

# Memorandum

**Project:** Santa Clara Valley Water District - Stream Maintenance Program

**Subject:** Mitigation Approach for 2012-2022 SMP Update

**Date:** July 29, 2011

**To:** Members of the SMP Inter Agency Working Group (IAWG)

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## 1. Purpose and Overview

The Santa Clara Valley Water District (SCVWD or District) implements its Stream Maintenance Program (SMP) to ensure that District streams and channels provide flood management functions. The District operates the SMP to balance flood management objectives while also seeking to protect and enhance natural resources. The purpose of this memorandum is to summarize the SMP’s existing mitigation program and describe updates to the mitigation program that support the 2012 SMP Update process. As described in Sections 2 and 3 below, the existing SMP programmatic mitigation program was developed in 2002 to include defined “up front” programmatic mitigation for sediment removal and vegetation management activities. This original programmatic mitigation continues to serve the SMP in perpetuity for maintenance activities and work areas identified in the 2002 program work projections. Sections 4 and 5 describe the proposed approach to address programmatic mitigation needs for sediment removal and vegetation management activities in “new” work areas, that is, locations where work was not projected or conducted during the 2002-2011 period. In addition, mitigation for potential impacts to special status species is described in Section 6. The mitigation approach for bank stabilization activities, provided in Section 7, has not changed significantly since 2002, but some treatment techniques have been refined based on implementation experience since 2002. Mitigation monitoring and reporting requirements are summarized in Section 8.

The organization of this memorandum is summarized as follows:

Section 1	Purpose and Overview
Section 2	Background
Section 3	Summary of Existing SMP Programmatic Mitigation
Section 4	2012 SMP Update and Mitigation Approach
Section 5	Mitigation for New Sediment Removal and Vegetation Management Work Areas 2012-2022
Section 6	Species Targeted Habitat Mitigation
Section 7	Bank Stabilization Mitigation
Section 8	Mitigation Monitoring and Reporting

The District remains committed to providing adequate and effective mitigation for resulting SMP impacts. This memorandum includes some new approaches in how mitigation requirements are identified and tracked. However, all mitigation objectives and activities are consistent with the existing mitigation program that has been in operation since 2002.

## **2. Background**

In 2002, the District initiated the SMP as a comprehensive multi-year effort to maintain its flood protection channels and associated facilities. Core SMP activities include sediment removal, vegetation management, bank stabilization, management of animal conflicts, and minor maintenance. The primary objective of sediment removal and vegetation management activities is to provide necessary flow conveyance capacity in the District's channels as well as to maintain the functional integrity of its stream facilities and provide ancillary protection such as fire protection. The primary objective of bank stabilization and management of animal conflicts activities is to repair or preserve stable streambanks and levees under the District's jurisdiction. As designed and implemented, the SMP also included several steps to protect and preserve natural resources along the riparian and stream corridors in the program area.

The District conducted CEQA analysis and compliance in 2001/02 and obtained several long-term programmatic permits with resource and regulatory agencies including the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Regional Water Quality Control Board (RWQCB, San Francisco Bay and Central Coast Regions), California Department of Fish and Game (DFG), and the Bay Conservation and Development Commission (BCDC).

Most of the programmatic permits authorizing SMP activities during the first decade of the program will expire in 2012. The SCVWD is currently reviewing SMP operations, updating the SMP program manual,

conducting a complete CEQA review of the SMP, and renewing its long-term permits.

For the SMP, compensatory mitigation is one element of a comprehensive impact avoidance, minimization, and compensation approach. Project planning, resource evaluations, and exclusionary practices are used to avoid impacts from maintenance activities. Best Management Practices (BMPs) are applied on-site to further minimize impacts. Residual impacts that are neither adequately avoided nor minimized may require compensatory mitigation depending upon the nature of the impact and the regulatory authority involved. In 2002 the District established the following goal for the SMP's compensatory mitigation program:

*"The Stream Maintenance Program compensatory mitigation program should establish an optimal set of mitigation strategies, a combination of components that best balance opportunity, feasibility, and cost to provide the maximum benefit to the natural functions of the watersheds and streams of Santa Clara County." (Source: SCVWD Stream Maintenance Program Document, 2002)*

### **3. Summary of Existing SMP Programmatic Mitigation**

The SMP's existing programmatic mitigation for sediment removal and vegetation management is based on a comprehensive accounting in 2002 of the potential impacts from maintenance activities on in-stream wetlands, tidal wetlands, riparian vegetation, and other sensitive habitats in the program area. Table 1 summarizes the existing mitigation requirements for on-going SMP activities. The SMP mitigation program includes land acquisition, habitat protection, wetland restoration/creation, and invasive vegetated species control activities to mitigate for maintenance activities. The mitigation elements shown in Table 1 provide mitigation in perpetuity for projected SMP maintenance activities that were identified in the 2002 SMP.

Impacts from other non-projected maintenance activities such as bank stabilization projects are mitigated on an "as-needed" basis using defined mitigation ratios as maintenance projects occur. Bank stabilization mitigation is discussed below in Section 7.

As shown in Table 1, to date not all of the SMP's mitigation requirements have been met. The District is committed to completing all remaining mitigation requirements. The District continues to pursue land acquisition opportunities for Stream and Watershed Protection. In addition, a proposed project to restore wetland at Laguna Seca is currently under technical review. If feasible, this project could provide some or all of the remaining needed wetland mitigation credit.

The mitigation requirements shown in Table 1 were established in 2002 based on the maximum SMP work projections at that time. The actual amount of sediment removal work conducted during the 2002-2012 period was 371,292 cubic yards (cu-yd), which is about 47% of the total sediment removal volume of 795,600 cu-yd projected in 2002. Or, in terms of length, 32.3 miles of sediment removal have been conducted to date, about 56% of the 2002 projected length of 58 miles. Completed vegetation management activities since 2002 have been more consistent with the original work projections.

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As shown in Table 1, 30 acres of required tidal wetland mitigation for the program have been completed. This is approximately 21 acres greater than the mitigation that would have been required based on the area of tidal wetland impacted to date. The District is proposing to use the 21+ acres already provided as mitigation as credit toward future tidal habitat impacts that are not yet identified or accounted for. The smooth cordgrass control mitigation component compensates for the time-lag between immediate impacts to tidal wetlands from SMP activities and the delay in the creation of a functional tidal wetland mitigation project. The smooth cordgrass control mitigation requirement is complete. Freshwater wetland mitigation in the Santa Clara Basin is not yet complete, but in the Pajaro Basin, freshwater wetland impacts have been mitigated fully. As described above, the SCVWD is committed to completing the mitigation requirements assigned for the 2002 program work projections.

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**Table 1.** Existing SMP Mitigation Program

Mitigation Type	Mitigation Purpose	Mitigation Requirement	Mitigation Completed to Date	Percent of Requirement Completed*
Tidal Wetland Restoration	Restore Bay salt ponds to tidal marsh conditions, provides mitigation for tidal wetland impacts.	30 acres	30 acres	100%
Freshwater Wetland Creation/ Restoration	Convert or restore areas to seasonal or perennial wetlands, provides mitigation for non-tidal wetland impacts.	10 ac Santa Clara Basin 4 ac Pajaro Basin	7ac Santa Clara Basin 4ac Pajaro Basin	70% Santa Clara Basin 100% Pajaro Basin
Stream and Watershed Protection	Preserve, protect, and improve streams and associated watersheds, provides mitigation for non-tidal wetland and CRLF impacts	Freshwater wetland habitat: <ul style="list-style-type: none"> <li>▪ 820-1080 ac acquired (81 ac credit) for Santa Clara Basin</li> <li>▪ 11 ac credit for Pajaro Basin</li> <li>▪ CRLF Habitat - 108 ac credit District wide</li> </ul>	Freshwater wetland habitat: <ul style="list-style-type: none"> <li>▪ 10 ac credit (125 ac total) for Santa Clara Basin</li> <li>▪ 11 ac credit (138 ac total) for Pajaro Basin</li> <li>▪ CRLF Habitat – 56 ac credit Santa Clara Basin</li> </ul>	<ul style="list-style-type: none"> <li>▪ 12% Santa Clara Basin</li> <li>▪ 100% Pajaro Basin</li> <li>▪ 52% CRLF Habitat</li> </ul>
Giant reed ( <i>Arundo donax</i> ) Control	Control giant reed outbreaks; map, revegetate, educate, and coordinate reed control efforts in County.	125 ac District wide	116 ac District wide	93%
Invasive smooth cordgrass Control ( <i>Spartina alterniflora</i> )	Control Invasive Cordgrass along tidal shorelines, provides mitigation for time lag until tidal wetland mitigation is established	Up to 10 acres in tidal areas	10 acres	100%

\*Does not include monitoring period and achievement of final success criteria.

#### **4. 2012 SMP Update and Mitigation Approach**

##### **4.1 New Work Areas for Sediment Removal and Vegetation Management**

The SMP employs a variety of impact avoidance and minimization steps to reduce the likelihood of impacts resulting from maintenance, and to avoid/reduce the magnitude or intensity of impacts if they should occur. The SMP also includes detailed Best Management Practices (BMPs) to avoid and minimize potential impacts caused by maintenance activities. The program's impact avoidance, minimization, and BMP measures are described in the SMP Manual and the 2012 SMP Update SEIR. However, in some cases, there are residual impacts from maintenance activities that are not fully reduced through the application of avoidance, minimization, and BMP measures. Residual impacts are those impacts that may require compensatory mitigation, depending upon regulatory agency jurisdiction and authority. Establishing the existing SMP mitigation approach involved projecting potential work activities for sediment removal and vegetation management, and on that basis, mitigation requirements were developed (as shown in Table 1). Additional description of program impacts, focused to conditions for special status species, are provided in the Biology section of the EIR. The Biological Opinions (BOs) for the 2012 SMP Update to be issued by NMFS and USFWS, the USACE Section 404 permit, and the CDFG Section 2081 and streambed alteration agreement may result in refinements of some of the mitigation approaches described here, but any refinements will result in mitigation measures being equally or more effective.

The 2012 SMP Update involves new maintenance work areas. These new maintenance areas are identified in the series of maps presented in Chapter 2 (*Project Description*) of the SMP Update SEIR. Table 2 lists the creeks where new maintenance work activities will occur. If a creek is listed in Table 2, it does not mean that the whole creek is subject to maintenance activities, but that maintenance activities may occur in the creek as indicated in the blue segments of the maps of Chapter 2 of the SEIR. Potential residual impacts from maintenance that require mitigation in new work areas are similar in nature to the potential impacts that were identified in the original SMP EIR (2002). While the existing SMP program mitigation will continue to serve as mitigation for work conducted in the same work category (e.g., sediment removal, vegetation management) in the original work areas identified in the 2002 SMP, additional mitigation is now required for the new work areas.

