studies), the City would calculate and receive nutrient reduction credit using the 12 percent value.

- Margin of Safety. All project proposals shall include a technically supportable Margin of Safety (MOS) to address uncertainties associated with nutrient reduction ratios and to ensure that the project will result in demonstrable water quality benefits. In reviewing direct and estimated nutrient reduction ratios for each proposal, the Executive Officer shall have discretion to request modification of the ratio based on the characteristics of a given proposal.

- Storm water management projects. No nutrient reduction project will overlap with best management practice activities required by the NPDES permit for the City's municipal separate storm water system ("MS4 Permit"). Under the Nutrient Offset Program, the Executive Officer shall not approve project proposals for storm water best management practice activities that are required by the City's current MS4 Permit (Order No. R1-2003-0062, NPDES Permit CA0025054) or the renewed MS4 Permit (scheduled for adoption in late 2008).

- **Nutrient reduction credit accounting**. Compliance with the no net loading requirement shall be calculated using a three-year averaging period. Each year the City will strive to offset the full amount of each year's anticipated discharge and will implement the approved projects as described in the annual report. At the end of each year, the City shall subtract the nutrient load reduction (pounds) from the City's actual nutrient discharge load, and may average the difference in the past three years. The City shall be deemed in compliance if the City has offset the full amount of actual discharge for the three year period if the three-year average difference is less than or equal to zero mass units.

- The no net nutrient loading requirement is scheduled to take effect at the beginning of the 2011-2012 discharge seasons. The City may choose to implement nutrient removal/reduction actions prior to the 2011-2012 discharge season. Credit (in pounds) for any nutrient removal/reduction actions implemented after 2007 and prior to the 2011-2012 discharge season shall be available to apply to the City's first three years of nutrient reduction. Any "banked" credits shall be distributed in a balanced manner so that water quality benefits from the Program are maximized. Factors to consider in this regard include the proportion of credits to new or ongoing projects in any given year, and the spatial temporal qualities of each credit. This issue will be considered when reviewing the nutrient reduction ratio of a given project and/or the City's annual report describing how the City plans to offset its anticipated discharge.

- The City may need to invest in capital facilities to comply with the no net nutrient loading requirement. Load reduction benefits from any such long-term capital facilities will continue to accrue to the City for the full life of such capital facilities until or unless additional regulatory controls are imposed by the RWQCB (for example, waste discharge requirements, waiver of waste discharge requirements, NPDES permit requirements, or 401 certifications) to control the same nutrient discharges the capital facilities are designed to control.

Program Implementation
Program implementation would occur according to the following steps:

1. City identifies nutrient reduction project(s)
2. City submits description of nutrient reduction project(s) to RWQCB documenting consistency with adopted Santa Rosa Nutrient Offset Program
3. RWQCB accepts proposed nutrient reduction project(s)
4. City implements project(s)
5. City submits annual report documenting nutrient discharged and controlled

Each step is described below.

1. *City identifies nutrient reduction project(s)*

   The City shall preliminarily estimate the mass of N and P that could be removed or prevented from discharging to the Laguna and its tributaries as needed to achieve no net loading (*i.e.* an amount equal to the annual N and P mass emission from the Laguna Plant).

   After assessing the options, the City shall identify one or more preferred nutrient reduction projects for implementation. The City would contact other parties (*e.g.* land owners, RCD, etc.) with which the City would need to partner to implement the project(s) to determine interest, cost and feasibility.

2. *City submits description of nutrient reduction project(s) to RWQCB*

   The City shall prepare a description of the project(s) identified in step 1 above that includes the following:

   - Project location
   - Description of N and P control facilities or practices
   - Quantity of N and P removed or controlled to be calculated as described in the *Program Framework* section above.
   - Expected life of facility or duration of practice. This description shall include a description of the facility and/or practice, plus any written agreements related to construction and maintenance of the facility or implementation of the practice.
   - Monitoring and reporting plan to document continued N and P removal. N and P removal shall be measured or estimated according to the type of removal/reduction actions identified in the *Nutrient reduction credits to be gained by performance of selected removal/reduction actions* section above.
   - Description of anticipated or actual CEQA documentation.

3. *RWQCB accepts proposed nutrient reduction project(s)*

   The Executive Officer of the RWQCB shall accept or reject the nutrient reduction project(s) submitted by the City in writing within 60 days of submittal or the project(s) are deemed accepted. The actual load reduction shall be determined according to the monitoring and reporting plan. The Executive Officer shall provide notice and the opportunity for the public to comment on the project(s). After consideration of any public comments and all available information, the Executive Officer may suggest modifications to the project(s) as necessary for acceptance. The Executive Officer of the RQWCB shall maintain discretion over accepted projects to request reasonable modifications based upon significant new information.

4. *City implements load reduction project(s) as proposed and accepted*

   The City, with any partners, shall implement the nutrient reduction project(s) as proposed and accepted.

5. *City submits annual report documenting nutrient discharged and controlled*

   Beginning in 2011, by July 1st each year, the City shall provide a report to RWQCB documenting the following:

   - Mass of N and P anticipated to be discharged to the Laguna de Santa Rosa (and tributaries) for the upcoming discharge season and a description of how the City plans to offset the anticipated discharge.
   - Mass of N and P actually discharged to the Laguna de Santa Rosa (and tributaries) during the previous discharge season, and the two prior discharge seasons if applicable.
   - Mass of N and P controlled during the previous twelve months (i.e., July 1st through June 30th, of the previous twelve months), and the two (2) prior twelve month periods years if applicable.
   - Calculation of the two and three year averaging, if applicable.
   - Detailed report for each of the accepted nutrient reduction projects according to projects' respective monitoring and reporting plan.
   - The report shall be signed and certified in accordance with 40 CFR 122.22(d).

   The annual report will be posted on the RWQCB website. A RWQCB staff contact will be listed for any questions or comments regarding the report.

Exhibit 1 below is an example where the City would be in compliance in all years (i.e., the Three-Year Average" value is less than 0 kg). The example in Exhibit 1 demonstrates that compliance with the requirement of the 0 kg three-year average requirement is achieved in 2013-14 by using some of the pre-2011 credit.

EXHIBIT 1

To

SANTA ROSA NUTRIENT OFFSET PROGRAM

	Kg Phosphorus					
	Pre-2011	2011-12	2012-13	2013-14	2014-15	2015-16
Anticipated City Discharge		4824	5400	5977	6554	7131
Actual City Discharge		4968	5238	7113	6030	8129
Control Project 1		3900	3950	3610	3290	4580
Control Project 2		900	1200	1200	1200	1200
Control Project 3			100	2000	2000	2200
Control Project 4						
Total Control		4800	5250	6810	6490	7980
Net Load		168	-12	303	-460	149
Pre-2011 credit available	500	500	332	332	0	0
Pre-2011 credit used		168	0	303		
Annual Load For Compliance		0	-12	0	-460	149
Three-Year Average				-4	-157	-104

Appendix B

SEDIMENT SAMPLING AND ANALYSIS GUIDELINES

Appendix B: Sediment Sampling and Analysis Guidelines

Introduction

These sediment sampling and analysis guidelines expand upon the description of sediment disposal in Chapter 5 of the Stream Maintenance Program (SMP) Manual, and identify disposal options based on the chemical quality of the sediment. Guidance is provided for identifying sediment sampling frequency, sampling methodology, sediment analysis, and other sediment characterization activities. Sediment sampling, disposal, monitoring, and reporting conditions issued by the North Coast Regional Water Quality Control Board (RWQCB) under Order No. R1-2009-0049 Waste Discharge Requirements and 401 Water Quality Certification are included by reference. The sediment sampling and disposal process will be coordinated annually between the RWQCB and SCWA as part of the review and approval process for annual SMP maintenance and disposal activities.

Sediment Disposal

Sediment disposal sites will be proposed to the RWQCB Executive Officer for approval on an annual basis. The conditions for site approval will be based on analytical results from sediment sampling at the channels to be maintained and at the proposed disposal site(s). The conditions for approval will evolve as the RWQCB and SCWA become familiarized with the characteristics of sediment removed as part of maintenance activities and with sediment disposal and reuse conditions.

In general, sediment disposal sites can be characterized into seven categories based on potential reuse or disposal opportunities. These categories include on-site reuse, other SCWA channel or easement reuse, other wetland supporting reuse, upland agricultural or commercial reuse (dry), upland agricultural or commercial reuse (wet), landfill disposal, and hazardous waste disposal options. These disposal options are listed below in preferential order according to how well they support program objectives for sustainability.

- **Option 1: On-site reuse.** This includes reusing the sediment on-site (i.e., at the project site) within the channel or easement area for various fill or restoration purposes. For example, sediment excavated from the channel bottom could be placed adjacent to the active channel (remaining within the easement area), to enhance soil, vegetation, and riparian habitat conditions. Sediment could also be used on-site for bank stabilization purposes.
- **Option 2: Other SCWA channel or easement reuse.** Similar to Option 1, this includes reusing the sediment within SCWA channel or easement areas for fill or restoration purposes. The key difference is that Option 2 would occur at a different channel or easement area within the program area, but in a similar setting to where the sediment was originally removed. For example, sediment removed from Colgan Reach 4 could be placed in Laguna Reach 1 to enhance channel habitats.

- **Option 3: Wetland or floodplain restoration or enhancement.** Option 3 consists of beneficial reuse of the sediment outside or off-site of SCWA channel or easement areas, but in a wetland or floodplain setting to support ecologic functioning and habitat. As examples, gravel removed from one creek that does not support steelhead or salmonids could be placed in another creek that does in order to enhance salmonid habitat. Additionally, excavated sediment could be reused as part of habitat enhancement activities in the Laguna area. Because reuse sites under this option would potentially be located farther from the work site, increased sediment hauling distances would result. For the purposes of the sediment criteria discussed below, Option 3 sites are located in the vicinity of and potentially drain to wetlands or water bodies.
- **Option 4: Upland agricultural or commercial reuse (dry).** Sediment would be reused for upland agricultural or commercial reuses that are dry, whereby the sediment would not be secondarily eroded to stream channels or water bodies. Demand for dry sediment is high, particularly for use as soil amendment for agricultural crops and construction of foundation pads for buildings or structures. It is likely that upland disposal sites within Sonoma County will be frequently available and can accept large quantities of sediment.
- **Option 5: Upland agricultural or commercial reuse (wet).** Under this option, sediment would be used as fill in an already approved and permitted wetland project. This is a specific case where an approved and permitted project requires the use of sediment to fill a wetland. It is important to note that this sediment disposal plan in no way encourages or sanctions the filling of existing wetlands. However, for projects that are already approved and permitted, it may be preferable to use sediment materials that share similar wetland properties. In this way, using good quality excavated channel sediment for reuse in a wetland setting may be preferable or advantageous to using other fill material or soils.
- **Option 6: Landfill disposal.** In this option the sediment would be disposed at an approved and operating landfill for use as daily cover material for landfill operations. Currently, waste generated in the program area is hauled to a number of landfills in the greater Bay Area. The nearest operating landfill is the Redwood Landfill in Novato, California. Sediment would be taken to the nearest landfill in need of cover material.
- **Option 7: Hazardous waste disposal.** This option involves the disposal of sediments containing hazardous levels of contaminants. Hazardous waste will be disposed at appropriate hazardous waste facilities. The nearest hazardous waste landfill is located in Kettleman City, California.

These seven disposal options will be evaluated in decreasing preference with potential site selection based on the quality of sediment. Due to the range of site locations for excavation and disposal, hauling distances will vary depending on the sediment removal project site location and the disposal option selected. The preference is to select disposal options that most beneficially reuse the sediment with the least environmental effects.

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

Sediment Sampling and Analysis Approach

As required by the current conditions of the RWQCB Waste Discharge Requirements - Monitoring and Reporting Program (Order No. R1-2009-0049), all sediment samples will be analyzed for the parameters/analytes listed in Table 1. Sampling parameters/analytes listed in Table 1 may be modified after a history of sampling is obtained. This may result in not requiring monitoring for some of these contaminants under certain situations or at certain locations, or the addition of more parameters/analytes if deemed necessary by the RWQCB.