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**Table 2.** SMP 2012-2022 New Work Areas by Watershed and Creek

Watershed	Creek	Sediment Removal	Herbicide Instream	Instream Other Vegetation Removal	Herbicide Non-Instream	Non-Instream Other Vegetation Removal
<b>Coyote Watershed</b>						
	BERRYESSA CREEK	x	x	x	x	x
	CALERA CREEK	x	x	x	x	x
	COCHRAN CHANNEL				x	
	COYOTE BYPASS				x	x
	COYOTE CREEK	x	x	x	x	x
	COYOTE CREEK SECONDARY CHANNEL				x	x
	EVERGREEN CREEK			x	x	
	FISHER CREEK	x	x			
	FLINT CREEK		x		x	
	LOS COCHES CREEK	x	x		x	x
	LOWER PENITENCIA CREEK	x	x	x		x
	LOWER PENITENCIA CREEK SECONDARY CHANNEL	x				
	LOWER SILVER CREEK	x	x		x	
	MIGUELITA CREEK	x	x	x	x	x
	NORTH BABB CREEK	x	x		x	
	NORWOOD CREEK	x	x		x	
	PIEDMONT CREEK		x		x	
	QUIMBY CREEK	x			x	
	RUBY CREEK		x		x	
	SIERRA CREEK	x	x		x	
	SOUTH BABB CREEK		x		x	
	THOMPSON CREEK		x	x	x	x
	TULARCITOS CREEK		x		x	
	UPPER PENITENCIA CREEK	x	x	x	x	x
	UPPER SILVER CREEK	x			x	x
<b>Guadalupe Watershed</b>						
	ALAMITOS CREEK	x	x		x	x
	ALAMITOS DIVERSION CHANNEL	x	x		x	
	CALERO CREEK	x	x	x	x	x
	DAVES CREEK		x		x	
	EAST ROSS CREEK				x	
	GOLF CREEK	x	x		x	
	GREYSTONE CREEK				x	x
	GUADALUPE BYPASS 2	x				
	GUADALUPE BYPASS 3	x				
	GUADALUPE BYPASS 4	x				
	GUADALUPE CREEK	x				
	GUADALUPE RIVER	x	x		x	
	GUADALUPE SECONDARY	x				

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Watershed	Creek	Sediment Removal	Herbicide Instream	Instream Other Vegetation Removal	Herbicide Non-Instream	Non-Instream Other Vegetation Removal
	CHANNEL					
	KIRK DISTRIBUTION SYSTEM				X	
	LOS GATOS CREEK	X	X		X	X
	LYNDON CANYON CREEK					
	MCABEE CREEK			X		X
	PAGE DISTRIBUTION SYSTEM UPPER				X	
	RANDOL CREEK		X		X	
	ROSS CREEK	X	X		X	X
	SANTA TERESA CREEK				X	
	WEST BRANCH RANDOL CREEK		X		X	
<b>Lower Peninsula Watersheds</b>						
	ADOBE CREEK	X	X			
	BARRON CREEK	X			X	
	BARRON DIVERSION CHANNEL					X
	DEER CREEK		X		X	
	HALE CREEK	X			X	
	HENEY CREEK					X
	MATADERO CREEK	X	X		X	
	PERMANENTE CREEK		X		X	
	PERMANENTE DIVERSION CHANNEL		X			
	PROSPECT CREEK				X	
	SAN FRANCISQUITO CREEK	X			X	X
	STANFORD CHANNEL					
	STEVENS CREEK	X	X		X	
<b>Uvas/Llagas Watersheds</b>						
	BODFISH CREEK	X		X		X
	CORRALLITOS CREEK		X			
	EAST LITTLE LLAGAS CREEK	X	X	X	X	
	EDMUNDSON CREEK		X			
	LIONS CREEK		X			
	LLAGAS CREEK	X	X		X	
	LOWER MILLER SLOUGH		X		X	
	MADRONE CHANNEL	X	X		X	
	MATADERO CREEK			X		
	NORTH MOREY CHANNEL		X		X	
	PAJARO RIVER				X	
	PRINCEVALLE DRAIN		X	X	X	
	SOUTH MOREY CHANNEL	X	X		X	
	TENNANT CREEK				X	
	UPPER MILLER SLOUGH		X		X	
	UVAS CARNADERO CREEK	X	X		X	

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Watershed	Creek	Sediment Removal	Herbicide Instream	Instream Other Vegetation Removal	Herbicide Non-Instream	Non-Instream Other Vegetation Removal
	WEST BRANCH LLAGAS CREEK				x	
	WEST LITTLE LLAGAS CREEK		x		x	x
<b>West Valley Watersheds</b>						
	CALABAZAS CREEK	x	x	x	x	x
	DAVES CREEK		x		x	
	GUADALUPE SLOUGH				x	
	MISTLETOE CREEK				x	
	PROSPECT CREEK		x		x	
	REGNART CREEK	x	x		x	
	RODEO CREEK				x	x
	SAN TOMAS AQUINO CREEK	x	x		x	x
	SARATOGA CREEK	x	x		x	x
	SMITH CREEK		x			
	SUNNYVALE EAST CHANNEL	x	x			x
	SUNNYVALE WEST CHANNEL		x		x	x
	WILDCAT CREEK	x		x	x	

Table 3 summarizes sediment removal maintenance activities for the 2012-2022 period. Estimated sediment removal activities may include up to 43 miles of creeks and canals in the program area, with approximately 35.4 miles in the Santa Clara Basin and 7.4 miles in the Pajaro River Basin. For the 2012-2022 work period, there are about 19 miles of new channel areas with projected sediment removal work where work was not previously projected during the 2002-2012 period. There is about 15 miles of channel where sediment removal work was previously conducted (2002-2012), but work is not projected in those locations for the 2012-2022 period. In sum, the 2012 SMP Update process is adding about 4.2 miles of channel length for sediment removal activities.

**Table 3.** Estimated SMP Sediment Removal Activities (2012-2022)

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

## 4.2 Identifying Mitigation Based on Actual Work Conducted

The District identified the 2012 new work areas based on its current understanding of maintenance needs for the coming 10-year period. However, as observed during the 2002-2012 work period, it is highly unlikely that all of the identified potential work areas will have actual work conducted. Because of this issue, and the potential inaccuracy of using projected work estimates developed in 2009-2011 as a basis for defining mitigation requirements until 2022, the District is now adjusting its approach in how mitigation requirements are identified. The District is shifting its approach to using the actual work areas (versus work area projections) as the final basis for mitigation requirements in new work areas.

The 2012-2022 maintenance work projections provided in the 2012 SMP Update SEIR are still reasonable and very useful estimates of where work will be conducted. The projections represent the District's best estimate of where work will occur. The work projections are "conservative" in that it is likely that work will not occur in all of the newly identified reaches shown in the maps of Chapter 2 of the SEIR. The work projections are a useful basis to consider potential impacts to wetlands and other habitats and develop a suitable mitigation approach that can guide the next decade of the program.

As a result of this revised approach, there are three key changes to the existing programmatic mitigation program (for sediment removal and vegetation management) for the 2012 SMP Update:

1. **Ecologic Services.** In addition to land acquisition-based mitigation projects that provide mitigation in perpetuity (i.e., mitigate for repeat impacts in the same work location), programmatic mitigation for sediment removal and vegetation management will now also include ecologic services-based mitigation projects for individual maintenance projects.<sup>1</sup> These approaches (described in Section 5 below) provide mitigation on a "pay as you go" or incremental basis. Ecologic services-type mitigation projects would only mitigate for an individual work activity. Service-based "pay as you go" mitigation would be identified annually based on the annual maintenance workplan (provided in the annual Notice of Proposed Work - NPW) and verified in the end of year annual Post Construction Report (PCR).
2. **Project Specific Accounting.** Rather than identifying all the necessary mitigation areas (acreages) for sediment removal and vegetation management activities "up front" in 2012 for the new work areas where maintenance will occur between 2012 and 2022, mitigation criteria and metrics will be identified by standard unit measures (typically acreages). The specific extent of mitigation required for any given year's work will be defined annually when the work areas are precisely identified. This annual mitigation analysis will clearly distinguish mitigation requirements for new work areas from mitigation already accomplished for work in areas

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<sup>1</sup> "Ecological services mitigation" refers to mitigation which is not based on land acquisition and management, but instead involves actions to improve the ecological and habitat quality at a given site – for instance, through invasive species removal or ecological restoration.

projected in 2002.

3. **New Programmatic Mitigation.** In addition to the mitigation approaches described above, the District will provide additional programmatic habitat mitigation through the instream complexity and gravel augmentation mitigation programs.

These three adjustments to the mitigation program are further described in Section 5 below. The District will be able to use “pay as you go” mitigation projects/services to provide incremental mitigation annually on an as-needed basis. The District can also continue to purchase lands to provide longer-term mitigation needs. In this way, the District will now have more flexibility to pursue suitable mitigation opportunities through either long-term land acquisition or annual mitigation project approaches. It is also noted that mitigation credits from the 2002 SMP mitigation program (Stream and Watershed Protection) may potentially be applied to new work areas in need of mitigation support. The District would work with the appropriate regulatory staff to identify, review, and approve the potential application of existing mitigation credit toward new SMP work areas.

It is important to note that the location and extent of bank stabilization activities are difficult to predict and have never been projected work activities. Since 2002, bank stabilization projects that require mitigation have been mitigated using an annual assessment and “pay as you go” incremental mitigation process. For bank stabilization projects, identifying impacts and necessary mitigation will continue to occur annually depending on what bank work is needed. Section 7 of this memorandum describes bank stabilization mitigation in more detail.

#### **4.3 Estimated Wetland and Riparian Habitat Impacts for Maintenance Areas**

Table 4 identifies all of the projected areas (not just the new areas) of impact for SMP activities in non-tidal areas to the following riparian vegetation and wetland habitats: woodlands, herbaceous (non-wetlands), wetlands (impacted by instream sediment removal), aquatic wetlands, herbaceous wetlands, shrubs, and other miscellaneous habitats. The District’s vegetation based habitat classification system is summarized in Appendix A. The classification system is based on hydromorphic and mesomorphic classes, with sub-units depending on formation, macrogroup, alliance, and wetland presence. Table 5 is a similar estimate of projected impacts for work in tidal areas. For both Table 4 and Table 5, impacts are identified for the main SMP work activities, including: sediment removal, herbicide, hand removal, discing, mowing, and hand pruning activities. These activities are described in the revised 2012 SMP Manual. Potential impacts are also identified by the principal District watersheds: Lower Peninsula, West Valley, Guadalupe, Coyote, and Pajaro. These watersheds are identified in the maps of Chapter 2 of the 2012 SMP Update SEIR.

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**Table 4.** Projected Impacts by Habitat Type and Activity, non-tidal reaches (acres)

Watershed	Activity Type	Habitat Type						
		Woodlands	Herbaceous (non-wetland)	Sediment Wetland	Aquatic (wetland)	Herbaceous (wetland)	Shrub	Misc.
Lower Peninsula	Sediment Removal	3.587	0.51	2.200	0.000	0.625	0.000	4.084
	Herbicide	6.52	3.253	na	0.000	0.209	0.262	7.765
	Hand Removal	0.064	0.000	na	0.000	0.000	0.000	0.002
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Mowing	0.967	2.659	na	0.000	0.008	0.025	0.604
	Hand Pruning	0.139	0.011	na	0.000	0.000	0.000	0.084
<i>Lower Peninsula Subtotal</i>		<i>11.277</i>	<i>6.433</i>	<i>2.200</i>	<i>0.000</i>	<i>0.842</i>	<i>0.287</i>	<i>12.539</i>
West Valley	Sediment Removal	2.065	3.227	8.530	0.000	0.798	0.059	1.426
	Herbicide	22.639	31.329	na	0.000	2.066	0.321	25.161
	Hand Removal	0.076	0.01	na	0.000	0.000	0.005	0.005
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Mowing	1.816	7.644	na	0.000	0.314	0.000	0.358
	Hand Pruning	0.225	0.056	na	0.000	0	0.001	0.102
<i>West Valley Subtotal</i>		<i>26.821</i>	<i>42.266</i>	<i>8.530</i>	<i>0.000</i>	<i>3.178</i>	<i>0.386</i>	<i>27.052</i>
Guadalupe	Sediment Removal	31.89	5.199	14.640	0.000	1.091	2.405	13.654
	Herbicide	42.051	65.511	na	0.000	1.916	1.782	19.619
	Hand Removal	0.237	0.052	na	0.000	0.001	0.015	0.004
	Discing	0.071	1.15	na	0.000	0.000	0.000	0.000
	Mowing	25.006	20.909	na	0.000	1.242	2.914	15.517
	Hand Pruning	0.221	0.046	na	0.000	0.001	0.000	0.003
<i>Guadalupe Subtotal</i>		<i>99.476</i>	<i>92.867</i>	<i>14.640</i>	<i>0.000</i>	<i>4.251</i>	<i>7.116</i>	<i>48.797</i>
Coyote	Sediment Removal	45.564	9.472	28.090	0.009	0.786	2.031	4.702
	Herbicide	30.24	137.874	na	0.001	34.432	1.299	33.286
	Hand Removal	3.175	0.993	na	0.000	0.036	0.069	0.262
	Discing	1.287	5.199	na	0.000	0.635	0	0.226

**Table 4.** Projected Impacts by Habitat Type and Activity, non-tidal reaches (acres)

Watershed	Activity Type	Habitat Type						
		Woodlands	Herbaceous (non-wetland)	Sediment Wetland	Aquatic (wetland)	Herbaceous (wetland)	Shrub	Misc.
	Mowing	8.151	20.502	na	0.000	0.000	0.567	1.776
	Hand Pruning	11.27	3.138	na	0.000	0.045	0.188	0.586
	<i>Coyote Subtotal</i>	<i>99.687</i>	<i>177.178</i>	<i>28.090</i>	<i>0.010</i>	<i>35.934</i>	<i>4.154</i>	<i>40.838</i>
SF Basin Total	Sediment Removal	83.106	18.408	53.460	0.009	3.300	4.495	23.866
	Herbicide	101.450	237.967	na	0.001	38.623	3.664	85.831
	Hand Removal	3.552	1.055	na	0.000	0.037	0.089	0.273
	Discing	1.358	6.349	na	0.000	0.635	0.000	0.226
	Mowing	35.940	51.714	na	0.000	1.564	3.506	18.255
	Hand Pruning	11.855	3.251	na	0.000	0.046	0.189	0.775
	<b>SF Basin Total</b>	<b>237.261</b>	<b>318.744</b>	<b>53.460</b>	<b>0.010</b>	<b>44.205</b>	<b>11.943</b>	<b>129.226</b>
Pajaro Basin Total	Sediment Removal	5.99	10.763	9.810	0.000	0.022	0.038	3.743
	Herbicide	49.097	86.642	na	0.268	1.083	0.579	10.719
	Hand Removal	4.173	2.239	na	0.047	0.276	0.037	0.442
	Discing	1.731	8.584	na	0.000	0.000	0.000	10.596
	Mowing	12.865	36.979	na		0.286	0.000	6.494
	Hand Pruning	2.334	4.007	na		0.005	0.037	0.111
	<b>Pajaro Basin Total</b>	<b>76.190</b>	<b>149.214</b>	<b>9.810</b>	<b>0.315</b>	<b>1.672</b>	<b>0.691</b>	<b>32.105</b>

Source: SCVWD, 2011

- Notes:
1. Includes areas that were also projected for maintenance (and/or maintenance was conducted) during the 2002-2012 period
  2. Acreages are shown for the total projection of each work activity type, this includes acreages for overlapping work activities at the same location, so potential impacts are over represented.
  3. Acreages incorporate the work area percentage estimate to account for varying work amounts within a reach.
  4. Miscellaneous habitat type includes features/elements as shown in Appendix A (Vegetation Classification System)

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**Table 5.** Projected Impacts by Habitat Type and Activity, tidal reaches (acres)

Watershed	Activity Type	Habitat Type						
		Woodlands	Herbaceous (non-wetland)	Sediment Wetland	Aquatic (wetland)	Herbaceous (wetland)	Shrub	Misc
Lower Peninsula	Sediment Removal	3.704	0.971	0.370	0.000	0.316	0.069	2.539
	Herbicide	0.000	0.001	na	0.000	0.000	0.000	0.001
	Hand Removal	0.139	0.000	na	0.000	0.000	0.000	0.000
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Mowing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Hand Pruning	0.000	0.000	na	0.000	0.000	0.000	0.000
	<i>Lower Peninsula Subtotal</i>		<i>3.843</i>	<i>0.972</i>	<i>0.370</i>	<i>0.000</i>	<i>0.316</i>	<i>0.069</i>
West Valley	Sediment Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Herbicide	0.048	0.294	na	0.000	0.337	0.000	0.57
	Hand Removal	0.000	0.000	na	0.000	0.000	0.000	0.000
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Mowing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Hand Pruning	0.000	0.000	na	0.000	0.000	0.000	0.000
	<i>West Valley Subtotal</i>		<i>0.048</i>	<i>0.294</i>	<i>0.000</i>	<i>0.000</i>	<i>0.337</i>	<i>0.000</i>
Guadalupe	Sediment Removal	2.82	17.302	18.080	0.000	1.611	0.069	1.892
	Herbicide	0.000	0.000	na	0.000	0.021	0.000	0.000
	Hand Removal	0.000	0.000	na	0.000	0.000	0.000	0.000
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Mowing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Hand Pruning	0.000	0.000	na	0.000	0.000	0.000	0.000
	<i>Guadalupe Subtotal</i>		<i>2.820</i>	<i>17.302</i>	<i>18.080</i>	<i>0.000</i>	<i>1.632</i>	<i>0.069</i>
Coyote	Sediment Removal	0.127	1.231	3.050	0.000	0.541	0.000	2.053
	Herbicide	0.000	0.014	na	0.000	0.18	0.000	0.098
	Hand Removal	0.000	0.000	na	0.000	0.000	0.000	0.000
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000

SCVWD Stream Maintenance Program  
2012-2022 Mitigation Approach

**Table 5.** Projected Impacts by Habitat Type and Activity, tidal reaches (acres)

Watershed	Activity Type	Habitat Type						
		Woodlands	Herbaceous (non-wetland)	Sediment Wetland	Aquatic (wetland)	Herbaceous (wetland)	Shrub	Misc
	Mowing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Hand Pruning	0.000	0.000	na	0.000	0.000	0.000	0.000
	<i>Coyote Subtotal</i>	<i>0.127</i>	<i>1.245</i>	<i>3.050</i>	<i>0.000</i>	<i>0.721</i>	<i>0.000</i>	<i>2.151</i>
SF Basin	Sediment Removal	6.651	19.504	21.500	0.000	2.468	0.138	6.484
	Herbicide	0.048	0.309	na	0.000	0.538	0.000	0.669
	Hand Removal	0.139	0.000	na	0.000	0.000	0.000	0.000
	Discing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Mowing	0.000	0.000	na	0.000	0.000	0.000	0.000
	Hand Pruning	0.000	0.000	na	0.000	0.000	0.000	0.000
	<b>SF Basin Total</b>	<b>6.838</b>	<b>19.813</b>	<b>21.500</b>	<b>0.000</b>	<b>3.006</b>	<b>0.138</b>	<b>7.153</b>

Source: SCVWD, 2011

- Notes:
1. Includes areas that were also projected for maintenance (and/or maintenance was conducted) during the 2002-2012 period
  2. Acreages are shown for the total projection of each work activity type, this includes acreages for overlapping work activities at the same location, so potential impacts are over represented.
  3. Acreages incorporate the work area percentage estimate to account for varying work amounts within a reach.
  4. Miscellaneous habitat type includes features/elements as shown in Appendix A (Vegetation Classification System)

## **5. Mitigation for New Sediment Removal and Vegetation Management Work Areas 2012-2022**

This section describes how mitigation will be provided for sediment removal and vegetation management activities at new channel locations not included in the existing SMP mitigation program. Within these areas, mitigation will be provided for impacts to the following vegetation types: woodlands, sediment wetland, aquatic (wetland), herbaceous (wetland), and shrub.

This section of the memorandum includes the following topics (the primary impacts from the Biological Resources chapter of the SEIR which are addressed by each component are included in parenthesis):

- Section 5.1 Acquisition and Restoration Program (Impact BIO-1: Loss or Disturbance of Wetlands and Other Waters; Impact BIO-2: Loss or Disturbance of Woody Riparian Vegetation)
- Section 5.2 Invasive Plant Management Program (Impact BIO-1: Loss or Disturbance of Wetlands and Other Waters; Impact BIO-2: Loss or Disturbance of Woody Riparian Vegetation)
- Section 5.3 Riparian Restoration and Planting Program (Impact BIO-1: Loss or Disturbance of Wetlands and Other Waters; Impact BIO-2: Loss or Disturbance of Woody Riparian Vegetation)
- Section 5.4 Application of Invasive Plant Management and Riparian Planting Programs
- Section 5.5 Mitigation for Tree and Shrub Removals 6-12 Inches (dbh) (Impact BIO-2: Loss or Disturbance of Woody Riparian Vegetation; Impact BIO-7: Loss of Ordinance Trees)
- Section 5.6 Instream Habitat Complexity Program (Impact BIO-8: Impacts on Steelhead)
- Section 5.7 Summary of Sediment Removal and Vegetation Management Mitigation

As described in the sections above, the existing SMP mitigation program will continue to serve as mitigation for maintenance work during the 2012-2022 period for areas projected in the 2002-2012 SMP. Using a variety of mitigation approaches, a mitigation “tool box”, the District will provide suitable mitigation for impacts in new work areas. The mitigation programs described in this section are consistent with on-going District mitigation operations. The key addition for the SMP is to now provide both “acquisition” and “pay as you go” mitigation processes for the sediment and vegetation maintenance activities. Increasing mitigation opportunities increases the flexibility for finding suitable mitigation options in any given year. The mitigation programs described in this section will provide mitigation specifically for the SMP and will not satisfy mitigation obligations for other District actions.

### **5.1 Acquisition and Restoration Program**

Consistent with the existing SMP mitigation program, land acquisition and restoration projects can be developed to serve as suitable mitigation for SMP maintenance activities in new work areas. As described in Section 3 above, the existing SMP mitigation program includes several acquisition and

restoration elements that provide mitigation in perpetuity for previously defined work areas.

In developing the existing land acquisition and restoration mitigation programs, the District worked closely with regulatory staff and external stakeholders to develop the following guiding principles for mitigation options:

1. Restoration or creation of larger, sustainable sites is preferable to smaller, fragmented sites.
2. Compatible adjacent land uses, especially those in public ownership or other mitigation sites will be evaluated to determine sustainability and suitable size of a mitigation site.
3. The conservation, protection from further degradation, and enhancement of existing habitats is preferable to the creation of artificially supported systems.
4. A watershed-wide, programmatic approach is preferable to a project-by-project approach.
5. Specific watersheds, streams, or stream reaches will be targeted for mitigation, restoration, and enhancement where the most ecological function will be obtained. When looking at ecological function, the net gain in function will be considered in addition to the existing functions. Areas outside of target streams and watersheds can also be considered.
6. Mitigation will match impacts by basin (Santa Clara Basin versus Pajaro River Basin).
7. In-kind mitigation opportunities are preferred over out-of-kind.
8. Out-of-kind mitigation will be considered, however, if it benefits the overall health of streams and watersheds and has cost advantages.
9. Technically and pragmatically feasible program elements, with a high probability of success, are preferable to those elements with a higher risk of failure or are based on speculative technology or feasibility.
10. Proposal elements that can be scaled up or down in size, effort, and cost are preferred over those that are less flexible.
11. It is preferable to complete mitigation prior to impacts. As much mitigation should be completed in the early years of the Stream Maintenance Program as possible.

These guiding principles will continue to be applied to the identification and selection of potential land acquisition and restoration mitigation projects.