Sampling Frequency and Locations

- For localized sediment removal projects and bank stabilization projects that involve the removal and disposal of less than 250 cubic yards of sediment, one sample will be collected and analyzed. Details on the methodology used to collect and composite samples are described below.
- For sediment removal or bank stabilization projects that require the removal and disposal of more than 250 cubic yards of sediment, one sample will be collected for every increment of 500 cubic yards of sediment to be removed. Details on the methodology used to collect and composite samples are described below.
- For project sites that require more than one sample, sampling locations will be selected to represent overall reach conditions. Sampling sites will be selected to target conditions at the upstream and downstream ends of the project zone. Sampling sites will also specifically target conditions downstream of culvert crossings, culvert outfalls, and key stream confluences.
- There may be situations, where for long channel reaches that are not particularly wide or deep with sediment, it will be preferable to take sediment samples for every 1,000 feet of project length rather than per 500 cubic yards of sediment removal. SCWA shall use whichever approach results in requiring more samples. It is expected that most often, the 500 cubic yard requirement will result in more sampling, but for certain projects the 1,000 ft length requirement will require more sampling and provide better representation.

Sediment Sampling Methodology

This guidance applies to discrete (single) samples and composite samples. All samples shall be collected by means of a hand trowel, a hand auger, or another sampling method approved by the regulatory agencies. The individual collecting the sample will have the discretion of choosing the sampling method which is the most efficient to perform.

Sampling will be conducted in accordance with the methods described below:

Hand Trowel Procedure

1. Remove vegetation and woody debris from the ground surface.

2. If collecting a subsurface sample, use a shovel to dig down to the desired sampling interval.
3. Use a stainless steel hand trowel to collect soil.
4. Place soil in an appropriate sampling container.
5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).

Hand Auger Procedure

1. Remove vegetation and woody debris from the ground surface.
2. Use the hand auger to advance down to the top of the sampling interval.
3. Use a hand auger to collect soil from the desired depth.
4. Use a clean (decontaminated) tool to scoop the soil out of the auger and place in an appropriate sampling container.
5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).
6. If hand auger refusal is encountered, sample will be collected from an alternate location.

Continuous Core Sediment Sampling

Continuous core sediment samples from sediment designated for removal will be collected using hand auger at a frequency of a maximum of one sample per site. Each continuous core sample will be composited by the laboratory, and analyses will be performed on the composite sample.

Discrete Sediment Sampling

Discrete sediment samples from sediment designated for removal will be collected from desired depths using hand auger. Samples will be composited by the laboratory, and analyses will be performed on the composite sample.

Sampling Depth

The sampling depth will be determined in the field. At each sampling location, the staff collecting the samples shall make an estimate of the depth of the sediment using visual clues and/or existing data. Sediment samples shall be collected at the surface and at 1 ft. intervals down to a maximum 4 ft level. In the event that the depth of the sediment is less than 1 foot, then the sample shall be collected at the surface. Samples will be collected up to a maximum depth of 4 feet because collection of samples below that depth is prohibitively difficult due to the finite strength of the individual collecting the sample, and the wet properties of the sediment, which may cause a borehole to collapse. In some locations it may even be infeasible to collect a sample at 3 or 4 feet bgs due to the wet, unstable nature of the sediments. In the event that it is infeasible to collect a sample at the depth interval specified, the sample shall be collected at the deepest interval possible (using 1 foot increments). Also note that the maximum depth at the majority of sediment removal sites is not greater than 4 feet because sediment is removed at this threshold due to the significant reduction in channel conveyance capacity which occurs when sediment is accumulated higher than 4 feet.

Other Sediment Sampling Details

In general, samples will be taken from the finest sediment at a sampling site and every attempt will be made to collect sediments that are representative of the materials to be removed. Most contaminants are associated with fine-grained sediment, and it is therefore important that some of the samples contain the finest sediment that is present at a given project site. For SMP channels, fine sediments include mud, silts, and finer sandy materials. A suitable field test for grain size is to rub sediments between the fingers: finer sediments will feel smooth, whereas coarser sediments will be gritty (SWRCB 2008). As described above, two sub-samples will be collected at each sampling site with the sub-samples composited into a single representative sample. Every attempt will be made to collect representative samples, i.e. samples will be collected at least 10 feet apart from one another. As described above, sampling will target key locations such as culvert outfalls and stream confluences as actual site conditions dictate.

It is noted, in the past ten years of maintenance activities, sediment removal from a single reach has never resulted in the removal of more than 20,000 cubic yards of sediment in a single project. If more than 20,000 cubic yards of sediment will be removed from a single reach, an individual sampling plan will be submitted for Executive Officer review and approval.

Observed Contamination and Results That Exceed Water Quality Criteria

For all projects, any observed contamination as evidenced by chemical-like odors, oily sheens, or irregularly colored sediment would be immediately reported to the local fire department's hazardous materials team and the appropriate Regional Water Quality Control Board staff person in the Cleanups and Investigations Unit. These agencies will direct SCWA on how to handle and remove potentially hazardous sediment.

In addition, if results are found to exceed selected water quality criteria, SCWA will coordinate with the appropriate Regional Water Quality Control Board to develop a contingency sampling plan. In this event, additional samples will be taken to determine the extent of contamination and pinpoint potential contamination sources. Under the guidance of the RWQCB, selection of the number and location of additional samples will be determined based on potential contamination sources such as parking lots, automotive service centers, and dry cleaners. All excavated materials will be stockpiled separately on heavy plastic, covered, and stored until an appropriate disposal location is determined. Additional sampling results will then be compared to the Total Threshold Limit Concentrations (TTLCs) and STLCs specified in CCR Title 22 Chapter 11 for hazardous waste identification. Sediments not meeting the TTLC and/or STLC criteria will be disposed of at an appropriate treatment, storage, and/or disposal, facility.

Sediment Disposal Best Management Practices

Sediment Disposal Best Management Practices are discussed in Chapter 7 of the SMP Manual.

Reporting of Sediment Sampling Results

SCWA will maintain records of field sampling methods, locations, depths, analysis, and results.

SCWA will submit complete laboratory sediment sampling results to the RWQCB on an annual basis.

Table 1: Sediment Sample Analyte List

EPA Test Method[1]	Analyte	Reporting Limit for Soil[2] (mg/kg)	Analyte (cont.)	Reporting Limit for Soil (mg/kg)
9045	pH	pH Units		
6010/ CAM 17	Metals			
	Antimony (total)	1.1	Lead (total)	1.1
	Antimony (soluble)	1.0 mg/l	Lead (soluble)	0.50 mg/l
	Arsenic (total)	0.086	Mercury (total)	0.10
	Arsenic (soluble)	0.10 mg/l	Mercury (soluble)	0.10 mg/l
	Barium (total)	0.13	Molybdenum (total)	0.36
	Barium (soluble)	1.0 mg/l	Molybdenum (soluble)	0.10 mg/l
	Beryllium (total)	0.11	Nickel (total)	1.1
	Beryllium (soluble)	0.050 mg/l	Nickel (soluble)	0.10 mg/l
	Cadmium (total)	0.12	Selenium (total)	0.074
	Cadmium (soluble)	0.10 mg/l	Selenium (soluble)	0.10 mg/l
	Chromium (total)	0.66	Silver (total)	0.33
	Chromium (soluble)	0.10 mg/l	Silver (soluble)	0.10 mg/l
	Cobalt (total)	0.30	Thallium (total)	1.1
	Cobalt (soluble)	1.0 mg/l	Thallium (soluble)	0.10 mg/l
	Copper (total)	0.26	Vanadium (total)	0.55
	Copper (soluble)	0.10 mg/l	Vanadium (soluble)	0.10 mg/l
	Fluoride (total)	1.0	Zinc (total)	2.4
			Zinc (soluble)	0.50 mg/l
8081	Organochlorine Pesticides			
	Aldrin	0.0050	Endosulfan I	0.0050
	α-HCH (hexachlorocyclohexane)	0.0050	Endosulfan II	0.0050
	β-HCH	0.0050	Endosulfan sulfate	0.0050
	γ-HCH (Lindane)	0.0050	Endrin	0.0050
	δ-HCH	0.0050	Endrin aldehyde	0.0050
	Chlordane (tech)	0.20	Heptachlor	0.0050
	4,4'-DDD	0.0050	Heptachlor epoxide	0.0050
	4,4'-DDE	0.0050	Kepone	1.0
	4,4'-DDT	0.0050	Methoxychlor	0.0050
	Dieldrin	0.0050	Mirex	0.10
			Toxaphene	0.20
8141	Organophosphorus Pesticides			
	Azinphos-ethyl	0.10	Famphur	0.10
	Azinphos-methyl	0.10	Fenthion	0.025
	Bolstar (Sulprofos)	0.050	Malathion	0.025
	Chlorpyrifos	0.025	Mevinphos	0.050
	Coumaphos	0.10	Parathion, ethyl	0.025

[1] The most recent version of EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", also known as SW-846, will be used.

[2] All laboratory analytical reports will include the detection and reporting limits, any flags, and a QA/QC report. Electronic (PDF) submittals are preferred.

EPA Test Method[1]	Analyte	Reporting Limit for Soil[2] (mg/kg)	Analyte (cont.)	Reporting Limit for Soil (mg/kg)
	Demeton-O	0.050	Parathion, methyl	0.025
	Demeton-S	0.050	Phorate	0.025
	Diazinon	0.025	Ronnel	0.050
	Dichlorvos (DDVP)	0.050	Simazine	0.050
	Dimethoate	0.10	Stirophos	0.025
	Disulfoton	0.025	Thionazin	0.050
	EPN	0.050	Tokuthion	0.050
	Ethion	0.025	Trichloronate	0.0050
	Ethoprop	0.050		
8082	Polychlorinated biphenyls (PCBs)			
	Aroclor 1016	0.20	Aroclor 1242	0.20
	Aroclor 1221	0.20	Aroclor 1248	0.20
	Aroclor 1232	0.20	Aroclor 1254	0.20
			Aroclor 1260	0.20
8260	Volatile Organic Compounds (VOCs)			
	Acetone	0.020	1,1-Dichloropropene	0.0050
	Benzene	0.0050	cis-1,3-Dichloropropene	0.0050
	Bromobenzene	0.0050	trans-1,3-Dichloropropene	0.0050
	Bromochloromethane	0.0050	Ethylbenzene	0.0050
	Bromodichloromethane	0.0050	Hexachlorobutadiene	0.0050
	Bromoform	0.0050	Isopropylbenzene	0.0050
	Bromomethane	0.0050	p-Isopropyltoluene	0.0050
	n-Butylbenzene	0.0050	Methyl ethyl ketone	0.015
	sec-Butylbenzene	0.0050	Methyl isobutyl ketone	0.010
	tert-Bertylbenzene	0.0050	Methyl tert-butyl ether (MTBE)	0.0050
	Carbon tetrachloride	0.0050	Methylene chloride	0.0050
	Chlorobenzene	0.0050	Naphthalene	0.0050
	Chloroethane	0.0050	n-Propylbenzene	0.0050
	Chloroform	0.0050	Styrene	0.0050
	Chloromethane	0.0050	1,1,1,2-Tetrachloroethane	0.0050
	2-Chlorotoluene	0.0050	1,1,2,2-Tetrachloroethane	0.0050
	4-Chlorotoluene	0.0050	Tetrachloroethene	0.0050
	Dibromochloromethane	0.0050	Toluene	0.0050
	1,2-Dibromo-3-chloropropane	0.0050	1,2,3-Trichlorobenzene	0.0050
	1,2-Dibromoethane	0.0050	1,2,4-Trichlorobenzene	0.0050
	Dibromomethane	0.0050	1,1,1-Trichloroethane	0.0050
	1,2-Dichlorobenzene	0.0050	1,1,2-Trichloroethane	0.0050
	1,3-Dichlorobenzene	0.0050	Trichloroethene	0.0050
	1,4-Dichlorobenzene	0.0050	Trichlorofluoromethane	0.0050
	Dichlorodifluoromethane	0.0050	Trichlorotrifluoroethane	0.0050
	1,1-Dichloroethane	0.0050	1,2,3-Trichloropropane	0.0050
	1,2-Dichloroethane	0.0050	1,2,4-Trimethylbenzene	0.0050
	1,1-Dichloroethene	0.0050	1,3,5-Trimethylbenzene	0.0050
	cis-1,2-Dichloroethene	0.0050	Vinyl chloride	0.0050
	trans-1,2-Dichloroethene	0.0050	m,p-Xylene	0.0050
	1,2-Dichloropropane	0.0050	o-Xylene	0.0050
	1,3-Dichloropropane	0.0050	Xylenes (total)	0.0050