While site-specific land acquisition and restoration mitigation projects are not yet identified to apply as specific mitigation for new work areas under the SMP Update 2012-2022, the general classes of such land acquisition mitigation projects are as follows:

- In-kind preservation and enhancement: The acquired lands provide similar ecologic functions and values to habitat areas impacted by SMP maintenance activities. Higher quality lands/habitats will be preserved. Ecologic enhancement activities may be applied to provide further lift in functions and values. The acquisition and preservation/enhancement of these higher quality lands will occur at a **ratio of 3:1**, meaning 3 acres of land shall be acquired, preserved, and/or enhanced for every 1 acre of impacted habitats due to SMP activities. For these lands, the District will prepare and implement a management and monitoring plan which identifies the ecological functions and values which are being preserved, and identifies the

management measures that will be implemented to ensure those functions and values are maintained into the future. As a performance standard, the identified functions and values will not be allowed to reduce in quality compared to their state at the time the lands began to function as mitigation.

- In-kind restoration: The acquired lands have good potential to provide similar ecologic functions and values to habitat areas impacted by SMP maintenance activities. However, restorative actions are necessary to lift the quality, functions, and values of the lands to provide a net improvement/benefit that can account as mitigation for SMP impacted habitats. Mitigation for acquisition and restoration lands will occur at a **ratio of 1.5:1**, meaning 1.5 acres of land shall be acquired and restored for every 1 acre of impacted habitats due to SMP activities. These lands would also have a management and monitoring plan developed, as with the in-kind preservation and management lands described above. The performance standard for the restoration/replanting shall follow the mitigation feasibility assessment (MFA) approach described below in Section 7.3.
- Watershed lands (out-of-kind): These are acquired lands that provide more general conservation, open space, and habitat values, but the acquired lands are not specifically tied or matched in-kind to wetland or riparian habitats impacted by SMP maintenance activities. Acquired watershed lands may include broader habitat communities such as woodland and grassland. Ecologic enhancement activities may be applied to provide further lift in functions and values. The acquisition of more general watershed conservation lands will occur at a **ratio of 8:1**, meaning 8 acres of land shall be acquired and restored for every 1 acre of impacted habitats due to SMP activities. For these lands, the District would prepare and implement a management and monitoring plan as described for the in-kind preservation and management lands, and would adhere to the same performance standards.
- Enhancement or management of land that is owned by other agencies. Under this option, the District would collaborate with owners of land that is currently managed for open space or passive recreation, and implement one of the three bulleted mitigation approaches above. In this situation, the District would not acquire the mitigation lands but would enter into an agreement with the landowners to provide management and financial support toward preserving or improving lands toward beneficial outcomes, including improved habitats. In these cases, a detailed management plan for species would be the responsibility of the District, and not necessarily be managed by the landowner. The mitigation accounting for such “partnership projects”, and how much mitigation would be provided to account for SMP activities, would be reviewed and developed with regulatory staff on a case-by-case basis.

By taking ownership of such mitigation lands, the District would commit these lands to conservation/preservation purposes in perpetuity (providing access and/or maintenance easements as necessary to support existing land functions). Because acquisition lands will be conserved in perpetuity, the mitigation they provide will also serve the SMP in perpetuity. In concept, a targeted land acquisition project will provide mitigation per the ratios identified above. Once mitigation lands are acquired, the District will identify which of the “new work areas” now identified under the 2012 SMP Update would be mitigated for (in perpetuity) by the acquired lands. The District will coordinate with SMP overseeing regulatory agencies on this process as the need arises. Similar to providing mitigation for new work areas, this same process of acquiring new lands to be applied as mitigation can be used to provide

mitigation for work areas from the 2002-2012 period that were not projected activities, and therefore not yet accounted for, but can now be considered as a 2012-2022 work activity and area mitigated for in perpetuity.

In general, maintenance on acquired lands would be similar in nature to the various activities which are part of the SMP. To the extent that maintenance activities on acquired lands are consistent with SMP covered activities, they would not require additional permitting. In these cases, maintenance activities on acquired lands will comply with the parameters, limitations and requirements of the 2012 SMP Update.

## **5.2 Invasive Plant Management Program**

The primary goal of the Invasive Plant Management Program (IPMP) element of the SMP's compensatory mitigation package is to preserve and improve habitat within Santa Clara County streams and riparian corridors by reducing the population of ecologically impacting invasive plant species. Controlling the spread of invasive plant species is a critical element in improving the ecological health of our streams and watersheds. Invasive plants thrive and spread aggressively, negatively altering resource allocation regimes, wildlife patterns, soil stability and water quality thus degrading habitat quality and the overall ecological value of a site. In addition, invasive plants can exacerbate flooding and fire danger, undermine structural assets, and impact access to roads, levees and trails.

The IPMP will provide compensatory mitigation for SMP vegetation impacts to upland, riparian, freshwater and tidal wetlands by eliminating or significantly reducing the population of invasive plant species from these affected habitats.

The IPMP will have a two-pronged approach:

- A systematic program with the longer term objective of identifying, prioritizing, and controlling invasive plants throughout the SMP area.
- An opportunistic, site-specific approach with the objective to remove invasive plants from individual SMP work sites. As mitigation for vegetation management activities, each of the SMP maintenance sites will be evaluated for on-site invasive plant removal and control.

The intent is that these two approaches, operating at different yet complimentary spatial scales will enhance the overall ecological health of the SMP's creek ecosystems.

At the systematic program-area scale, the IPMP will develop a priority matrix of invasive plant species that integrates a variety of factors including: the 2006 CAL-IPC ratings, the anticipated rate of spread without management intervention, the feasibility of effective control, impacts to fish and wildlife, impacts to sensitive plant communities, increases in flood threat, increases to fire danger, aggressive growth patterns known to cause structural damage, and impediments to maintenance access. Priority target species will be selected annually from this matrix. Following development of the matrix, the IPMP will then prioritize locations to implement plant control. High priority sites will include areas where:

- Targeted invasive species are degrading habitat for sensitive fish and/or wildlife species.
- Invasive plant removal and subsequent native habitat colonization will improve connectivity between existing patches of high-quality habitat.
- The upstream extents of invasive plant species distribution (within the SMP area) will reduce the potential for re-invasion of control sites via propagule dispersal from upstream source populations.
- Invasive plant control is technically feasible (e.g., given access constraints) and can be accomplished while minimizing impacts to adjacent aquatic, wetland, and riparian habitats as well as urban development.

### **5.3 Riparian Planting Program**

The primary goal of the riparian planting component of the SMP mitigation package is to compensate for the loss of quality and quantity of native-dominated riparian habitat due to sediment removal and vegetation management. Riparian planting will enhance habitat for birds, amphibians, and other wildlife using terrestrial riparian areas while providing shading, sources of organic matter and coarse woody debris, and water quality benefits to aquatic species. Restoration will be accomplished primarily via the revegetation of creek banks and floodplains within the SMP area where the existing physical conditions (i.e., topography, hydrology, and soils) are suitable for the establishment of native-dominated riparian habitat. The planting palette for the Riparian Planting Program is shown in Table 7. This list of species is not inclusive and each revegetation site will be assessed for ecologically appropriate native species. Riparian planting may also include site preparation, including minor grading and topsoil preparation, and incorporation of soil amendments.

Opportunities for riparian planting and restoration will be evaluated at all SMP vegetation management and sediment removal maintenance locations. The District's preference will be to first prioritize riparian planting at maintenance sites, and in this way provide direct onsite mitigation for maintenance activities. Riparian planting and restoration will provide mitigation that directly addresses impacts associated with vegetation management activities as described in the 2012 SMP Update SEIR.

Specific revegetation plan details are highly dependent on conditions at each restoration site, particularly with regard to hydrology and soils. Where opportunities for onsite riparian planting and restoration are unavailable or highly constrained, the District will identify offsite locations that can provide suitable mitigation opportunities. Offsite riparian planting restoration sites will be prioritized toward:

- Stream reaches with riparian restoration opportunities for sensitive fish and/or wildlife species.
- Stream reaches where riparian restoration of existing riparian canopy gaps will improve connectivity between existing patches of high-quality riparian habitat.

**Table 7.** Riparian Planting Palette for Mitigation Program

Botanical Name	Common Name
<b>TREES</b>	
<i>Acer negundo</i>	Box elder
<i>Aesculus californica</i>	Buckeye
<i>Platanus racemosa</i>	Western sycamore
<i>Populus fremontii</i>	Fremont cottonwood
<i>Quercus agrifolia</i>	Coast live oak
<i>Quercus lobata</i>	Valley oak
<i>Populus trichocarpa</i>	Black cottonwood
<i>Salix laevigata</i>	Red willow
<i>Salix lasiandra</i>	Arroyo willow
<i>Salix lucida</i>	Shining willow
<i>Alnus rhombifolia</i>	White alder
<i>Quercus douglasii</i>	Blue oak
<b>SHRUBS</b>	
<i>Salix exigua</i>	Sandbar willow
<i>Baccharis salicifolia</i>	Mulefat
<i>Heteromoles arbutifolia</i>	Toyon
<i>Rhamnus CA</i>	Coffeeberry
<i>Sambucus mexicana</i>	Elderberry
<i>Cornus glabrata</i>	Brown dogwood
<b>LOW PLANTS</b>	
<i>Artemesia douglasiana</i>	Mugwort
<i>Aster chilensis</i>	Chilean aster
<i>Clematis ligusticifolia</i>	Virgin's Bower
<i>Artemesia californica</i>	California sage
<i>Mimulus aurantiacus</i>	monkeyflower
<i>Euthamia occidentalis</i>	Goldenrod
<i>Rosa californica</i>	California rose
<i>Rubus ursinus</i>	California blackberry
<i>Leymus triticoides</i>	Blue wild rye
<i>Symphoricarpos laevigatus</i>	Snowberry
<i>Eriogonum fasciculatum</i>	California Buckwheat

- Stream reaches with riparian habitat gaps where invasive plant species have been treated to accelerate native riparian plant establishment and inhibit re-colonization by invasive plant species.

The target species composition, location, and extent of riparian planting and restoration will be related to the ecological functions and values impacted from SMP maintenance activities, such as temporary impacts to riparian vegetation resulting from pruning and selective tree removal. In sum, the benefits of restoration will offset the adverse effects of temporary habitat loss. District staff will: (1) select the necessary area, (2) plant it with appropriate spacing for each species to achieve success, (3) determine whether excess is possible, and (4) decide whether to plant the excess or not.

Riparian mitigation plantings are installed based on plant densities found in natural communities and factoring in the site's carrying capacity. For tree species (mature height and spread > 20'), plantings are installed at 12-15' on center (OC). For shrub species (mature height and spread < 20'), plants are installed at 6-8' OC. Using industry standard formulas, planting areas or quantities are calculated to provide mitigation based on *area* impacted or *number of trees/plants* impacted. Grasses, forbs, and herbaceous vegetation are not accounted for in the planting calculation, but in order to provide habitat complexity are typical components of planting projects. Any excess planted will be documented and used toward future impacts.

The performance standard for the riparian planting program shall follow the mitigation feasibility assessment (MFA) approach described below in Section 7.3.

#### **5.4 Application of Invasive Plant Management and Riparian Planting Programs**

A mitigation ratio of 1.2:1 (area mitigated to area impacted) shall be applied for habitat impacts from sediment removal and vegetation management activities. The District can use either the invasive plant management program or the riparian planting program (or a combination of the programs) to achieve this net mitigation target for annual projects. Both of these programs directly address impacts by improving riparian habitat quality.

Mitigation opportunities will be assessed annually at both onsite maintenance work locations and offsite locations within the SMP program area. Required mitigation acreages will be determined annually based on the annual maintenance workplan and its associated impacts to habitat types (i.e., upland, riparian, freshwater and tidal wetlands).

In mitigating for vegetation management projects, invasive plant management or riparian planting mitigation projects shall have a "shelf life" or "warranty" for 5 years. This means that the mitigation required for impacts due to vegetation management activities provides 5 years of mitigation coverage for that maintenance site. In other words, once the invasive plant management or riparian planting mitigation is developed and applied for a specific maintenance project, the District can return to that maintenance site to conduct any vegetation management activity, any number of times, for up to 5 years. The District shall monitor invasive plant management and riparian planting mitigation sites in years 1, 3, and 5 and maintain the mitigation site to meet success criteria as described in the mitigation monitoring section below (see Section 8.1).

For riparian planting mitigation areas, the District commits to not impacting such areas for a minimum of 10 years. If the District impacts riparian planting mitigation areas, the impacted mitigation area will be replaced in-kind, and the monitoring clock will be reset for those areas for another 5 years.

This "shelf life" or "warranty" of 5 years does not apply to impacts caused by sediment removal activities. Impacts caused by sediment removal activities are mitigated on a "one time, pay as you go" basis. Repeated sediment removal work (if necessary) will require repeated mitigation, unless mitigation lands are acquired (per Section 5.1) that would enable the "new" maintenance area to be mitigated for in perpetuity.

The District shall describe the targeted invasive plant management or riparian planting mitigation activities in the annual Notice of Proposed Work (NPW)<sup>2</sup> and verify implementation of the mitigation in the annual Post Construction Report (PCR)<sup>3</sup>. Planned acreages for mitigation activities, targeted plant species for removal, or targeted species for planting will be described in the NPW. Annual monitoring data for the mitigation sites shall be submitted to overseeing agencies (including USACE, USFWS, NMFS, RWQCB - San Francisco Bay and Central Coast Regions, DFG, and BCDC) with other SMP monitoring results.

While both onsite and offsite opportunities will be considered, the District preference is to first apply invasive plant management and riparian planting activities onsite along stream channel reaches where other vegetation management maintenance or sediment removal activities are occurring. If onsite invasive plant management or riparian planting mitigation is not necessary at a particular maintenance reach, or there are other limits/constraints that prevent invasive plant management from being implemented, then the District will apply the mitigation at suitable offsite locations within the program area. The success criteria will be determined through the Mitigation Feasibility Assessment (MFA) process as described in Section 7.3 below.

### **5.5 Mitigation for Tree and Shrub Removals 6-12 Inches**

Trees and shrubs less than 12" dbh may be removed under the SMP. The removal of trees and shrubs in new work areas, that are less than 6 inches dbh, is mitigated through the invasive plant management and riparian planting programs described above. Impacted maintenance areas from vegetation management and sediment removal activities (that include the removal of trees/shrubs less than 6" dbh) will be mitigated for according to the 1.2:1 ratio as described above.

Removing trees sized 6-12 inches dbh will be mitigated through the individual planting of replacement trees. Appendix B (*Tree Scoring for Removal of Trees and Shrubs 6 - 12"DBH - April, 2011*) provides a specific tree appraisal and evaluation protocol to determine how replacement planting occurs. The protocol in Appendix B involves carefully assessing targeted tree removals for their existing conditions and functions, including their canopy cover, local area value, ecosystem benefits, and ecosystem detriments. Using a cumulative ranking method, tree replacement mitigation ratios for removed trees (6-12 inches dbh) occurs at either 1:1, 2:1, or 3:1 (replacement tree to removed tree) depending on the

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<sup>2</sup> The NPW is the document which the District submits annually to the various permitting agencies describing the annual work plan for that year.

<sup>3</sup> The PCR is the document which the District submits at the end of the year to the various permitting agencies describing the actual work which was completed during that year.

overall quality and function of the removed tree. Chapter 2 of the SMP Manual describes the District's vegetation management and tree removal activities in detail.

The performance standard for tree replacement shall follow the mitigation feasibility assessment (MFA) approach described below in Section 7.3.

## 5.6 Instream Habitat Complexity Program

The District will develop, enhance, or provide in-kind installation of instream habitat complexity features to mitigate for the loss of instream complexity due to annual sediment removal and vegetation management projects, including large woody debris removal activities. The instream habitat complexity mitigation described in this section may also be suitable for application to bank stabilization mitigation projects as described in Section 7 below.

A complex instream and channel bed environment provides habitat heterogeneity, cover, and refugia during high flows. Prior to sediment removal, large woody debris removal, bank stabilization, or other maintenance activities, the affected work area will be surveyed by an SCVWD fisheries ecologist to identify any features that provide high-quality instream complexity for fish. The fisheries ecologist will determine whether such features are of "high quality" based on a combination of the following criteria:

- Large woody debris providing cover and refugia from high flow velocities
- Deep pools providing rearing habitat and refugia from high flow velocities
- Cobble/boulder features providing cover, refugia from high flow velocities, and velocities suitable for good invertebrate drift

If such high-quality features must be removed during the proposed SMP activities, compensatory mitigation will be provided by the installation of instream complexity features at a ratio of 0.5:1 (mitigation-to-impact) basis. The 0.5:1 ratio can be assessed to either the *number* of instream complexity features affected by the maintenance activity or to the *area of impact* due to the maintenance work. Similarly, the required mitigation can be provided either on a "number of projects" or "area" basis depending on which metric is most appropriate based on the habitat values to fish provided. A District fisheries ecologist will determine which approach to determining the required mitigation (number of projects or area) is the most suitable.

In sum, either one instream complexity feature will be installed for every two that are removed (number approach), or an instream complexity feature will be installed with half the area as the impacted footprint (area approach). It is acknowledged that this ratio is less than 1:1 under the understanding that erosion, deposition, tree-falls, and debris mobilization within a few years following the removal of an instream complexity feature will naturally reintroduce some complexity to the stream.

As examples, enhancing instream complexity would include:

- enlarging an existing large woody debris feature

- anchoring a large woody debris feature
- geomorphically shaping an instream bar or bed feature for improved habitat
- enhancing a pool feature threatened by sedimentation
- enhancing streambed conditions to increase the range of flow velocity and habitat conditions.

Priority for these mitigation activities will be given to SMP sites where instream features cannot be retained during construction due to conflicting objectives. For example, if a channel pool configuration cannot be retained during a bank protection job and the area is devoid of other complex bed or pool features, then this area will be evaluated for the addition of an instream complexity feature.

In addition to enhancing existing features, new instream features may be developed to achieve several habitat objectives, including: increasing pool habitat in homogenized stream reaches, providing escape cover for rearing and spawning fish, deepening feeding areas in riffle habitat, creating a variety of stream flow velocities for cover, sorting gravel, and providing resting areas for upstream migration. Additionally, improving instream function can benefit other aquatic flora and fauna by improving the overall stream complexity for which these species depend upon for survival. If effective, such new instream complexity features (particularly in highly modified, urban streams) can augment or replace existing structural features required for successful reproduction and rearing of native fish and amphibians in the freshwater environment.

Newly developed instream habitat improvements may use log structures, boulder structures, or a combination of both log and boulder structures to achieve more complex habitats. Possible configurations of boulders or logs include weirs, clusters, single and opposing wing deflectors, spider logs, and digger logs. The construction materials selected for each instream complexity feature would depend upon the target objective and site conditions.

The selected mitigation site will be as close to the impacted reach as is technically feasible. For instream complexity features that are removed by sediment removal or bank stabilization projects, mitigation will be incorporated into the same reach where instream complexity was removed to the extent feasible. The site will be selected with input from the District fisheries ecologist, taking channel capacity and other SMP-related factors into account. The fisheries ecologist will prepare specifications for the mitigation, including size, type, and configuration of the feature. The mitigation will be implemented within one year following the impact.

As a performance standard, instream habitat improvements shall be maintained to serve designed functions for at least five years, and will be monitored annually to ensure compliance.

## **5.7 Summary of Mitigation for Sediment Removal and Vegetation Management Activities**

Working together, land acquisition and habitat restoration, invasive plant species management, riparian planting and restoration, tree planting to replace 6-12" tree removals, and developing instream habitat complexity projects provide a broad spectrum of natural system functions and values that mitigate

impacts from vegetation management and sediment removal maintenance projects. Table 8 summarizes the key attributes of the updated mitigation approach for sediment removal and vegetation management activities.

**Table 8.** 2012-2022 Mitigation Approach for Sediment Removal and Vegetation Management Activities

Mitigation Component	Ratio/Metric	Notes
Land acquisition (in-kind preservation/enhancement)	3:1	Mitigation applied in perpetuity
Land acquisition (in-kind restoration)	1.5:1	Mitigation applied in perpetuity
Land acquisition (watershed lands out of kind)	8:1	Mitigation applied in perpetuity
Invasive plant management program	1.2:1	Mitigation assessed and applied annually
Riparian restoration and planting program	1.2:1	Mitigation assessed and applied annually
Tree plantings for removal of trees 6-12" dbh	1:1 2:1 3:1	Mitigation ratio determined by tree scoring protocol provided in Appendix B
Instream habitat complexity features	0.5:1	Mitigation can be applied either through a number of projects or according to project area, using the 0.5:1 ratio
Gravel augmentation in steelhead creeks	1:1	Mitigation option for impacts in steelhead creeks due to sediment removal activities. Note that because this mitigation is primarily species-targeted, it is described below in Section 6, rather than above in Section 5. However, it has been included in this table because of the general benefits it would provide to aquatic habitat in addition to steelhead.

## **6. Species-Targeted Habitat Mitigation**

In addition to the mitigation described in Section 5 for sediment removal and vegetation management, mitigation will be provided to compensate for impacts to individual special-status species resulting from SMP activities. The species for which compensatory mitigation will be provided, and the form that this mitigation will take, is identified in the current 2012 SMP Update SEIR and will be further refined in Biological Opinions (BOs) for the 2012 SMP Update to be issued by NMFS and USFWS.

Although SMP activities could result in adverse effects on both individuals and habitat of special status species, mitigation will focus on improvement and/or protection of habitat for these species with the goal of increasing the abundance, productivity, and/or survivorship of individuals, commensurate with the magnitude of the impact. For potential affected species, the type of mitigation sought will depend on the nature of the impacted habitat (e.g., whether it involves breeding or foraging habitat), the size of mitigation required, and suitable mitigation locations. The specific mitigation qualities will be linked closely to the functions and values of habitat that are impacted by SMP activities. The 2012 SMP Update SEIR and the BOs from NMFS and USFWS will be used to refine the criteria, metrics, and/or ratios necessary to provide mitigation, but any refinements will result in mitigation measures being equally or more effective.

To the extent feasible, habitat mitigation for impacts to individual special-status species will dovetail with mitigation efforts to address impacts to wetlands and riparian habitats as described above. Ideally, a given set of mitigation actions can be performed and integrated to compensate for effects on multiple sensitive habitats and resources. Integrating mitigation solutions into joint projects is an efficient approach and provides multiple benefits. For example, riparian habitat restoration along a South County creek may provide compensation for temporary impacts to both riparian habitat and Least Bell's vireo habitat. Similarly, instream complexity or gravel augmentation (described below) activities along a steelhead creek may help address wetland impacts and/or temporary impacts to steelhead. In other instances, however, species-specific mitigation (such as compensatory mitigation for impacts to serpentine species) would not overlap with mitigation provided for impacts to regulated habitats such as wetlands and riparian habitats. In such cases, species targeted mitigation would be planned and implemented independently of other mitigation projects.