EPA Test Method[1]	Analyte	Reporting Limit for Soil[2] (mg/kg)	Analyte (cont.)	Reporting Limit for Soil (mg/kg)
8270	Poly Aromatic Hydrocarbons (PAHs)			
	Acenaphthene	0.062	Dimethyl phthalate	0.33
	Acenaphthylene	0.062	4,6-Dinitro-2-methylphenol	1.6
	Anthracene	0.062	2,4-Dinitrophenol	1.6
	Benzidine	1.6	2,4-Dinitrotoluene	0.33
	Benzoic acid	1.6	2,6-Dinitrotoluene	0.33
	Benz(a)anthracene	0.33	1,2-Diphenylhydrazine	0.33
	Benzo(b)fluoranthene	0.062	Fluoranthene	0.062
	Benzo(k)fluoranthene	0.062	Fluorene	0.062
	Benzo(g,h,i)perylene	0.062	Hexachlorobenzene	0.33
	Benzo(a)pyrene	0.062	Hexachlorobutadiene	0.33
	Benzyl alcohol	0.66	Hexachlorocyclopentadiene	1.6
	Bis(2-chloroethoxy) methane	0.33	Hexachloroethane	0.33
	Bis(2-chloroethyl) ether	0.33	Indeno(1,2,3-cd)pyrene	0.062
	Bis(2-chloroisopropyl) ether	0.33	Isophorone	0.33
	Bis(2-ethylhexyl) phthalate	0.33	2-Methylnaphthalene	0.062
	4-Bromophenyl phenyl ether	0.33	2-Methylphenol (o-cresol)	0.33
	Butyl benzyl phthalate	0.33	3 & 4 –Methylphenol (m,p-cresol)	0.33
	4-Chloroaniline	0.66	*N*-Nitrosodi-*n*-propylamine	0.33
	4-Chloro-3-methylphenol	0.33	*N*-Nitrosodimethylamine	0.66
	2-Chloronaphthalene	0.33	*N*-Nitrosodiphenylamine	0.33
	2-Chlorophenol	0.33	Naphthalene	0.062
	4-Chlorophenyl phenyl ether	0.33	2-Nitroaniline	1.6
	Chrysene	0.010	3-Nitroaniline	1.6
	Dibenz(a,h)anthracene	0.062	4-Nitroaniline	1.6
	Dibenzofuran	0.33	2-Nitrophenol	1.6
	Di-n-butyl phthalate	2.0	4-Nitrophenol	1.6
	Di-n-octyl phthalate	0.33	Nitrobenzene	0.33
	1,2-Dichlorobenzene	0.33	Pentachlorophenol	1.6
	1,3-Dichlorobenzene	0.33	Phenanthrene	0.062
	1,4-Dichlorobenzene	0.33	Phenol	0.33
	3,3'-Dichlorobenzidine	0.66	Pyrene	0.062
	2,4-Dichlorophenol	0.33	1,2,4-Trichlorobenzene	0.33
	Diethyl phthalate	0.33	2,4,5-Trichlorophenol	0.33
	2,4-Dimethylphenol	0.33	2,4,6-Trichlorophenol	0.33
8015[3]	Total Extractable Petroleum Hydrocarbons (TPHs)			
	TPH as Diesel	1.0		
	Motor Oil	2.0		
	Gasoline (1,4-Bromoflurobenzene)	1.0		
8290[4]	Dioxin	1.0 pg/g		
	Asbestos	1% (PLM EPA Qualitative Method) 0.005 to 0.001 (TEM by EPA Quantitative Method)		
GCMSSIM	Nonylphenol	0.2		

[3] The full list of TPHs will be reported with all peaks (rather than specific compounds).

[4] For dioxin/furans all congeners and their TEQs will be reported.

References Cited

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San Francisco Bay Regional Water Quality Control Board, 2000. *Beneficial Reuse of dredged materials: sediment screening and testing guidelines. Draft Staff Report.* Available: http://www.waterboards.ca.gov/sanfranciscobay/water_issues/available_documents/benreuse.pdf

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Redwood Landfill, Inc.
8950 Redwood Highway, Novato, CA 94945
Phone: 415-892-2851 Fax: 415-898-1354

Waste Acceptance Criteria

EPA ID: CAD982492795

Last Revised: June 2008

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Appendices

Appendix A: Waste Profile Sheet and Terms & Conditions
Appendix B: Schedule 1
Appendix C: Schedule 2
Appendix D: Empty Container Certification Form

Section 1. General Information

The Redwood Landfill (Redwood) is located at 8950 Redwood Highway in Novato, California. Redwood is owned and operated by Waste Management Inc., the nation's largest provider of environmental services. Redwood's full range of solid waste services provides the entire Bay Area Region with safe, economical and environmentally sound waste management.

Mailing Address: P.O. Box 793
Novato, CA 94948

Physical Address: 8950 Redwood Highway
Novato, CA 94945

Phone: 415-892-2851
Fax: 415-898-1354

Hours of Operation: Monday through Friday 7AM-3PM
Saturday 8AM-3:30PM

Redwood is subject to certain local and state regulatory restrictions on daily disposal tonnage and on traffic/truck trips. Haulers must have prior approval if planning to:

- Haul more than 4 loads or 40 yards of garbage or demo (disposal material) on one day, or
- Haul more than 4 loads of dirt or concrete in a day.

Please contact the scale house at 415-898-6098 to schedule loads.

When Redwood's daily limit of acceptable tons and traffic/truck trips has been fully scheduled and a hauler has not scheduled over 4 loads, the hauler's trucks may be rejected after the 4th load (or 40 yards or disposable material). This will depend on Redwood's traffic and tonnage at the time. The way to ensure that trucks are not rejected is to schedule in advance.

Section 2. Waste Management Services

Redwood presently operates a Class III cell. Redwood provides waste management services for Class III wastes, non-friable asbestos containing wastes, and various alternative daily cover materials.

Redwood operates an alternative daily cover (ADC) program. Redwood is presently approved to accept petroleum and metal contaminated soils, biosolids, green waste, and wood waste for ADC. Contact Redwood's technical staff for specific ADC approval requirements.

Section 3. Petroleum Contaminated Soils

Redwood's site permits do not require specific testing requirements for waste streams other than Petroleum Contaminated Soils, which are listed below. Contact Redwood technical staff for assistance in developing an appropriate sampling plan for other special wastes. If generator's knowledge is used in lieu of analytical testing, Redwood may require a written explanation and supporting documentation.

Specific Sampling Requirements – Petroleum Contaminated Soils

Gasoline:	TPH – Gasoline	EPA 5030/8015 Modified
	BETX	EPA 5030/8020
	Lead*	TTLC – Pb
Diesel & Virgin Oil:	TPH – Diesel/Motor Oil	EPA 3550/8015 Modified
Waste Oil:	TPH – Diesel/Motor Oil	EPA 3550/8015 Modified
	TPH – Gasoline	EPA 5030/8015 Modified
	Volatile Organics	EPA 8260 (or 8010 & 8020)
	Semi Volatile Organics	EPA 8270
	Total Oil & Grease	EPA 5520 E&F (or 1664)
	Metals: TTLC** Metals – Cd, Cr, Pb, Ni, Zn, Cu	

*TTLC for lead is required when the generator determines that leaded gasoline was or may have been present. In situations where there is proof that a generator's tank never contained leaded gasoline, the TTLC requirement for lead may be omitted.
**TTLC results may be used in lieu of STLC if TTLC value is less than 10 times the STLC.

NOTE: These requirements are minimum testing standards for Petroleum Contaminated Soils. Additional sampling may be required if levels do not meet threshold requirements or Redwood technical staff determine additional analyses is necessary to determine appropriate waste management.

Section 4. Special Waste Program

Special waste materials include, but are not limited to: non-friable asbestos, contaminated soils, and biosolids.

All special waste materials must be pre-approved prior to acceptance at Redwood. Redwood requires the completion of a service agreement, a generator's waste profile sheet, terms and conditions, and may include analytical reports and/or other information, needed to determine waste acceptability. A Waste Profile Sheet and Terms & Conditions is included in Appendix A. Once paperwork is completed, including requested analytical reports; standard approval turnaround time is 48 hours. Expedited approvals will be arranged on a case-by-case basis.

Section 5. Representative Sampling

It is the responsibility of the generator to certify that the materials requested for management at Redwood are non-hazardous per 22CCR66260. For materials which

require analysis, the generator must provide representative sampling as per Test Methods for Evaluation of Solid Waste, Volume II: Field Manual, Physical/Chemical Method, Chapter 9 (SW-846 Third Edition, 1997 EPA, and future additions or amendments).

Section 6. Class III Requirements

Table 1. Reactivity, Corrosivity, Ignitability

Reactivity:	**Sulfide**	500	H_2S/kg
	Cyanide	250	HCN/kg
	Reaction w/H_2O	Negative	
Corrosivity:	**pH range**	2.0 to 12.5	
Ignitability:	**Flashpoint**	**>**140 degrees F. or >60 degrees C.	

Moisture Content

The moisture content of bulk material must be < 50% with no free liquids (within moisture holding capacity). The only exception is sewage sludge. Sludge from Primary Treatment must be > 20% solids and Secondary Treatment must be >15% solids.

Table 2. Inorganic – Metals Requirements

CONTAMINANT	STLC (mg/l)
Aluminum	10.0
Antimony	1.5
Arsenic	0.25
Barium	50.0
Beryllium	0.05
Cadmium	0.25
Chloride	12,500.0
Chromium (VI)*	2.5
Cobalt	2.5
Copper	2.5
Lead	0.75
Manganese	2.5
Mercury	0.0006
Molybdenum	0.5
Nickel	5.0
Nitrate	500.0

CONTAMINANT	STLC (mg/l)
Nitrite	50.0
Selenium	0.5
Silver	2.5
Sulfate	12,500.0
Thallium	0.1
Vanadium	1.0
Zinc	100.0

NOTE: *At the discharger's discretion, may be met based on total Chromium analyses provided that the Total Chromium analyses is below 0.5 mg/l.
TTLC analysis is acceptable if results are below 10 times the STLC.

Table 3. Polychlorinated Biphenyls (PCBs)

CONTAMINANT	STLC (mg/l)
PCBs (All Aroclors)	0.0075

NOTE: Redwood cannot accept any TSCA regulated PCB materials.

Table 4. Volatile Organic Compounds (VOCs) – Requirements

CONTAMINANT	STLC (mg/l)
Benzene	0.015
Dichloromethane	0.075
Ethylbenzene	0.45
Methyl Ethyl Ketone (MEK)	3.0
Perchloroethylene (PCE)	0.075
Toluene	0.6
Trichloroethylene	0.075
Vinyl Chloride	0.03
Xylenes	0.3

Total VOC concentrations must be less than 50 ppm.

Table 5. Semi-Volatile Organic Compounds (SVOCs) – Requirements

CONTAMINANT	STLC (mg/l)
Diesel (TPH)	0.15
Phenol	0.075
Styrene	0.15

Table 6. TPH/BETX Requirements

Diesel:	100 ppm	EPA 8015M
Motor Oil:	100 ppm	EPA 8015M
Gasoline:	50 ppm	EPA 8015

Section 7. Non-Friable Asbestos Requirements

The following information provides general requirements for acceptance of non-friable asbestos containing wastes at Redwood.

Non-friable asbestos containing wastes and wastes containing less than 1% friable asbestos are non-hazardous wastes. For acceptance at Redwood, the procedures listed below must be followed:

- Analytical report from a State Certified Laboratory or Certificate from a certified asbestos inspector.
  - Analytical Reports/Certificate must state material is non-friable or material contains less than 1 percent friable asbestos.
- Waste must be wrapped and sealed in plastic so that none of the material is exposed,
- Each shipment must be accompanied Redwood approval number.

Section 8. Biosolids Requirements

Redwood requires contractual agreements with customers bringing in biosolids. Please contact Redwood if you wish to enter into a contract with Redwood to dispose of biosolids.

Redwood requires analytical data from contracted sludge customers twice yearly (composite samples from 1st and 3rd quarter sampling events). If results have not been received by the requested due dates, Redwood reserves the right to charge a five percent administration fee. Included with the requested data, completed forms shall be

sent to Redwood showing test results. Sludge analytical results may be used to help determine the acceptability of grit/screenings and grease.

Redwood requires results for the analytes listed in Schedule 1 (Appendix B) twice per year, due on May 15 and November 15 of each year. If any exceedances occur, the customer is contacted and informed that they will need to address the issue, either by re-sampling or retesting the original sample, if it is still available and holding times have not been exceeded.

Schedule 2 (Appendix C) Title 22 analytes are required to be tested for prior to bringing sludge to Redwood and then once every three years afterward. The TTLC for all analytes is required. If the results of the TTLC are equal to or greater than 10 times the STLC limit, then the STLC must also be run. If there is any significant change in the plant's operations, influent, or in the results of the "waste acceptance" tests, Redwood may ask that "Title 22" be run at annual intervals. The generator is required to state that the material is non-hazardous by completing the Waste Profile Sheet and Terms & Conditions that must be submitted with each analysis packet.