The specific extent of species-targeted mitigation will be identified annually using the previously developed criteria, metrics and/or ratios, based on the annual workplan and the specific species and habitats that would be affected. Impacts to habitat of individual species would be predicted annually, and appropriate mitigation would be identified and implemented on an annual basis. However, if mitigation requirements for special-status species can be estimated farther in advance, there is likely some economy of scale that would be realized from pursuit of species-targeted mitigation that would compensate for SMP impacts occurring over two or more years. For example, habitat acquisition, preservation, and/or enhancement may be easier and less costly (on a per-acre basis) to plan and implement over a larger area than over a number of smaller areas. Using larger, consolidated mitigation areas may enable more efficient mitigation planning over several years. In these cases, either annual or

multi-year mitigation activities would be identified. In this scenario, species-specific impacts and mitigation would still be tracked and accounted for annually. If a “mitigation credit” exists because the District previously purchased or established a larger mitigation area than previously needed, then the District will track the “mitigation account” through the annual SMP reporting processes (NPW and PCR) and relay this information to overseeing agencies.

Also, note that the District may seek to include Almaden-Calero Canal maintenance as a covered activity in the Santa Clara Valley Habitat Plan (for terrestrial species) and the Three Creeks HCP (for aquatic species). These plans would include mitigation or conservation measures that are required by the federal and California Endangered Species Acts to minimize impacts of covered activities on covered species. If Almaden-Calero Canal maintenance is included as a covered activity in these habitat plans, once the plans are adopted, satisfaction of species-targeted mitigation via in-lieu-fee payments or other measures contained in these plans would be possible for maintenance work along the Almaden-Calero Canal, and in fact, this may be the required approach to maintain consistency with the plans. It is anticipated that this approach be adequate to reduce biological impacts of Almaden-Calero Canal maintenance to less-than-significant levels. The District will finalize this approach if/when these plans are adopted.

#### **Gravel Augmentation in Steelhead Creeks**

Instream gravel and coarse sediment along a streambed can be a fundamental habitat element to a healthy functioning stream directly supporting life-cycle needs of fish (including steelhead), amphibians and other aquatic wildlife. Often, gravel and coarse streambed sediment supply is reduced due to dams or other upstream barriers that trap sand, gravel, and coarse bed materials upstream behind the barrier. In addition to curtailing sediment supply, dams, reservoirs, and other upstream barriers also moderate or reduce the magnitude of stream flows such that natural gravel mobilization and transport processes are diminished. Dams or other facilities reduce flow magnitude and duration resulting in less frequent (or non-occurrence) flows strong enough to mobilize sediments along the channel bed.

The District actively removes sediment from stream channels when an accumulation of sediment reduces floodwater conveyance capacity or prevents a facility or structure from functioning as intended. Additionally, the District removes sediment to facilitate fish passage where sediment accretion has created passage impediments for migration or localized movements of fish. As a result of these efforts, general impacts to channel hydraulics, sediment transport and stream morphology may occur. To ameliorate those impacts and restore stream function, the District will implement projects to provide coarse substrate (sand and gravel) back into the creek.

Gravel augmentation provides direct benefits for improving fish spawning and rearing habitat. Gravel augmentation will be applied to mitigate for instream impacts on spawning and rearing steelhead habitat due to sediment removal activities. The general goal of gravel augmentation projects is to improve fish spawning and rearing habitat by enhancing sedimentary materials within the channel bed. Some minor and localized stream and riparian impacts are expected to occur when crews and equipment place the gravel back into the stream course.

SCVWD can reuse watershed-specific gravels collected through sediment removal activities as a source for the gravel augmentation program. SCVWD would collect, sort, separate, and reuse clean, appropriately-sized gravel. When designing a gravel augmentation project, several factors will be considered, including: the existing channel conditions; the grain size distribution of the sediment to be added; the volume of gravel to deposit; the frequency of gravel addition that will be required in light of sediment transport; how the added gravel will interact with to the existing flow regime and/or channel geometry; and the extent of augmentation effects within the channel reach.

#### **Gravel Augmentation Mitigation Commitment**

Gravel augmentation will be provided as mitigation for SMP impacts to Central California Coast steelhead (CCC) and South-Central California Coast steelhead (SCCC) spawning habitat. The approach to gravel augmentation will be developed and refined in coordination with NMFS; at a minimum, any refinements will result in mitigation measures being equally or more effective than those described here. If more than 100 ft<sup>2</sup> of sediment removal is proposed along Upper Penitencia Creek, or more than 500 ft<sup>2</sup> of sediment removal is proposed along other steelhead streams, a District fisheries ecologist will assess the sediment removal site for spawning and rearing habitat quality prior to the initiation of sediment removal work. The square footage mitigation threshold for conducting an assessment is lower for Upper Penitencia Creek than for other creeks due to its narrowness and disproportionate importance to the maintenance of CCC steelhead populations in the SMP area. The District biologist will review the sediment removal workplan and assess the footprint of work activities and the texture and quality of the sediment to be removed.

Sediment targeted for removal will be considered “high-quality” spawning gravel, based on the following criteria:

- < 25-30 percent fines < 6.35 mm (Kondolf 2000, Kondolf and Wolman 1993)
- < 12-14 percent fines < 0.85 mm (Kondolf 2000)
- D50 (median particle size) of 12.5 to 22.0 mm, based on D50 of rainbow trout and steelhead from 30 to 65 cm length (Kondolf and Wolman 1993), corresponding to a range of 275 to 640 cm of steelhead adults recovered in streams of the San Francisco estuary (Leidy et al. 2005)
- Minimum patch size > 1.1 m<sup>2</sup> (Trush 1991)
- The habitat needs to be accessible under typical flows for when the appropriate life stages are present. Suitable depths and velocities must be available during flows typical of spawning season. Factors related to accessibility include depth and velocity criteria, which for spawning, are:
  - Depth: 10 – 150 cm (Moyle 2002)
  - Velocity: 20 – 155 cm/s (Moyle 2002)

If more than 100 ft<sup>2</sup> of high-quality gravel will be removed along Upper Penitencia Creek, or more than

500 ft<sup>2</sup> of high-quality gravel will be removed along other steelhead streams, compensatory mitigation will be provided by the installation of suitable spawning gravel along the affected creek at a 1:1 (mitigation-to-impact) ratio on a square footage or acreage basis. The mitigation site will be as close to the impacted reach as is feasible, and will be located within a steelhead-accessible reach of the same creek. The site will be selected with input from the fisheries ecologist, taking channel capacity and other SMP-related factors into account. The fisheries ecologist will prepare specifications for the mitigation, including size, type, depth, and configuration of gravel. The mitigation will be implemented within one year following the impact.

## **7. Bank Stabilization Mitigation**

### **7.1 General Approach**

Stabilizing and repairing eroding stream channel banks and levees is a routine SMP activity. Based on the maintenance work conducted from 2002-2010, the District stabilizes about 0.94 mi of stream channel banks or levees on average per year. While bank stabilization is routine and expected, the specific work locations are not certain until after each winter season. As a result, this type of maintenance (unlike sediment removal and vegetation management) is not a projected work activity. Rather, bank stabilization maintenance needs are assessed annually on an as-needed basis. Site-specific mitigation for bank stabilization projects is also determined on an annual basis depending on the identified work need.

The 2002 SMP Manual included Appendix E *Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities* (July, 2001) that described the mitigation approach for bank stabilization used during the 2002-2012 program period. The 2002 mitigation approach identified revegetation mitigation ratios of 1:1, 2:1, or 3:1 for treatment impacts depending upon the bank repair technique and the resulting change to the creek ecosystem. Bank repair treatments that used more hardened materials resulted in higher mitigation ratios.

For the 2012 SMP Update, the District has slightly revised and reorganized the list of suitable SMP bank stabilization treatments (Table 9). The general approach to bank stabilization and its mitigation is consistent with the 2002 program. Table 9 identifies the SMP's 13 bank stabilization treatments (and variations), shows mitigation ratios, describes whether the technique uses softscape or hardscape elements, and notes whether the technique requires review by regulatory agencies. The bank stabilization techniques shown in Table 9 are described in detail in the 2012 SMP Manual.

**Table 9.** SMP Bank Stabilization Methods (2012 SMP Update )

I.D. No.	Method	Mitigation Ratio	Hard-/Softscape	Requires Plan Review by Agencies
1	Earth Repair	1:1	Soft	No
1A	Earth Repair with Buried Rock	1:1	Soft	No
2	Live Construction	1:1	Soft	No
2A	Live Construction with Boulder Toe	1:1 if boulder toe is vegetated 1.5:1 if boulder toe is not vegetated	Vegetated: hybrid Not vegetated: hard	No
2B	Live Construction with Log Toe	1:1	Soft	No
3	Contour Wattling	1:1	Soft	No
3A	Contour Wattling with Boulder Toe	1:1 if boulder toe is vegetated 1.5:1 if boulder toe is not vegetated	Soft	No
3B	Contour Wattling with Log Toe	1:1	Soft	No
4	Brush Mattress (Brush Layering)	1:1	Soft	No
4A	Brush Mattress (Brush Layering) with Boulder Toe	1:1 if boulder toe is vegetated 1.5:1 if boulder toe is not vegetated	Vegetated: hybrid Not vegetated: hard	No
4B	Brush Mattress (Brush Layering) with Log Toe	1:1	Soft	No
5	Surface Matting (Erosion Mats)	1:1	Soft	No
5A	Surface Matting (Erosion Mats) with Boulder Toe	1:1 if boulder toe is vegetated 1.5:1 if boulder toe is not vegetated	Vegetated: hybrid Not vegetated: hard	No
5B	Surface Matting (Erosion Mats) with Log Toe	1:1	Soft	No
6	Add Rock to Invert	1:1	hybrid	No
6A	Rock Cross Vanes	1:1	hybrid	No
6B	Root Wads and Boulders	1:1	hybrid	No
6C	Live Log Crib Walls	1:1	Soft	No
6D	Log Revetment	1:1	hybrid	No

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7	Cellular Confinement System	2:1	Hard	Yes
8	Rock Blanket	2:1	Hard	Yes
8A	Boulder Revetment	2:1	Hard	Yes
8B	Boulder Revetment with Soil and Vegetation	1:1	hybrid	Yes
9	Articulated Concrete Blocks	3:1	Hard	Yes
9A	Articulated Concrete Blocks with Planted Areas	2:1	Hard	Yes
10	Concrete Crib Walls	3:1	Hard	Yes
11	Sacked Concrete	3:1	Hard	Yes
12	Gunite Slope Protection	3:1	Hard	Yes
13	Earth with Rock Toe on Grass Lined Channels*	None if rock is below bankfull depth, and includes some element of instream complexity.  For areas above bankfull depth, use mitigation ratios as specified in ID Nos.1 thru 12 above	Soft/hybrid	No

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

The District favors using biotechnical techniques (as appropriate for site conditions) that use soil, vegetation, or other organic materials as a softscape approach to stabilize eroding stream banks. As shown in Table 9, softscape approaches use willow plantings, contour wattling, brush mattresses, root wads, log crib walls, and earthen soil banks to provide the benefits of effective erosion control and natural resource enhancement. When implemented, these softscape approaches are combined with additional vegetation plantings (see Table 7 – riparian planting palette) to enhance the riparian habitat along the bank.

Where on-site mitigation is not feasible, particularly for lower valued streams, mitigation will be targeted at higher valued streams. The Mitigation Feasibility Assessment (MFA) process is discussed below in Section 7.3.

It is important to note that not all bank stabilization projects necessarily have negative impacts. Depending upon the situation, some bank stabilization projects result in a net environmental benefit when considering the functions and values of the existing bank condition (baseline) compared to the post project condition. Notably, if left untreated, eroding and destabilized streambanks will generally become progressively more severe with increased erosion and flooding risks. Beneficial bank stabilization projects, particularly approaches that use softscape or biotechnical techniques are typically “self mitigating” and do not require additional revegetation or other mitigation.

Depending on the size, functions, and values of the natural resources developed at the bank repair site, beneficial bank stabilization projects may provide mitigation credit toward future bank protection activities, or if appropriate, provide mitigation for other types of maintenance impacts. The balance of mitigation credit for bank stabilization activities, including credit that has accumulated during the current program, will be reported by watershed every year in the PCR.