Delivery Restrictions

Grit/Screenings and grease that are less than 50% solids may be delivered between the hours of midnight and 11:00 AM. If these are greater than 50% solids then the delivery times are between midnight and 3:00 PM. They will be directed to off loading areas designated by Redwood personnel. Other delivery times must be approved by Redwood at least 24 hours prior to delivery.

Section 9. Empty Containers

Redwood accepts empty containers that meet the following requirements:

- For containers previously containing hazardous materials (pesticides, chemicals, etc.), the generator must either provide the scale house with signed documentation stating that the containers have been triple-rinsed or must sign the Empty Container Certification form (Appendix E).
- For latex and oil based empty paint containers, lids must be removed and all paint inside must be dry.

Appendix C

WATERSHED PARTNERSHIPS PROGRAM MEMORANDUM OF AGREEMENT

Appendix C-1

SAMPLE OF MEMORANDUM OF AGREEMENT

SONOMA COUNTY WATER AGENCY

FILE:1-4131-21 SOTOYOME RESOURCE CONSERVATION DISTRICT (AGREEMENT FOR FUNDING OF COOK CREEK HEADWATERS EROSION CONTROL AND SEDIMENT MANAGEMENT PROJECT) TW# 07-08-114

September 17, 2008

Valerie Sherron
Sotoyome Resource Conservation District
PO Box 11526
Santa Rosa, CA 95406

RE: AGREEMENT FOR FUNDING OF COOK CREEK HEADWATERS EROSION CONTROL AND SEDIMENT MANAGEMENT PROJECT

Dear Ms. Sherron:

Enclosed is your fully signed copy of the subject agreement.

Sincerely,

Rochelle Mueller

Rochelle Mueller
Technical Writing Specialist

Encs

c Jon Niehaus
Accounting/Auditor

RW: \\fileserver\data\cl\pinks\week091508\0708-114 exec.doc

TW 07/08-114

Agreement for Funding of Cook Creek Headwaters Erosion Control and Sediment Management Project

This agreement ("Agreement") is by and between Sonoma County Water Agency, a body corporate and politic of the State of California and Sotoyome Resource Conservation District, a special district organized under the State of California Public Resources Code (hereinafter "Recipient"). The Effective Date of this Agreement is the date the Agreement is last signed by the parties to the Agreement.

RECITALS

A. Landslides in the upper Cook Creek Watershed contribute large volumes of sediment to Cook Creek and downstream creeks. Sediment loadings to downstream creeks impacts habitat and channel capacity in the downstream creeks.
B. The Agency owns and maintains several flood control channels downstream from the project site.
C. The Cook Creek Headwaters Erosion Control and Sedimentation Management Project ("Project"), described in Exhibit B, will act as partial mitigation for the Agency's 2008 stream maintenance activities on Copeland, Coleman, Todd, Hinebaugh, Steele, College, Airport, Ducker, Colgan, and Gossage Creeks.
D. Agency will utilize funding from the Zone 1A Flood Control fund.

AGREEMENT

Agency and Recipient agree as follows:

1. RECITALS

A. The above recitals are true and correct.

2. LIST OF EXHIBITS

A. The following exhibits are attached hereto and incorporated herein:
   1. Exhibit A: Scope of Work
   2. Exhibit B: Project Description

3. COORDINATION

A. Recipient shall coordinate with Agency's Project Manager. Contact information:

Agency	Recipient
Project Manager: Jon Niehaus	Contact: Valerie Sherron
PO Box 11628	PO Box 11526
Santa Rosa, CA 95406	Santa Rosa, CA 95406
Phone: 707-547-1947	Phone: 707-569-1448 x102
Cell: 707-975-3999	
Fax: 707-524-3782	Fax: 707-569-0434
Email: jon@scwa.ca.gov	Email: vsherron@sotoyomercd.org

4. RECIPIENT'S RESPONSIBILITIES

A. General: Recipient agrees to perform all work in accordance with the requirements of applicable federal, state, and local laws.

B. Project:

1. Recipient agrees to perform all work described in Exhibit A.

C. Deliverables: By December 31 of each year following completion of planting, Recipient shall submit to Agency:

1. Monitoring Report

D. Indemnification: Recipient agrees to accept all responsibility for loss or damage to any person or entity, including but not limited to Sonoma County Water Agency, and to defend, indemnify, hold harmless, reimburse and release Sonoma County Water Agency, its officers, agents, and employees, from and against any and all actions, claims, damages, disabilities, liabilities and expense, including but not limited to attorneys' fees and the cost of litigation incurred in the defense of claims as to which this indemnity applies or incurred in an action by Agency to enforce the indemnity provisions herein, whether arising from personal injury, property damage or economic loss of any type, that may be asserted by any person or entity, including Recipient, arising out of or in connection with the performance of Recipient hereunder, whether or not there is concurrent negligence on the part of Agency, but, to the extent required by law, excluding liability due to the sole or active negligence or due to the willful misconduct of Agency. If there is a possible obligation to indemnify, Recipient's duty to defend exists regardless of whether it is ultimately determined that there is not a duty to indemnify. Agency shall have the right to select its own legal counsel at the expense of Recipient, subject to Recipient's approval, which approval shall not be unreasonably withheld. This indemnification obligation is not limited in any way by any limitation on the amount or type of damages or compensation payable to or for Recipient or its agents under workers' compensation acts, disability benefit acts, or other employee benefit acts.

E. Insurance:

With respect to performance of work under this Agreement, Recipient shall maintain insurance as described below.

1. Types of Insurance:

a) Workers' Compensation Insurance. Workers' compensation insurance with statutory limits as required by the Labor Code of the State of California. Said policy shall be endorsed with the following specific language:

(1) This policy shall not be cancelled or materially changed without first giving thirty (30) days prior written notice to the Sonoma County Water Agency.

b) General Liability Insurance. Commercial general liability insurance covering bodily injury and property damage using an occurrence policy form, in an amount no less than one million dollars ($1,000,000.00) combined single limit for each occurrence. In the event Recipient cannot provide an occurrence policy, Recipient shall provide insurance covering claims made as a result of performance of this Agreement and shall maintain such insurance in effect for not less than two (2) years following completion of performance of this Agreement. Said commercial general liability insurance policy shall either be endorsed with the following specific language or contain equivalent language in the policy:

(1) Additional insured(s): The Sonoma County Water Agency, its officers, agents, and employees, are named as additional insured(s) for all liability arising out of the operations by or on behalf of the named insured in the performance of this Agreement.

(2) Separation of insured: The inclusion of more than one insured shall not operate to impair the rights of one insured against another insured, and the coverage afforded shall apply as though separate policies had been issued to each insured, but the inclusion of more than one insured shall not operate to increase the limits of the company's liability.

(3) Primary coverage: The insurance provided herein is primary coverage to the additional insured(s) with respect to any insurance or self-insurance programs maintained by the additional insured(s).

(4) Cancellation: This policy shall not be cancelled or materially changed without first giving thirty (30) days prior written notice to the Sonoma County Water Agency.

c) Automobile Liability Insurance. Automobile liability insurance covering bodily injury and property damage in an amount no less than one million dollars ($1,000,000.00) combined single limit for each occurrence. Said insurance shall include coverage for owned, hired, and non-owned vehicles. Said policy shall be endorsed with the following language:

(1) This policy shall not be cancelled or materially changed without first giving thirty (30) days prior written notice to the Sonoma County Water Agency.

2. Documentation:

a) Prior to execution of the Agreement by Agency, Recipient shall submit to Agency properly executed Certificates of Insurance clearly evidencing all coverages, limits, and endorsements required above.

b) Upon Agency's written request, certified copies of insurance policies shall be provided to Agency. Said policy copies shall be submitted within thirty (30) days of Agency's request.

c) Unless specifically noted otherwise, subconsultants and subcontractors are not required to submit insurance documentation to Agency.

3. Policy Obligations: Recipient's indemnity and other obligations shall not be limited by the foregoing insurance requirements.

4. Material Breach: If Recipient, for any reason, fails to maintain insurance coverage or fails to ensure that all subconsultants, subcontractors, and other agents maintain insurance coverage that is required pursuant to this Agreement, the same shall be deemed a material breach of contract. Agency, at its sole option, may terminate this Agreement and obtain damages from Recipient resulting from said breach. Alternatively, Agency may purchase such required insurance coverage, and without further notice to Recipient, Agency may deduct from sums due to Recipient any premium costs advanced by Agency for such insurance. These remedies shall be in addition to any other remedies available to Agency.

5. Subconsultants' Insurance: Recipient shall require all of its subcontractors, subconsultants, and other agents to maintain the same insurance coverage as specified above for Recipient.

F. Invoices: Invoice Agency as described under paragraph 6.

5. AGENCY'S RESPONSIBILITIES

A. Payment:

1. For all services and incidental costs required hereunder, Recipient shall be paid in accordance with the terms listed under paragraph 6.
2. The total amount paid by Agency under this Agreement shall not exceed $67,633.50.

6. PAYMENT

A. Recipient shall be paid based on the following table:

	Hours	Hourly Rate	Total
Task 1: Installation of Erosion Control Measures			
Restoration Program Manager	125	$57.00	$7,125.00
Project Coordinator	40	$58.00	$2,320.00
Circuit Rider Productions Subcontract			$25,000.00
Mileage	600	$0.50	$300.00
Subtotal			$34,745.00
Task 2: Project Maintenance, Irrigation & Monitoring			
Restoration Program Manager	50	$57.00	$2,850.00
Project Coordinator	145	$58.00	$8,410.00
Watershed Biologist	30	$59.00	$1,770.00
Project Assistant	115	$51.00	$5,865.00
Mileage	1,050	$0.50	$525.00
Subtotal			$19,420.00
Task 3: Contract Administration			
Executive Director	30	$73.00	$2,190.00
Project Coordinator	60	$58.00	$3,480.00
Bookkeeper	30	$55.00	$1,650.00
Subtotal			$7,320.00
Overhead (billed at 10%)			$6,148.50
Total			**$67,633.50**

B. Invoices: Recipient shall submit its bills in arrears on a monthly basis, based on percentage of work complete and a justification for such percentage in a form approved by Agency's Project Manager. The bills shall show or include:

1. Recipient name
2. Name of Agreement
3. Agency's Project-Task number 7251-2 and Account number 673202-6180
4. Task performed with an itemized description of services rendered by date
5. Copies of receipts for reimbursable materials/expenses

7. ADDITIONAL REQUIREMENTS

A. Term of Agreement: This Agreement shall remain in effect until December 31, 2011, unless terminated earlier in accordance with the terms herein.

B. Termination: At any time and without cause, Agency has the right, in its sole discretion, to terminate this Agreement by giving five calendar days' written notice to Recipient. In the event of such termination, Agency will pay Recipient for portions of the Project satisfactorily completed to the date of termination. In addition, should Recipient fail to perform any of its obligations hereunder, within the time and in the manner herein provided, or otherwise violate any of the terms of this Agreement, Agency may immediately terminate this Agreement by giving Recipient written notice of such termination, stating the reason for termination. In the event of such termination, Agency will pay Recipient for portions of the Project satisfactorily completed to the date of termination. However, Agency will deduct from such amount the amount of damage, if any, sustained by Agency by virtue of the breach of the Agreement by Recipient. Agency's right to terminate may be exercised by Agency's General Manager/Chief Engineer.

C. Authority to Amend Agreement: Changes to the Agreement may be authorized only by written amendment to this Agreement, signed by both parties.

D. No Waiver of Breach: The waiver by Agency of any breach of any term or promise contained in this Agreement shall not be deemed to be a waiver of such term or promise or any subsequent breach of the same or any other term or promise contained in this Agreement.

E. Construction: To the fullest extent allowed by law, the provisions of this Agreement shall be construed and given effect in a manner that avoids any violation of statute, ordinance, regulation, or law. The parties covenant and agree that in the event that any provision of this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions hereof shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

Recipient and Agency acknowledge that they have each contributed to the making of this Agreement and that, in the event of a dispute over the interpretation of this Agreement, the language of the Agreement will not be construed against one party in favor of the other. Recipient and Agency acknowledge that they have each had an adequate opportunity to consult with counsel in the negotiation and preparation of this Agreement.

F. No Third-Party Beneficiaries: Nothing contained in this Agreement shall be construed to create and the parties do not intend to create any rights in third parties.

G. Applicable Law and Forum: This Agreement shall be construed and interpreted according to the substantive law of California excluding the law of conflicts. Any action to enforce the terms of this Agreement or for the breach thereof shall be brought and tried in the County of Sonoma.

H. Captions: The captions in this Agreement are solely for convenience of reference. They are not a part of this Agreement and shall have no effect on its construction or interpretation.

I. Merger: This writing is intended both as the final expression of the agreement between the parties hereto with respect to the included terms and as a complete and exclusive statement of the terms of the agreement, pursuant to Code of Civil Procedure Section 1856. No modification of this Agreement shall be effective unless and until such modification is evidenced by a writing signed by both parties.

J. Time of Essence: Time is and shall be of the essence of this Agreement and every provision hereof.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as set forth below.

Reviewed as to substance:

Agency's Department Head

Reviewed as to funds:

Agency's Division Manager - Administrative Services

Reviewed as to form:

County Counsel

Sotoyome Resource Conservation District

By: Kara Heckert

Kara Heckert
(Please print name here)

Title: Executive Director

Date: August 14, 2008

Insurance Documentation is on file with Agency

8/19/08 RLM
(Date)

Sonoma County Water Agency

By:
Chair, Board of Directors

Date: 9/9/08

Attest:
Clerk of the Board of Directors

Exhibit A

Scope of Work

Recipient agrees to perform work to control erosion and sediment on landslides in the headwaters of Cook Creek. Specific tasks include:

Task 1: Installation of Erosion Control Measures

Recipient shall contract with Circuit Rider Productions, Inc. (CRP) for installation of jute netting and straw waddles, erosion control seeding, and re-establishment of woody vegetation on the landslides. Recipient shall also have CRP install an irrigation system to support the re-establishment of vegetation. Numbers of plants for woody vegetation re-establishment are as follows:

Site #1: Landslide closest to house:
90 direct seed acorns & buckeye
120 container plants w/ irrigation

Site #2: Across the channel from site #1:
315 direct seed acorns & buckeye
No container plants or irrigation

Recipient shall coordinate with the landowner and shall oversee the work performed by CRP. Installation shall take place during the Fall and Winter months of 2008/2009 and shall be completed by March 2009.

Task 2: Project Maintenance, Irrigation & Monitoring

Recipient shall visit the project site every 10 to 14 days from April through October for 2 to 3 years to check the irrigation system and make repairs where necessary. Recipient shall perform weed removal around each plant 3 times per year for 3 years following plant installation. Recipient shall monitor plant survival during each year of maintenance, and shall submit a report to Agency By December 31 of each monitoring year. Maintenance activities shall begin in April 2009 and conclude in October 2011. Monitoring shall begin in Fall 2009 and conclude in Fall 2011, with the final monitoring report delivered to Agency by December 31, 2011.

Task 3: Contract Administration

Recipient shall perform activities necessary to the administration of this contract, including preparation and submission of monthly invoices and quarterly progress reports to Agency. These activities shall be ongoing throughout the contract term.

Exhibit B

Project Description

A. Background

A landslide developed in the headwater area of the Cook Creek subbasin in 2007, and has continued settling during the winter of 2008. The landslide (~9,000 sq ft.) has resulted in the mass movement downslope of soil and earth materials. The landslide has also exposed a barren steep slope that is susceptible to continued surface erosion. Currently, the landslide is on a slope above the Cook Creek stream channel, outside of Waters of the State/U.S., but adjacent to the stream zone. However, without treatment the slumping area will contribute large amounts of sediment directly to Cook Creek and continue eroding materials into Cook Creek.

This project will stabilize the active landslide and thereby reduce abundant sediment loading to Cook Creek.

B. Overview

Key actions of this project include slope grading and vegetation planting to stabilize the soil mass, arrest movement, reduce further erosion and prevent a large volume of sediment from being discharged to Cook Creek and downstream areas. The slope face will be regraded and compacted, and covered with erosion control fabric. The toe of the slope will be anchored with rip rap and include a rock/soil mix that will enable tree plantings at the base of the slope. The grading design is integrated with upslope drainage improvements to keep the slope face well drained. Because of the steepness of the slope and the proximity to the creek, use of heavy equipment is difficult and will be minimized. All work will occur upslope and outside of Waters of the State/U.S., with appropriate BMPs implemented to prevent any construction related water, sediment, or other materials from entering the creek zone.

C. Planting Plan

The vegetation plan includes planting of shrubs, trees, emergent transplants, and dormant cuttings. These target planting numbers are based on the current site evaluation. The placement of emergents and dormant cuttings is contingent on local conditions. Slope stabilization grading and rock placement may impact the amount and type of species in a given zone. Best efforts have been made to avoid plants with high water demands that would require irrigation.

Plant stock shall include dormant cuttings, on-site transplants, liner-sized seedlings (supercell or depot), or one gallon tree pots. Plants will receive protective hardware and weed control fabric. Plant hardware will be either collar and screen or Tubex. This hardware and weed control fabric should remain in place for 5 years at which time it should be removed and disposed of off-site.

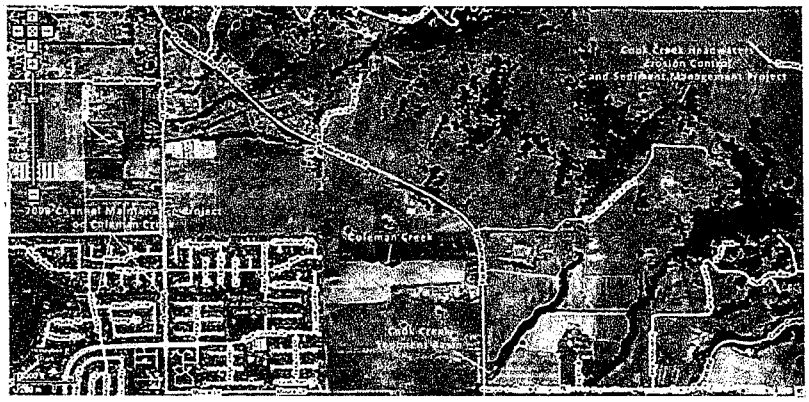
D. Project Maintenance, Irrigation, and Monitoring

Plants in all areas will be irrigated with an above ground temporary drip system, which will be designed to operate for 2-3 years. Irrigation water will be delivered to the area immediately surrounding the plant via drip emitters. To meet the goals of this project, irrigation amounts will likely be limited to the lowest possible amount so as to minimize inundation of the unstable slope.

E. Project Benefits

This project provides several direct and indirect benefits that occur both on-site and are beneficial to the watershed as a whole. Direct benefits occurring on-site include erosion control and the prevention of a stream section from being buried and inundated with accumulated landslide material. This is particularly important in headwater first-order streams where the transition from the defined channel network to the hillside catchment areas is an important ecotone.

Downstream benefits include reduced sediment loading to the Cook Creek sediment basin and to the Cook Creek and Coleman Creek flood control channels. The reduction in downstream sediment loading to these flood control channels reduces the need for in-channel maintenance activities, which in turn, reduces potential maintenance impacts to the channel. Erosion control and sediment reduction from the watershed headwaters will also help areas further downstream including the Laguna de Santa Rosa which is currently impaired for sediment. The reduction of sediment loading to the Laguna enhances aquatic habitat for fish and other aquatic organisms. Increased sedimentation is also known to create an ideal habitat for invasive Ludwigia sp. in the Laguna de Santa Rosa. The reduction of sediment loading to the Laguna helps reduce and avoid invasive Ludwigia colonization.



Issue Date (MM/DD/YYYY)
08/19/2008

CERTIFICATE OF COVERAGE

SDRMA

This is to certify that coverages listed below have been issued to the member named below for the period indicated. Notwithstanding any requirement, term, or condition of any contract or other document with respect to which this certificate may be issued or may pertain; the coverage described herein is subject to all the terms, exclusions, and conditions of the specific coverage document; limits shown may have been reduced by paid claims.

This certificate of insurance or binder evidences the limits of liability in effect at the inception of the policies shown. This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policies listed below.

Participating Member:
Sotoyome Resource Conservation District
Post Office Box 11526
Santa Rosa, CA 95406

Member Number:
BOP-7213

Company Affording Coverage:
Special District Risk Management Authority
1112 I Street, Suite 300
Sacramento, California 95814
Toll-Free 800.537.7790 www.sdrma.org

Type of Coverage	Policy Number	Effective Date	Expiration Date	Limits	
General Liability	LCA-SDRMA-200809	07/01/2008	07/01/2009		
Personal Injury Liability - Auto				Per Accident	$1,000,000
Personal Injury Liability - General				Per Occurrence	$1,000,000
Auto Liability	LCA-SDRMA-200809	07/01/2008	07/01/2009		
Personal Injury and Property Damage				Per Occurrence	$1,000,000
				Property Damage Deductible	$1,000
Workers' Comp.	WCP-SDRMA-200809	07/01/2008	07/01/2009		
A. Statutory Workers' Comp.				Each Occurrence	$200,000,000
B. Employers' Liability Coverage				Each Occurrence	$5,000,000

Description; All listed coverage is in effect only for the time period specified.

The Sonoma County Water Agency, its officers, and employees are named as primary additionally insured members for liability arising out of the operations by or on behalf of the named insured in the performance of this contract.

Cancellation: Should any of the above-described policies be cancelled before the expiration dates thereof, the issuing company will endeavor to mail 30 days written notice to the above-named certificate holder, but failure to mail such notice shall impose no obligation or liability of any kind upon the company.

Certificate Dates:	Effective Date 07/01/2008	Expiration Date 07/01/2009	Certificate Type:	[X] Additional Insured [ ] Loss Payee [ ] Evidence of Coverage

CERTIFICATE HOLDER

Sonoma County Water Agency, Attn: Joan Hultberg
P O Box 11628
Santa Rosa, CA 95406

Authorized Signature

Appendix C-2

GRANT FUNDING APPLICATION FORM

[INSERT SCWA LOGO]

Watershed Partnership Program Project Funding Application

APPLICANT INFORMATION

Applicant/Lead Agency (organization)_____

Address_____

_____

Contact name and title _____

Telephone (____) _____ Fax (____) _____

E-mail _____

Signature _____ Date _____

For nonprofit organizations, Federal Tax ID# _____

PROJECT INFORMATION

Project title _____

Project location: _____

Proposed starting date _____ Estimated completion date _____

Total budget: $_____ Available matching funds: $_____

Total requested through WPP: $_____

Project Readiness (e.g., in design, permitted, in progress, etc.):_____

_____

Project Activities: Rate level of activity in each area from 0-3
(0=no activity, 1=minimal, 2=moderate, 3=primary purpose of project)

_____Water Quality Enhancement

_____Habitat Restoration/Invasive Species Control

_____Protection/Habitat for Endangered Species

_____Flood protection/storm event attenuation

_____Project Development /Planning

_____Education / Interpretation

_____Research Data Collection

_____Other

Proposal Narrative (maximum 5 pages single spaced, 12-point text, 1" margins all around). Respond in each of the following areas:

1. Needs Assessment or Opportunity Statement
2. Project Description
3. Deliverables/Outcomes
4. How does this project advance goals for the Laguna watershed identified in the Sonoma County General Plan, SCWA plans, previous watershed assessments or the Laguna watershed Restoration and Management Plan?
5. (Implementation projects only): indicate whether project will take place along channels managed by the Sonoma County Water Agency, and if so, whether the project will reduce the frequency of required maintenance in the project area after project is completed.
6. Indicators and Evaluation Methods
7. Timeline, showing Tasks
8. Maintenance and Monitoring (if appropriate, as for restoration projects: indicate how long project will be maintained after completion, and how outcomes will be monitored)

Budget. Provide a project budget arranged by tasks shown in Narrative item #7. Show columns for proposed use of WPP funds, matching funds, and total project budget. Indirect expenses (administration and overhead) limited to XX% of total project budget.

Supporting documents. Provide project maps and site photographs if applicable, landowner agreement letters from participating landowners, commitment letters by collaborating agencies, and documentation of status as a federally recognized nonprofit organization, a Resource Conservation District, or an organization with either of these serving as its fiscal sponsor.

Supplemental attachments (optional). Brochures or other materials relating to educational our outreach programs, CD with audio or video material for proposed public education campaigns (if available), etc.

Sustainability. Please make an effort to minimize paper consumption by printing two-sided and providing only the materials necessary to fully explain your project and its effects.

Appendix D

WATERSHED MITIGATION PROJECT DESCRIPTIONS

Appendix D-1

2006 Cook Creek Headwaters Erosion Control and Sediment Management Project

Photo a. Overview of landslide scar in headwaters of Cook Creek (Feb. 2006), slide debris moves downslope directly into Cook Creek.

Photo b. Toe of active slide pushes eroded material directly into creek (Feb. 2006).

Photo c. Active slide face graded, drain pipes used to dewater surface drainage away from slide; drain, manhole cover, and detention area seen in mid-ground (Feb. 2006).

Photo d. Active lower slide face transports sediment directly to Cook Creek, this is below the area shown in Photo (c), plastics and wattles used to reduce slide saturation and erosion (Feb. 2006).