As shown in Table 9, the District does retain hardscape bank stabilization treatments within the SMP for specific locations and conditions which require a higher level of resistance for erosive shear forces. For example, the softscape approaches shown in Table 9 can be combined with selective rock use (typically at the toe of the bank where erosive forces are greatest) to provide added shear strength. The outer bends of channels where flow velocities and shear stresses are greater are also common locations for using hardscape. As stated above, the District’s preference is to first consider use of softscape approaches, and only use hardscape where absolutely necessary. Between 2002 and 2009, the District used softscape techniques over 80% of the time for bank stabilization projects (32,088 linear ft of softscape treatment versus 7,383 linear ft of hardscape treatment). To further refine the control on the use of hardscape, the program will not install more than 50% of the total area of bank stabilization projects with hardscape. This means that the total area of all hardscape elements divided by the total area of all bank stabilization projects will not exceed 50%. This calculation results in a percent of hard elements within all bank stabilization jobs, and accurately reflects the proportion of hard and soft methods overall. Calculated in this way, the program in 2002-2010 has installed roughly 20% hardscape.

Where appropriate based on site conditions, the mitigation components described in Section 5 above for sediment removal and vegetation management activities will also be used to support mitigation activities at bank stabilization project sites.

Through the SMP reporting process, the District has submitted annual PCRs to the overseeing permitting agencies since 2002, and this process will continue through 2022. These annual reports document where bank stabilization projects occur, their length, type, mitigation requirement, mitigation accounting balances, resource inventories conducted, and pre/post construction photographs. The District has also monitored and documented conditions at mitigation sites for bank stabilization projects and reported the quality and status of the mitigation sites. The District provides monitoring reports following years 1, 3, and 5 for selected bank stabilization projects (see Section 8.1 below for more detail).

Mitigation credit from excess riparian planting in watersheds over the first part of the program (2002-

2012) has been consistently reported in annual PCRs. This program of apportioning credit to the appropriate locations will continue. The previously accumulated credit will be carried forward into the new program.

## **7.2 Mitigating for Hardscape**

As discussed above, some bank stabilization sites will require hardscape treatments. It is important to note that for the treatments listed in Table 9 with hardscape elements, there is a range of actual hardened features. Some treatments have bio-technical approaches on most of the bank slope, but include a limited amount of rock to protect the toe of the bank. This mixed approach is exemplified by techniques 2A (live construction with boulder toe), 3A (contour wattling with boulder toe), 4A (brush mattress with boulder toe), and 5A (surface matting with boulder toe). Mitigation ratios for softscape solutions that have boulder toe placement are higher if the rock placement does not include plantings between rocks.

Mixed softscape/hardscape approaches enable bio-technical treatments and vegetation on most of the bank slope and are different than other more traditional hardscape approaches such as articulated concrete blocks (9), concrete crib walls (10), sacked concrete (11), gunite (12), and earth repair with buried rock (1B) which create a more uniformly hardened bank environment.

The rock toe used in grass lined channels (13) is specifically intended to provide a more stable solution in grass lined channels with higher flow velocities. Earthen banked projects in grass lined channels have historically been prone to failure. The careful placement of rock at the toe of grass lined bank repairs is intended to make them more successful. Because these channels are often lower biological value, a lower mitigation ratio is proposed for the application of rock in grass lined channels. Application of this method is subject to annual approval.

Revegetation will occur according to the mitigation ratios shown in Table 9. Revegetation requirements are calculated by the square footage of the bank stabilization project. Revegetation plantings will be incorporated into the site as appropriate to the stabilization design and the existing site conditions (see Mitigation Feasibility Assessment discussion in Section 7.3 below). While revegetation is currently used as the predominant mitigation method for bank stabilization sites, the other mitigation approaches described in this memo would also provide mitigation. For the hardened bank stabilization areas that cannot be directly planted, additional mitigation will be necessary. Additional mitigation may also be provided through installing instream complexity features in the channel adjacent to the bank stabilization project (see Section 5.6 above).

Stream functions and habitat values that require mitigation due to hardscape include:

- Loss of instream escape cover provided by undercut banks, large boulders, tree roots, downed trees, and other structural elements; (instream complexity)
- Reduction in hydraulic variation and complexity due to flow interaction non-hardened banks;

- Loss of velocity refuge provided by earthen features along the bank;
- Loss of shading and water temperature moderation provided by mature riparian shrubs and trees; and/or
- Loss of overhanging escape cover provided by shrubs and grasses near the stream edge.

Potential impacts to special status aquatic species are described in the SMP SEIR. As necessary, mitigation to these aquatic species due to bank stabilization projects will be provided through species specific mitigation that will be assessed annually (see Section 6 above).

### **7.3 Mitigation Feasibility Assessment (MFA) – Revegetation Component**

One of the important lessons learned from implementing the SMP during 2002-2010 is that the success criteria for revegetation mitigation projects should carefully consider existing site conditions and constraints. The Mitigation Feasibility Assessment (MFA) process was designed to provide a consistent assessment methodology that can guide mitigation design and success criteria based on what type, degree, and quality of revegetation the site will support.

The MFA process begins with a broad evaluation of the existing conditions at the mitigation site. Depending upon which bank treatment will be used, the target mitigation site may be at the same location where the bank stabilization work will occur, or it may occur at an off-site location. The MFA assessment includes evaluating site hydrology, flow velocity, soils and soil moisture, aspect, slope, adjacent land use, site access, presence of invasives, presence of rare/listed species, maintenance needs, animal damages, human activity, and the potential revegetation design. Based on this assessment the site is categorized as having either a high, medium, or low revegetation potential. Each of these categories is based on the presence or absence of existing opportunities and constraints at the site. Planting species appropriate to the site conditions can promote a more successful and efficient revegetation program. If a site is identified as having poor conditions yet is still desirable to plant, lower success criteria will be established to account for the poorer site conditions. This will enable some replanting prior to seeking off-site mitigation. If the MFA identifies the project location as a highly constrained site, then off-site mitigation will be considered to ensure greater revegetation success.

The MFA process is designed to provide ecologically feasible mitigation success criteria, given site specific conditions and the proposed revegetation palette. The District may support revegetating a highly constrained creek bank that will rarely meet typical success criteria. Therefore, lower success criteria will be allowed to facilitate replanting on ecologically challenging sites. Project sites with fewer constraints will meet standard success measures more easily and will continue to be held to those higher standards. The MFA approach will be formalized to provide the District with flexibility to revegetate a broader range of sites without committing to futile replanting efforts. The MFA approach is based on the experience gained through planting several constrained bank stabilization sites during the 2002-2012 period.

## **8. Mitigation Monitoring and Reporting**

### **8.1 Monitoring**

This section describes monitoring approaches for the mitigation programs discussed above. The proposed mitigation monitoring and reporting program builds on the existing monitoring program. All monitoring programs are intended to be adaptively managed and implemented in conjunction with input and support from regulatory agencies. Monitoring reports will be provided to the resource agencies.

#### **Monitoring Protocols**

Since the SMP inception in 2002 the District has developed surveying and monitoring protocols as part of the routine implementation of the program. The District conducts annual field inspections of their streams to determine the needs for maintenance activities. They track all maintenance activities conducted by stream reach, and all restoration and mitigation efforts implemented to address maintenance impacts. The District maintains an extensive database, including a GIS mapping database, to document and track annual maintenance and mitigation activities. The District's existing monitoring protocols and corresponding databases will meet the monitoring needs of the updates to the mitigation program as described in this memorandum. For proposed new mitigation efforts not directly addressed by an existing monitoring protocol (or entry into the existing database system), the District will expand the database and develop monitoring protocols.

Monitoring requirements for species-specific mitigation projects will be refined as directed by regulatory permit conditions and guidance.

#### **Bank Stabilization Monitoring**

Each year in the NPW, the District will identify bank stabilization sites to be monitored in years 1, 3, and 5 after construction. The monitoring sites will include 50% of the bank stabilization sites implemented in the Pajaro Watershed (Central Coast Regional Board) and up to 10 other sites per year from the 4 other watersheds in the Santa Clara Basin (San Francisco Bay Regional Board). Monitoring reports for bank stabilization sites will be submitted for the duration of the program period (2012-2022) for a total of 60 sites and 180 reports in the Santa Clara Basin. This monitoring will include a visual observation erosion conditions upstream and downstream of the site (i.e., 200 feet), conditions of the bank stabilization repair, and conditions of vegetation planting. In addition, 2 sites per year in the Santa Clara Basin will be selected for additional monitoring of peak flows and water levels during storm events. Bank stabilization monitoring reports will be submitted to resource agencies annually.

#### **Duration of Revegetation Mitigation Monitoring**

Monitoring revegetation mitigation project sites that involve restoration plantings will be conducted for five (5) years following planting, or until success criteria are met. Success criteria will be determined through the Mitigation Feasibility Assessment (MFA) as described above in Section 7.3. Information collected on restoration plantings will include the number and species planted at each site, square

footage of area planted, estimated percent canopy cover, number or percent of planted trees and shrubs surviving, and observations on whether recolonization of invasives occurs after removal. Note that percent cover canopy will not be reported likely until year 5 or at which time canopy has developed significantly enough to describe.

Instream complexity and gravel augmentation projects will be monitored annually up to five years, to evaluate and describe their functioning.

Selected bank stabilization projects will be monitored following years 1, 3, and 5 and will be reported on annually. Post construction monitoring efforts will enable the District to evaluate the success of each bank stabilization project.

### **Success Criteria for Plantings**

Success criteria for shrubs and trees planted in riparian areas above bank repair sites will be determined through the MFA process (Section 7.3). In the event of poor plant survival, corrective measures will include replanting to reach the pre-determined success criteria, via the MFA, as needed based on scheduled monitoring activities. Such remedial measures will be monitored for a 5-year period following implementation to ensure that the project is successful. For instance, if remedial activities were taken during the fifth year after project implementation, monitoring of these remedial measures would continue until year 10. If they did not meet success criteria at that point, additional measures would be required or new mitigation would be provided elsewhere should a project not be capable of meeting success criteria.

Success criteria for bank stabilization and riparian planting and revegetation projects are described in the Mitigation Feasibility Assessment implementation document.

### **Success Criteria for Invasive Plant Management**

In areas where the District conducts invasive plant management mitigation activities the District will monitor conditions in years 1, 3, and 5 following mitigation. The success criterion for invasive plant management mitigation will be species specific to ensure the appropriate control method, timing, and frequency. Control work for certain invasive species may require several years of treatment to be effective. For infestations that require more than 2 years of treatment efforts, the work in year 3 will count for partial acreage credit (i.e., 50% of patch size for credit).

Success criteria will be developed for each site based on site specific conditions and target species. Many interconnected factors go into a determination of the level of success that can be expected. Each proposal for invasive management will be negotiated annually and will include the following elements:

1. Description of the target species including the suggestions for an optimal management approach based on the available published literature and local professional expertise.
2. Discussion of site constraints as certain sites may have limitations in the techniques that can be used for invasive plant management due to regulatory and/or ESA concerns.
3. Discussion of control timeframes and strategies. Different species require different repeat

treatments to be effective. Therefore, the success strategy might be laid out over a period of time for difficult to control species.

4. Discussion of site specific success strategies. Adjacent invasive plant populations will have a significant effect on individual site success. It might be desirable to manage an invasive plant at a particular site, but if there is an adjacent invasive population that is off of District property, the potential for success is less. However, it might still be desirable to treat the invasive with a containment strategy. For example, maintaining a pickleweed population with lepidium all around it.