Photo e. Cook Creek Sediment Basin downstream of the landslide (July 2005), prior to landslide treatments sediment basin required frequent excavation.

Photo f. Cook Creek Sediment Basin (July 2007), following erosion control treatments upstream, frequency and need for sediment removal at basin is diminished.

Appendix D-2

WASHINGTON CREEK (BARBONI RANCH) HEADWATERS GRAZING AND EROSION CONTROL PROJECT

Watershed Partnerships Program: 2007

Washington Creek (Barboni Ranch) Headwaters Grazing and Erosion Control Project, with Watershed Partner the Natural Resources Conservation Service (NRCS)

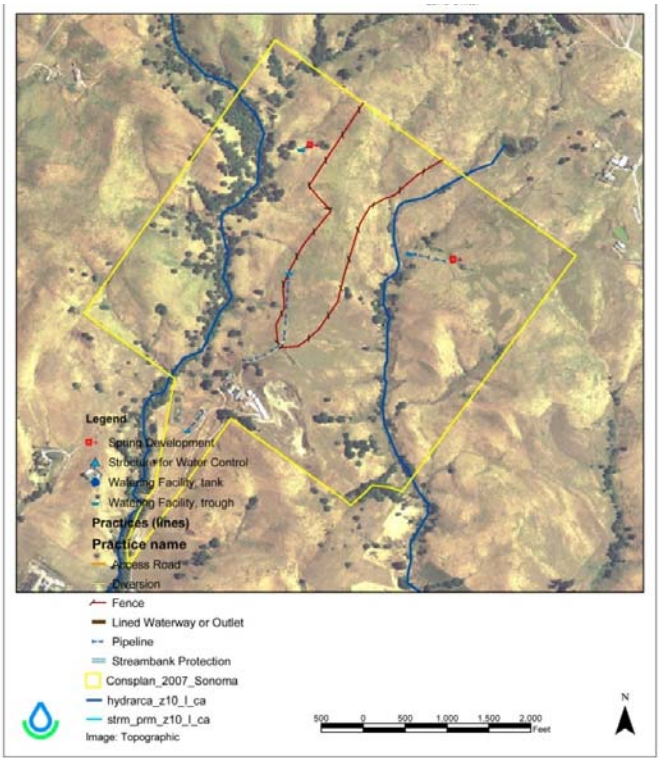
Barboni Ranch in the upper Washington Creek watershed was historically grazed year-round. This resulted in surface water quality impairments from pathogen, nutrient, and sediment loading, as well as streambank instability and degraded riparian habitat.

This project provided watershed based mitigation (Tier 3) for the 2007 East Washington Creek Sediment Removal Project. SCWA provided $15,000 for conservation and erosion control activities with watershed partner NRCS.

Project activities included fencing to keep cattle out of the creek zones, and developing gravity-fed springs and planned livestock watering areas to replace the need for livestock to enter the creek. The project also involved developing long-term grazing management approaches.

Benefits of this project include reducing stream and hillslope erosion from upland areas and protecting water quality. Over the longer-term, reducing grazing impacts will improve soil quality, and foster vegetation growth, health, and recruitment.

This project provides a sustainable solution and mitigation approach to stream maintenance. Over time, reducing sediment sources from grazing areas in the headwaters of Washington Creek reduces the need for instream sediment removal activities downstream in the flood control channels. This mitigation project occurred in the headwaters directly upstream of where SCWA removed channel sediments at Washington Creek in 2007, demonstrating the close spatial relationship between maintenance activities and watershed mitigation.



Appendix D-3

COTATI CREEK CRITTERS: LAGUNA RESTORATION PROJECT

Watershed Partnerships Program: 2008

Cotati Creek Critters: Laguna Restoration Project

Contact Information: Jenny Blaker and Wade Belew
Cotati Creek Critters
Cotati City Hall, 201 West Sierra Avenue
Cotati, CA 94931
(707) 792-4422; jenny@creeks.cotati.info
www.cotaticreekcritters.info

Organization Description: Cotati Creek Critters (CCC) is a grassroots habitat restoration group that has conducted restoration activities along the Laguna de Santa Rosa in Cotati since 1999. Their mission is to enhance natural habitat for native species; organize community workdays to plant native species and remove invasives; encourage an appreciation of Cotati's creeks; raise awareness that Cotati's creeks are part of the larger Laguna de Santa Rosa and Russian River watersheds; and enjoy the natural resources with the community. CCC is fiscally sponsored by Laguna de Santa Rosa Foundation - a 501(c)(3) non-profit organization.

Project Description: CCC proposes to implement a restoration plan on a 5,000 ft. long reach of the Laguna channel in Cotati through community planting events. The project will establish an understory layer of native plants including grasses, sedges, rushes, vines and other appropriate herbaceous perennials. CCC plans to install 1,000 plants in proximity of the 1,500 previously planted trees and shrubs. They predict the understory plants will be viably reproducing and spreading by seed, roots and rhizomes within one to two years. The project also includes treating eroded banks and bare soil with a combination of erosion control fabrics and straw mulch. To reduce non-native grass encroachment they will selectively mow the site, and distribute native seed in its place.

Watershed Partnerships Program: 2008

Cotati Creek Critters: Laguna Restoration Project

Objectives:

1. Stabilize channel banks to reduce soil erosion and sediment delivery to the Laguna de Santa Rosa, as well as damage to important infrastructure like the bike path/service road. A native understory at maturity is much lower and compact to the ground. Most vegetative growth will be less than 2 feet high. This should result in less resistance and trapping of sediment.

2. Increase ecological values of the stream with a diverse native understory. Native plants often have symbiotic relationships with native wildlife.

3. Promote community outreach by encouraging citizens and service groups to invest volunteer time in the Laguna and engage in the broader discussion of reducing non-point source pollution from urban watersheds.

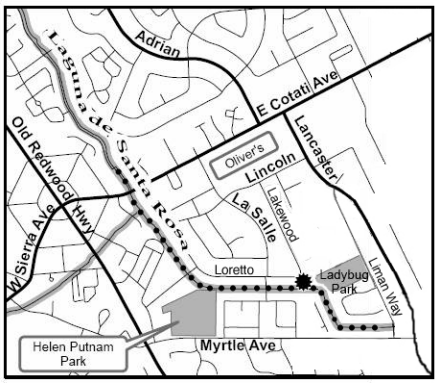
4. Increase environmental education opportunities for people using the bike and pedestrian path and for the general Laguna watershed community.

Budget:

Potential WPP Supported Tasks

Materials and equipment (including plants, tools, jute netting, straw, stakes):		$9,000
Community restoration days (organize and implement 16 volunteer workdays):		$14,000
Community outreach and volunteer recruitment :		$7,500
Irrigation and maintenance (including mowing and week removal):		$6,000
Monitoring activities		$5,000
Project communications:		$3,200
	Subtotal	$43,700

Project Location:



Appendix D-4

2008 Cook Creek Headwaters Erosion Control and Sediment Management Project

Watershed Partnerships Program: 2008

2008 Cook Creek Headwaters Erosion Control and Sediment Management Project

Upper Cook Creek watershed looking south. Landslide and erosion area seen with plastic cover in mid ground. Rohnert Park plain seen in distance to right.

WPP Partner:	Sotoyome Resource Conservation District
Watershed:	Upper Laguna Subbasin, Cook Creek and Coleman Creek headwaters
Stream:	Cook Creek
Project Location:	Northeast from Terra Bella Vista Way
Project Size:	9,000 sq. ft.
Project Budget:	$51,700

Key Restoration Actions:

- 9,000 sq. ft. of erosion control and slope stabilization
- tree planting throughout site

Project Schedule:

Summer 2008, earthwork and grading activities are initiated. In fall 2008, slope planting begins following the earthwork. Planting continues into the winter of 2009 and should be complete by March 2009.

Project Goals and Benefits:

The goal of this project is to prevent movement of sediment into Cook Creek by:

- stabilizing the slope through grading and vegetation planting; and
- improving drainage away from the slide face, underneath soil, or slide toe.

Benefits of this project include:

- on-site erosion control and protection of headwater area;
- reduced sediment loading to downstream areas; and

reduced downstream channel maintenance needs.

Project Costs:

$26,000	earthwork grading and compaction
$2,000	plant materials and hardware
$2,500	plant installation labor
$2,000	irrigation system materials and labor
$3,200	weed maintenance (9 visits)
$8,000	irrigation maintenance (36 visits)
$8,000	monitoring (3 annual reports)
$51,700	Total

2008 Cook Creek Headwaters Erosion Control and Sediment Management Project

Key Notes on the Slope Stabilization Plan:

- All work will occur upslope and outside of waters of the U.S./state
- The slope face will be regraded, compacted, and covered with erosion control fabric
- The base of the slope will be anchored with rip rap and soil and planted with trees
- Drainage improvements will be installed to keep the slope face well drained
- Use of heavy equipment will be minimized, especially near channel zone
- Appropriate BMPs will be used to prevent construction-related impacts to water quality

Nearer view of slide area showing head scarp adjacent to road, slide face, and base of slide in upland zone above creek.

Planting Plan:

- 164 shrubs (coyote brush, toyon, coffeeberry, Western spicebush, oceanspray, and California wild rose)
- 50 trees (California bay laurel, big leaf maple, Coast live oak, Oregon white oak, blue oak, and California buckeye)
- 40 emergent Santa Barbara sedge transplants
- 40 dormant willow cuttings
- Plants will be treated with protective hardware and weed control fabric (remaining in place for 3 to 5 years)
- Planting locations will be identified by a qualified botanist

View of slide zone showing arcuate slide face in profile. Project treatments would include grading of slide face and strenghthening toe of slide area with earthwork and tree plantings.

Direct view of slide face from vicinity of creek bank area below slide.

Project Irrigation:

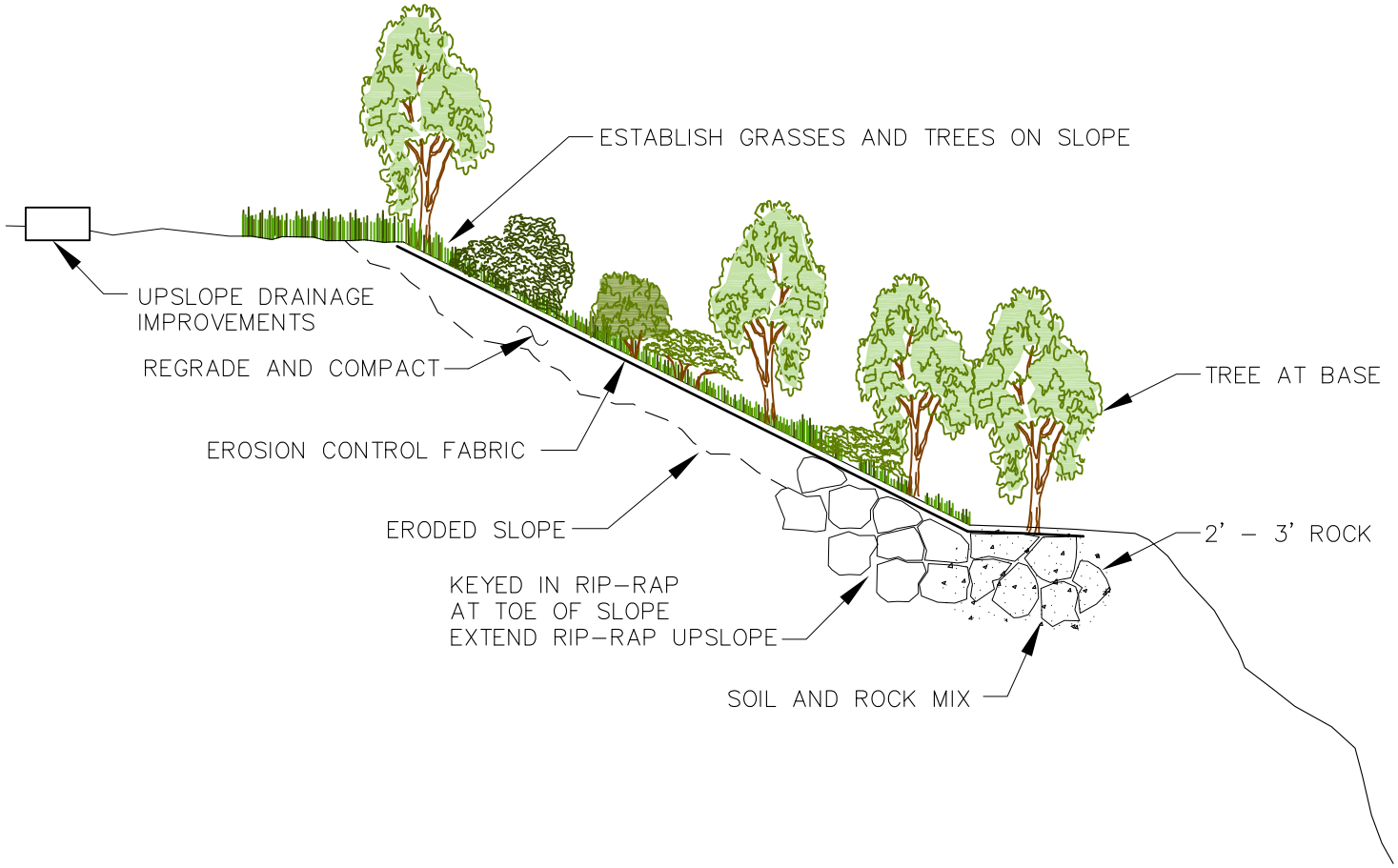
- Irrigation begins in the first April following plant installation
- Plants will be irrigated with above-ground drip system for 2 to 3 years
- Plants will likely receive 1-2 gallons of water per week, depending on local climate conditions and consideration for soil moisture and
- slope protection.
- The irrigation system will be inspected and maintained every 10 to 14 days through the summer months.