## **8.2 Mitigation Reporting**

Mitigation planning, design, implementation, and monitoring activities will be notified and reported to the relevant permitting agencies through the course of the regular program communications, including submittal of the SMP annual Notice of Proposed Work (NPW) and Post-construction Report (PCR). These reports will include a discussion of mitigation activities associated with the SMP.

Mitigation information to be included in the NPW will include a description of mitigation activities planned for the coming year including locations, lengths, areas, and other project details. The NPW will also include a schedule for implementing mitigation activities and a statement describing the status of permit approvals necessary to perform project (if applicable). As needed, reporting for land acquisition and restoration projects will include a description of how the proposed off-site mitigation will address SMP related impacts.

Permitting agencies will have the opportunity to review and comment on the proposed annual mitigation plan. The SMP annual mitigation plan will be consistent with the mitigation approaches and requirements described in this document and the SMP Manual.

Each year, the District will submit a PCR on SMP activities including summary descriptions of the maintenance activities conducted in the past year. The annual report will also include status reporting on the program's mitigation activities, including the submittal of follow up monitoring reports from previous mitigation projects. The mitigation activity section of the PCR will include a comparison with success criteria, and describe efforts to meet those criteria. Individual tree replacement planting for the removal of 6-12 inch dbh trees will be reported annually through the PCR.

Reporting requirements will apply according to the duration of monitoring requirements, as described above. Once projects have fulfilled the 5-year monitoring requirement and meet the appropriate success criteria, they would no longer need to be reported in the annual PCR.

## Appendix A: Vegetation Classification

Formation Class	Formation	Macrogroup	Alliance Id	Wetland	Alliance
<b>Hydromorphic Vegetation (Aquatic Vegetation)</b>	Freshwater Aquatic Vegetation	8100 - Western North American Freshwater Aquatic Vegetation	8100	Y	Naturalized Temperate Pacific Freshwater Vegetation
<b>Mesomorphic Forests &amp; Woodlands</b>	Cool Temperate Forests	Californian-Vancouverian Montane & Foothill Forest	1200	N	Vancouverian Evergreen Broadleaf & Mixed Forests &
			1210	N	Arbutus menziesii
			1211	N	Lithocarpus densiflorus
			1212	N	Pseudotsuga menziesii – Lithocarpus densiflorus
			1300	N	Upland Vancouverian Mixed Woodland & Forests Group
			1310	N	Pseudotsuga menziesii
			1311	N	Acer macrophyllum
	Vancouverian Rainforest	1400	N	Vancouverian Hypermaritime Lowland Rainforest Group	
		1410	N	Sequoia sempervirens	
	Exotic Woodland	Exotic Woodland	100	N	Exotic Trees Group
			101	N	Exotic Trees, Canopy Height < 2 Meters
			102	N	Exotic Trees, Canopy Height 2-15 Meters
			103	N	Exotic Trees, Canopy Height > 15 Meters
			110	N	Eucalyptus
	Temperate Flooded Forests	Southwestern North American Riparian, Flooded, & Swamp Forest/Scrubland	3200	N	Southwestern North American Riparian Evergreen & Deciduous Woodlands Group
			3210	N	Populus fremontii
			3211	N	Salix laevigata
			3212	N	Salix gooddingii
			3213	N	Platanus racemosa
			3214	N	Acer negundo
			3215	N	Juglans hindsii Semi-Natural Stands
		Western Cordilleran Montane-Boreal Riparian Scrub	3100	N	Vancouverian Riparian Deciduous Forests Group
			3110	N	Alnus rhombifolia

### Appendix A: Vegetation Classification

	Warm Temperate Forests	California Forests & Woodlands	1100	N	California Broadleaf Forests & Woodlands Group
			1110	N	Quercus chrysolepis
			1111	N	Umbellularia californica
			1112	N	Quercus agrifolia
			1113	N	Aesculus californica
			1114	N	Quercus kelloggii
			1115	N	Quercus lobata
			1116	N	Quercus douglasii
<b>Mesomorphic Herbaceous Vegetation</b>	Mediterranean Grassland & Forb Meadow	California Perennial & Annual Grasslands	7100	N	California Perennial & Annual Grasslands Mapping Unit Group (Native component)
			7110	N	Serpentine component mapping unit
			7200	N	Mediterranean California Naturalized Annual & Perennial Grassland Group (Weedy grasslands with no na)
			7201	N	Conium-Foeniculum patches
		Western North America Temperate Grassland & Meadow	7300	N	Western Dry Upland Perennial Grassland Group
			7301	N	Lolium multiflorum
	Temperate & Boreal Freshwater Marsh	North American Pacific Coastal Salt Marsh	7800	Y	Temperate Pacific Tidal Salt and Brackish Meadow Group
			7801	Y	Salicornia
			7802	Y	Salicornia - Salt Grass - Jaumea
			7803	Y	Chord Grass
			7804	Y	Scirpus maritimus
			7805	Y	mixed bulrush spp. (Scirpus californicus and S. robustus)
			7806	Y	Scirpus robustus
			7807	Y	Scirpus californicus
			7808	Y	bulrush/cattail mix
			7810	Y	Typha (angustifolia, latifolia, domingensis)
			7820	Y	brackish/tidal bulrush spp. mapping unit
			7830	Y	brackish/tidal Bulrush-Cattail mapping unit
7900	Y	Southwestern North American Salt Basin and High Marsh Group			
	Western North	7700	Y	Naturalized Warm-Temperate Riparian & Wetland Group	

### Appendix A: Vegetation Classification

		America Wet Meadow & Low Shrub Carr	7701	Y	Lepidium latifolium	
		Western North American Freshwater Marsh	7400	Y	Freshwater Wet Meadow Mapping Unit Group (Meadow vegetation)	
			7500	Y	Arid Freshwater Emergent Marsh Group (Marsh vegetation)	
			7510	Y	Typha (angustifolia, latifolia, domingensis)	
			7520	Y	Fresh or brackish bulrush spp. mapping unit	
			7530	Y	Bulrush - Cattail mapping unit	
		Western North American Vernal Pools	7600	Y	Californian Mixed Annual/Perennial Freshwater Vernal Pool/Swale/Plain Bottomlands Group	
			7601	Y	Eleocharis macrostachya, Downingia, Trifolium variegatum, Eryngium	
	<b>Mesomorphic Shrub Vegetation</b>	Mediterranean Scrub	California Chaparral	4100	N	Californian Xeric Chaparral Group
				4111	N	Arctostaphylos glauca
4112				N	Adenostoma fasciculatum	
4200				N	Californian Mesic Chaparral Group	
California Coastal Scrub			4300	N	Central & South Coastal Californian Coastal Sage Scrub Group	
		4310	N	Artemisia californica		
Temperate & Boreal Scrub & Herb Coastal Vegetation		Vancouverian Coastal Dune & Bluff	4400	N	California Coastal Evergreen Bluff & Dune Scrub Group	
			4410	N	Baccharis pilularis	
		Vancouverian Lowland Grassland & Shrubland	4500	N	Naturalized Non-native Deciduous Scrub Group	
			4510	N	Rubus discolor	
			4600	N	Vancouverian Coastal Deciduous Scrub Group	
			4610	N	Toxicodendron diversilobum	
Temperate Flooded Scrubland		Southwestern North American Riparian & Flooded Swamp Scrubland	3300	N	Southwestern North American Riparian/Wash Scrub Group	
			3310	N	Salix lasiolepis	
			3311	N	Salix exigua	
			3312	N	Baccharis salicifolia	
			3313	N	Sambucus nigra (lumped with Mexican elderberry)	

### Appendix A: Vegetation Classification

<b>Miscellaneous Class</b>	Lithomorphic, Anthropogenic & Water	Lithomorphic, Anthropogenic & Water	3400	N	Southwestern North American Introduced Riparian Scrub Group
			3401	N	Arundo donax
			3402	N	Tamarix
			9200	N	Agriculture Group (Without fallow annual grasses dominating)
			9201	N	Row Crops
			9202	N	Vineyards
			9203	N	Orchards
			9204	N	Other Agriculture including related disturbance
			9300	N	Built up & Urban Disturbance Group
			9301	N	Roads
			9400	N	Areas of Little or No Vegetation Group
			9401	N	Cliffs & Rock Outcroppings
			9402	N	River & Lacustrine Flats & Streambeds
			9403	N	Earth Lined Channels
			9404	N	Concrete Lined Channels
			9405	N	Fence Row
			9406	N	Landscaping
			9800	N	Water Group
			9801	N	Perennial Stream Channel
			9802	N	Reservoirs
9803	N	Small Earthen Dam Ponds and Natural Lakes			
9999	N	Unknown Type Group (flagged for field)			

## Appendix B

### Tree Scoring for Removal of Trees and Shrubs ≤ 12" DBH

April 5, 2011

Trees up to 12" dbh may be removed under the Stream Maintenance Program 2012-2022. The sum value from the assessment of four (4) attributes will provide a mitigation ratio for the trees/shrubs proposed for removal. Trees >12" dbh are not included as a part of this removal program.

High scores equate to higher value trees, with greater potential impacts if they are removed; and therefore, will require more mitigation. Low scores equate to lower value trees, having fewer potential impacts if they are removed; and therefore, require lower mitigation.

#### A. Approach

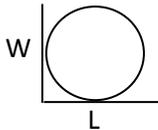
Tree replacement would start with a baseline ratio of 1:1. Replacement ratios would increase or decrease based on specific ecological attributes of the individual(s) to be removed and the setting in which it is/they are located.

Scoring would add to or subtract from the baseline ratio. Final ratios would be calculated using the methodology outlined below.

#### B. Ranking

##### 1. Canopy cover

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



Metric: Choose 1. Assess at widest dripline extension point and square that value.

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

**0-2 points**

##### 2. Local Area Value

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

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

Attribute	Score
Native Species	+1 point
No similar vegetation within 500 feet radius (Size of canopy, height, or similar measurable)	+1 point

criteria; even if non-native).	
Stand Reduction (Removal of target trees would reduce stand by more than...)	+1 point for 20-50% reduction +2 points for greater than 50% reduction

**0-4 points**

3. Ecosystem Benefits (wildlife, fisheries, streams)

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

Metric: Choose all that apply.

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

**1-4 points**

4. Ecosystem Detriments

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

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

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

**-4-0 points**

C. Mitigation Calculation

Baseline is 1:1 ratio for trees impacted in this size class.

Point reductions could result in a final score that reduces the ratio to less than 1:1.

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

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

## Appendix B

## Tree Scoring for Removal of Trees and Shrubs ≤ 12" dbh

Site Location \_\_\_\_\_  
 Assessors Name \_\_\_\_\_  
 Date \_\_\_\_\_  
 ESU # \_\_\_\_\_

Species \_\_\_\_\_  
 DBH \_\_\_\_\_  
 Canopy Cover sq ft \_\_\_\_\_  
 Reason for Removal \_\_\_\_\_

### 1. Canopy cover

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

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

**0-2**

**Vegetation Cover**  
Score: \_\_\_\_\_

**Stand maximum = 2000 sq ft**

### 2. Local Area Value

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

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

**0-4**

**Local Area Value**  
Score: \_\_\_\_\_

### 3. Ecosystem Benefits (wildlife, fisheries, streams)

Metric: Choose all that apply.

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

**1-4**

**Ecosystem Benefit**  
Score: \_\_\_\_\_

### 4. Ecosystem Detriments

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

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

**-4 – 0**

**Ecosystem Detriment**  
Score: \_\_\_\_\_

# Appendix B

## C. Mitigation Calculation

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

**Total 4 Attributes**  
Score: \_\_\_\_\_

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

**Mitigation Ratio:** \_\_\_\_\_

Canopy Cover sq ft X Ratio quotient = Amount Owed

\_\_\_\_\_