2008 Cook Creek Headwaters Erosion Control and Sediment Management Project

Project Maintenance and Monitoring:

- Plants will be inspected and maintained for three years following installation.
- Weeds will be removed from a two-inch radius around plant stems three times each year during late winter and early spring.
- Plant survival will be monitored and documented annually for three years starting at the end of the first growing season (September – November 2009).
- Monitoring reports will be submitted to appropriate regulatory agencies. The reports will include the survival, percent cover, and height of both tree and shrub species. The number by species of plants replaced, the methods used to assess these parameters, and photos will also be included in the monitoring report.
- Reports will be submitted to relevant agencies by December 31 of each year during the three year monitoring period.
- All plants, with the exception of the willow sprigs and *Carex* transplants, shall have a minimum of 70% survival at the end of the monitoring period. If the survival percentage is below 70%, the Agency will replant, provide additional watering, weeding, and eradication of invasive and exotic species to achieve the 70% survival requirement. Replacement plants will be monitored with the same survival and growth requirements specified for three years after planting.

Cook Creek Headwaters Erosion Control and Sediment Management Project
Project Locator Map



SONOMA COUNTY WATER AGENCY

Upper Cook Creek
Slope Stabilization

Sonoma County Watershed Partnerships Program

Appendix E

VEGETATION MANAGEMENT PLAN

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 develop 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 is managed to accommodate natural recruitment. Focused planting forms two discrete zones at the toe of bank and instream areas) that should be managed separately but in parallel.** 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 bank zone establishes and matures much more rapidly than the slower growing species that establish or are planted along the higher mid and upper bank zones. Along many of the Agency's engineered channels the instream zone is in a 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 bank represent the longer term more permanent makeup of the riparian corridor and include the oaks (Q*uercus* 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. There are a number of ecological characteristics of invasive species that allow them to successfully invade native habitats and to rapidly colonize disturbed areas. Aggressive vegetative colonizers spread either from root or stump sprouts, underground rhizomes, plant fragments, or via air layering. Aggressive seeders produce copious amounts of seed annually and often have fruit that are eaten and dispersed by wildlife. Leaf litter builds up under the plant and inhibits undergrowth. Thick layers of this litter can change the chemical makeup of runoff and soils, and modify soil microbial and abiotic processes. Without proper management, the entire channel can become filled with fast-growing, invasive vegetation that further degrades habitat for native species 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 Figures 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 SMP goals for 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 the active channel edge zone (transitional border between in-channel and upland habitat), offers habitat functions and beneficial uses including creek shading, provides aesthetic value, and reduces the need for future in-channel and bank vegetation 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, as listed as Class 2 vegetation below in Section 3;
- 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. As indicated in Table E-1, 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. Table E-1 lists the mechanism by which invasive species displace native species and their growth tolerances. 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 (*Typha* sp.)
2. Himalaya blackberry (*Rubus discolor*)
3. Arroyo willow (*Salix lasiolepis*)
4. Giant reed (*Arundo donax*)
5. Pampas grass (*Cotaderia selloana*, and *C. jubata*)
6. Indian bean (*Catalpa bignoniodes*)
7. Privet (*Ligustrum* sp.)
8. English and Algerian ivy (*Hedera helix, H. canariensis*)
9. Periwinkle (*Vinca major*.)
10. Red clusterberry (*Contoneaster* sp.)
11. Brooms (*Spartium* and *Genista* spp.)
12. Sweet fennel (*Foeniculum vulgare*)
13. Harding grass (*Phalaris aquatica*)
14. Water primrose (*Ludwigia peploides montevidensis*)
15. Eucalyptus (*Eucalyptus* ssp.)
16. Tree of heaven (*Ailanthus altissima*)
17. Acacia (*Acacia* ssp.)
18. White poplar (*Populus alba*)
19. Lombardy poplar (*Populous nigra 'Italicia'*)
20. Tamarisk (Tamarix spp.)

21. Rattlebox (*Sesbania punicea)*

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[1] of bankfull flows[2].

3) Visually estimate existing channel roughness, vegetation growth conditions, and how much instream vegetation has grown since the previous year based on annual inspection records.

B. Assess specific in-channel vegetation conditions:

1) Identify the in-channel and bank vegetation types.

[1] Risk of bankfull flow considers if the bed elevation of the channel has aggraded by means of sediment deposition, such that the bankfull flow event (defined below) is at risk for overtopping the overall flood control channel.

[2] Bankfull flow" is a generic term describing a flow magnitude that occurs (in frequency) approximately between the annual and 2-yr flow event. This scale of flow event is often responsible for shaping the active channel form. As the flood control channels of the SMP were designed to accommodate large flood flows (typically toward the 100-yr design event), the bankfull flow event represents a "geomorphic shaping" flow event that creates inset forms such as small benches, point bars, or cut banks – within the much larger flood control channel.

The Table below lists Class 2 species that are particularly problematic from both flood control perspectives as well as in native landscapes.
The most significant habit or tolerance each species displays in SCWA flood control channels is marked in the columns.

Table E-1: Characteristics of Problematic (Class 2) Channel Vegetation

Species	Habit (tree, shrub, vine, herbaceous)	Zone (in-channel, side bank, upper bank)	Ecological Habits that Displace Natives[1]						Tolerances			
			Aggressive Vegetative Colonizer	Aggressive Seeder[2]	Alleopathic Leaf litter	Scandent)	Phreatophyte	High Evapotranspiration Rates	Shade	Scour	Saturated Soils	Drought
Cattails (*Typha* sp.)	herbaceous	In-channel	X	X			X	X		X	X	
Himalaya blackberry (*Rubus discolor*)	vine	In-channel, side banks, upper banks	X	X		X			X	X	X	X
Arroyo willow (*Salix lasiolepis*	tree, shrub	In-channel, side banks, upper banks	X	X			X	X		X	X	
Giant reed (*Arundo donax*)	herbaceous perennial	In-channel, side banks, upper banks	X			X		X		X	X	X
Pampas grass (*Cotaderia selloana*, and *C. jubata*)	herbaceous perennial	side banks, upper banks	X	X						X	X	X
Indian bean (*Catalpa bignoniodes*)	tree	In-channel, side banks		X				X			X	
Privet (*Ligustrum* sp.)	tree, shrub	side banks, upper banks	X	X	X				X			X
English and Algerian ivy (*Hedera helix, H. canariensis*)	vine	side banks, upper banks	X			X			X	X		X
Periwinkle (*Vinca major*)	herbaceous perennial	In-channel, side banks, upper banks	X			X			X	X	X	X
Red clusterberry (*Contoneaster* sp.)	shrub	side banks, upper banks	X	X (berries)		X						X
Brooms (*Spartium* and *Genista* spp.)	shrub	side banks, upper banks	X	X (long lived)					X		X	X
Sweet fennel (*Foeniculum vulgare*)	herbaceous perennial	side banks, upper banks	X	X								X

[1] There are a number of ecological characteristics these species have that allow them to successfully invade native habitats and to rapidly colonize disturbed areas. **Aggressive Vegetative Colonizers** spread either from root or stump sprouts, underground rhizomes, plant fragments, or via air layering. **Aggressive Seeders** produce copious amounts of seed annually and often have fruit that are eaten and dispersed by wildlife. **Alleopathic** (secondary metabolites, often toxic, made up of usually complex hydrocarbons left in the leaf when it drops) leaf litter builds up under the plant and inhibits undergrowth. Thick layers of this can change the chemical makeup of runoff and soils, and modify soil microbial and abiotic processes. **Scandent** plants can climb up other vegetation and arch over stream channels. Scandent plants can harm other plants by twisting around and constricting them. **Phreatophytes** are deep-rooted plants that obtains water from a permanent groundwater supply or from the water table.

Table E-1: Cont.

Species	Habit (tree, shrub, vine, herbaceous)	Zone (in-channel, side bank, upper bank)	Ecological Habits that Displace Natives[1]						Tolerances			
			Aggressive Vegetative Colonizer	Aggressive Seeder[2]	Alleopathic Leaf litter	Scandent)	Phreatophyte	High Evapotranspiration Rates	Shade	Scour	Saturated Soils	Drought
Harding grass (*Phalaris aquatica*)	herbaceous perennial	side banks, upper banks	X	X								X
Water primrose (*Ludwigia peploides montevidensis*)	herbaceous perennial	In-channel	X			X		X		X		
Eucalyptus (*Eucalyptus* ssp.)	tree	side banks, upper banks	X	X	X		X	X			X	X
Tree of heaven (*Ailanthus altissima*)	tree	side banks, upper banks	X	X	X				X		X	X
Acacia (*Acacia* ssp.)	tree	side banks, upper banks	X	X	X							X
White poplar (*Populus alba*)	tree	In-channel, side banks, upper banks	X	X	X		X			X	X	
Lombardy poplar (*Populus nigra 'Italicia'*)	tree	In-channel, side banks, upper banks	X		X		X			X	X	
Tamarisk (Tamarix spp.)	shrub	In-channel, side banks	X	X	X (salt buildup)		X	X			X	X
Rattlebox (*Sesbania punicea)*	shrub	In-channel, side banks		X					X	X	X	

Web Links for Additional Information	http://www.cal-ipc.org/about/index.php http://plants.usda.gov/ http://www.nbii.gov/portal/community/Communities/Geographic_Perspectives/California/ http://endeavor.des.ucdavis.edu/weeds/	http://www.teamarundo.org/ http://wric.ucdavis.edu/ http://www.sercal.org/ http://www.nature.nps.gov/biology/invasivespecies/index.cfm

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 such as ponding or bed scour. 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 (e.g., 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 though limbing or pruning. The rationale for removing a native tree is based on results from the vegetation assessment and consideration of management triggers as discussed in Sections 4.1 and 4.2, respectively.

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

Tree removal involves considering the tree in the context of its setting. This includes evaluating 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 the tree or not, and how does the tree fit with the long term vision for the channel vegetation and morphology. Consideration for individual tree removal or thinning (of any type) 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 (for example, Class 3 trees are preferable over Class 2 trees)? 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, such as refugia or foraging habitat?
- Does the tree under question provide longer-term canopy development or riparian corridor benefits?

The rationale to either thin, prune, or remove trees is 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, all types of trees (native or non-native) 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 (Class 1) 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. Class 3 vegetation (moderately acceptable non-native species) are managed on a case by case basis in the upper bank zone, based on an evaluation of the health of the tree, its contribution to the riparian corridor, and what else is growing nearby (see step B, bullet 4 of the vegetation assessment discussed in Section 4.1).

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. Similar to the upper bank zone, in the mid bank zone, Class 3 vegetation (moderately acceptable non-native species) are managed on a case by case basis, based on an evaluation of the health of the tree, its contribution to the riparian corridor, and what else is growing nearby (see step B, bullet 4 of the vegetation assessment discussed in Section 4.1). .

3) **Lower bank (toe of bank):** generally native (Class1) and Class 3 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) with the vegetation is excessively horizontal and blocking flows 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 (based on the vegetation assessment described in Section 4.1);
   - 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 Pacific 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. Non-native (Class 3) trees will not be relocated, but their vacated root structure sites will be treated as bank stabilization projects.

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 it 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. Consideration will also be given to the bank's orientation to sun exposure and how that may affect potential growth and shading conditions. 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 capacity 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. Again, the goal is to nurture growth of healthy native trees, so young red and Pacific willows will not be

pruned in a manner that would affect their health (i.e., young willows within the channel will not be pruned down to one stalk).

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 Class 2 and 3 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 habitat 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., Class 2 species such as 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 Pacific 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	1. Vegetation pruning and removal activities will be conducted under the guidance of a staff biologist or certified arborist and will follow the approaches of the Vegetation Management Plan (Appendix E of the SMP Manual). 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 (*Quercus* 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 (*Alnus* spp.) and cottonwoods (*Populus* spp.) are the second priority for preservation; these single-trunked species offer the benefit of improved flood conveyance and reduced roughness by comparison with multi-trunked species. 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, *phasing of remov*al 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. Where vegetation is removed from the active channel, removal will target nonnative species and removal of native species that are stiff and/or multi-trunked such as arroyo willow (*Salix lasiolepis*). Trees will never be topped as this encourages shrubby growth and weak branch attachments 6. Large woody debris, stumps, or root wads that are fully or partially buried and do not present a flood hazard shall be allowed to remain in place to provide habitat and to maintain bank stability. 7. If vegetation requires removal for access to project site, non-native species and/or quick growing species (Class 2 species) shall be targeted first and Class 3 species next for removal. Removal of native, mature Class 1 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	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. 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	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 removal and replanting with native species.

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

- This *Vegetation Management Plan* that is included as an appendix to the SMP Manual to provide specific guidance and direction on ways to avoid and minimize potential impacts when planning and implementing vegetation management activities. This *Vegetation Management Plan* describes the criteria and rationale used to identify and determine vegetation management actions and also describes 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:

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

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).

Williams, David B. 2001. Seattle's New-Look Park— keeping dying trees creates habitats for animals. Available: <http://findarticles.com/p/articles/mi_m1016/is_1_107/ai_78399946/print;%20http://www.islandnet.com/beaconhillpark/articles/111_wildlife_trees.htm>. Accessed: December 13, 2007.

Appendix F

OUTLINES FOR ANNUAL REPORTS

Appendix F-1

Outline for Annual Notification Report

Appendix F-1
OUTLINE FOR ANNUAL NOTIFICATION REPORT

1. Cover Letter

- Purpose and need for this year's projects.
- Permitting coordination – reference program permit numbers, agency compliance, etc.
- Reference programmatic guidance provided by SMP Manual (BMPs and impact avoidance measures).
- Schedule field visit.

2. Project List and Locations

A. Project List and Type

- Sediment Management Projects (reach, intermediate, localized)
- Bank Stabilization Projects

B. Project Site Locations General Information

Insert a table listing the following standard information:

- Project Site Name
- Creek
- Tributary to
- SMP Reach name and number
- United States Geological Survey (USGS) Quad, Township, Range, Section
- Latitude and Longitude

C. Project Setting and Resources

- Channel characterization sheets – insert from SMP Manual (Chapter 4) and/or updated sheets
- Results of site surveys for cultural resources
- Results of site surveys for presence of special-status plants

3. Project Activities

The following information summary tables will be provided for the various maintenance projects.

A. Sediment Management Projects

Project Site	Length (linear feet)	Volume Removed (cu. yds.)	Acres Disturbed: Waters of the U.S. (below OHWM)	Acres Disturbed: Temporary fill below OHWM	Acres Disturbed: Waters of the State
Reach Scale					
Project 1					
Project 2					
Intermediate Scale					
Project 3					
Project 4					
Localized Scale					
Project 5					
Project 6					
Project Totals					

B. Bank Stabilization Projects

Project Site	Length (linear feet)	Acres Disturbed: Waters of the U.S. (below OHWM)	Acres Disturbed: Waters of the State (entire project site)	Volume of Fill (cu.yds)	Treatment Approach (SMP Manual Figures 5-5, 5-6, or 5-7)
Example:					
Reach 5	60	0.01	0.02	160	Compacted Soil (Figure 5-5)
Totals					

C. Other Minor Activities

Textual description of other minor maintenance activities, such as trash and debris removal, that do not require fee payment.

4. Project Designs for Sediment Removal

Submit design drawings for each project. The drawings will display the following information:

- Project Profiles (existing conditions and the project design)
- Plan Views (existing conditions, OHWM, and the project design)
- Cross Sections (existing conditions and the project design)
- Sediment Sampling Locations (based on Appendix B *Sediment Sampling and Analysis Guidelines* and Regional Water Quality Control Board permit requirements)

5. Annual Mitigation Plan

a. On-Site Mitigation Activities (Tier 1)

Description of planned on-site restoration and enhancement activities.

b. Off-Site Mitigation Activities (Tiers 2 and/or 3)

Description of planned restoration or enhancement activities at other SCWA channels or properties.

Tables containing details of candidate off-site mitigation projects, including the project name, partners, cost, length, and area of mitigating activities. Tables 5A and 5B are examples of how this information will be presented (these are based on similar tables submitted in the interim 2007-2008 permit applications).

Table 5A. Summary of Maintenance Costs and Off-Site Mitigation Contributions

Project	Cost	10% Off-Site Mitigation Contribution
[Year] Maintenance Projects		
Reach Scale Sediment Removal Projects		
Example:		
Coleman Reach X	$81,806	$8,181
Hinebaugh Reach Y and Z	$358,000	$35,800
Localized Sediment Removal Projects		
Copeland Reach V	$9,007	$901
College Reach S	$11,275	$1,128
Airport Reach X	$11,275	$1,128
Ducker Reach Y	$13,828	$1,383
Bank Repair Projects		
Gossage Reach Z	$12,939	$1,294
Total	**$498,130**	**$49,813**
[Year] WPP Mitigation Projects		
Erosion control project at X-Ranch, supported by Ranch Partners, RCD, and Friends of Y-Creek		$31,000
Friends of Y-Creek, restoration activities on the Upper Laguna de Santa Rosa Channel		$17,800
WPP Project Fund		$1,013
Total		**$49,813**

Table 5B. Accounting of Impacts and Mitigation (example)

Project and Type	Impact	Mitigation	Ratio of Mitigation to Impact
Maintenance Projects			
Project 1 – reach-scale sediment removal	0.75 ac		
Project 2 – reach scale sediment removal	0.50 ac		
Project 3 – bank stabilization	0.20 ac		
Total	**1.45 acres**		
Mitigation Projects			
Project 1 (on-site)		0.75 ac	
Project 2 (on-site)		0.50 ac	
Project 3 (on-site)		0.20 ac	
WPP Project 1 (off-site)		0.5 acres	
WPP Project 2 (off-site)		0.5 acres	
Total		**2.45 acres**	
Ratio of Mitigation to Impact			**1.7:1**

6. Annual Sediment Disposal Plan

a. Identify this year's sediment disposal options and available capacity at each. Identify the preferred site. Include a map showing site location.

b. Identify sediment sampling locations and methodology following the *Sediment Sampling and Analysis Guidelines* (Appendix B of SMP Manual).

c. Obtain sediment samples from the maintenance sites and the proposed disposal site, if appropriate.

d. Obtain disposal site suitability documentation (as needed - CEQA, permitting, landowner agreements, etc.)

e. Submit sample results from maintenance sites and proposed disposal site to Regional Water Quality Control Board.

f. Proceed with disposal upon receipt of approval from the Regional Water Quality Control Board.

7. Permit Fees

a. 401 Certification (dredge and fill fee)

b. DFG 1602 fees (based on total project cost)

8. Submittal Confirmation

Record date notification package sent to agencies.

Appendix F-2

Outline for Annual Post-Maintenance Summary Report

Appendix F-2

OUTLINE FOR ANNUAL POST-MAINTENANCE SUMMARY REPORT

1. Cover Letter

General introduction, including year of permitting program.

Reference existing program permit numbers and authorizations received during the notification period.

2. Summary of Work Completed

- Table summarizes maintenance work completed during previous year. Confirms that projects were not completed (explain ones that were not), and confirms that activities were conducted according to project description. Notes/comments used to explain any differences.

Maintenance Project	Length (linear feet)	Volume Removed (cu. yds.)	Project Complete?	Project Conducted According to Notification Report?	Comments
Project 1	750	2,500	Yes	Yes	
Project 2	500	1,200	No	No	Project half completed. Will be finished in 2011.
Project 3	250	800	Yes	Yes	

- Cumulative SMP maintenance activities on sensitive creeks with restrictions will be documented/tracked and a summary table provided. Tracking of cumulative SMP activities is important to demonstrate compliance with programmatic permits that have restrictions/conditions, such as Russian River BO conditions. Example table below uses hypothetical creek conditions.

Creek Name	Permitting Condition from Russian River BO (NMFS, 2008)	Current Year SMP Activities	Total SMP Maintenance Activities on Creek to Date	Remaining Available Maintenance Activities on Creek
Santa Teresa Creek	4 times in 15-yr RRBO term 2,000 ft. max maintenance in any one year	1,500 reach-scale sediment removal project	1	3

- Site photo sheets (1-2 before and after photos per site) documenting conditions pre- and post-maintenance

3. Sediment Disposal Summary

Summary quantities of sediment disposed off-site and disposal locations (and acres affected, if applicable). Reference *Annual Sediment Sampling Report* for results of sediment testing.

Sediment Disposal Site	Volume Disposed (cu.yds.)	Comments
Site A	XX	Sediment from project sites near Rohnert Park taken here.
Site B	XX	Sediment from project sites near Santa Rosa taken here.
Total Disposed	XX	

4. Confirmation of Avoidance, Minimization, and Best Management Measures

Discussion of implementation of avoidance/minimization and BMP measures. Review list of BMPs and identify additional minimization actions that were implemented as a result of site conditions or other unexpected issues.

Examples:

- Were any sensitive species or other sensitive resources encountered during maintenance? If so, how was this handled, and what impact avoidance steps were taken?
- Did any hazardous spills or other threats to water quality occur? If so, what actions were taken to remedy the situation?

5. Mitigation Activities Implemented in Year 20XX

Summarize on-site and off-site mitigation activities that were implemented. Was mitigation implemented as stated in the notification package? If not, why.

6. On-going Program Mitigation Monitoring

Program mitigation monitoring includes 5-year observation, recording, and tracking of all mitigation sites. Photos will be provided in annual report to document progress as well as provide regulatory compliance documentation.

- A master table (example below) will be included to track all SMP mitigation sites, including off-site mitigation projects.
- Mitigation site photo sheets will be updated and submitted with report. An example layout for these photo sheets is provided below.

Year of Implementation	Mitigation Project	Year Created	Current Monitoring Year	Remaining Years of Monitoring	Evaluation of Mitigation Sufficiency	Mitigation Photo Reference
2008	On-site Project 1	2007	2	3		Photo A on

						sheet 1
	On-site Project 2					
	WPP Project 1					
2009	Project 1	2008	1	4		
	Project 2					
	Project 3					
2010		2009				

Photo Sheet for Mitigation Project 1			
[photo]	[photo]	[photo]	[photo]
Photo A. Mitigation Project X Initiation (month, year)	Photo B. Project X Year 1 (month, year)	Photo C. Project X Year 2 (month, year)	Photo D. Project X Year 3 (month, year)
[photo]	[photo]		
Photo E. Project X Year 4 (month, year)	Photo F. Project X Year 5 (month, year)		

7. Recommended SMP Revisions or Updates (if needed)

Potential revisions or updates to maintenance methods

Potential revisions or updates to BMPs

8. Anticipated Future Maintenance Activities (if known)

Projects that didn't finish this year

Anticipated projects for next year

Appendix F-3

Outline for Sediment Sampling Report

Appendix F-3
OUTLINE FOR SEDIMENT SAMPLING REPORT

1. Sediment Sampling Approach and Methodology

- List of annual projects, project types, and quantity and characteristics of sediment to be removed (verify that the number of samples obtained from each site complies with the requirements of the RWQCB permits)
- Map showing project sampling locations
- Attach sample logs (exact location, date, collection method, sample depth)

2. Proposed Disposal or Reuse Site Conditions

- Site location address and map showing sediment sampling locations
- Site history and plans for future use of the site
- Available capacity for disposal or reuse
- Use of sediment after placement

3. Summary of Test Results

- Attach full laboratory reports and gas chromatographs

4. Discussion of Results and Conclusions

- Explain test results and any unusual results

5. Disposal Site Request Letter

- Purpose of this letter is to request approval of an identified disposal or reuse site where sediment extracted during stream maintenance activities can be taken. This request is in specific response to requirements of Regional Water Quality Control Board (RWQCB) permits for the Stream Maintenance Program.
- Submit to North Coast and/or San Francisco Bay RWQCB for Executive Officer consideration of approval. Executive Officer approval must be granted before the site can be utilized for sediment disposal.
- Reference SMP Discharge Order number.
- Briefly describe the proposed disposal or reuse site.
- Attach supporting documentation (items 1-4 above)