Arroyo Grande Creek Channel
Waterway Management Program
Habitat Mitigation and Monitoring Plan

San Luis Obispo County Flood Control &
Water Conservation District

2019

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1 INTRODUCTION

This Habitat Mitigation and Monitoring Plan (HMMP) documents the methods for mitigating project impacts to riparian and wetland habitats associated with the Arroyo Grande Creek Channel Waterway Management Program (WMP) Alternative 3a, Modified 3c project (project). The project will result in permanent and temporary impacts to areas regulated by the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), and California Coastal Commission (CCC). This HMMP follows guidelines presented in the Checklist for Compensatory Mitigation Proposals (USACE 2008a) and the Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (USACE 2008b). The information contained here is a combination of the information that is fleshed out more thoroughly in the Project documents, including the project's Environmental Impact Report (EIR) (SWCA 2010, State Clearinghouse #20090610302013), Addendum to the EIR (3/13/13), Waterway Management Program (Waterways Consulting 2010), Alternatives Analysis (Swanson Hydrology and Geomorphology 2006), and 100% Administrative Draft Plans (Waterways Consulting).

Two key elements of the WMP, namely the vegetation and sediment management programs, will require activity within Arroyo Grande Creek and Los Berros Creek diversion channel over the long-term and in some cases on an annual basis. The first two dry season construction periods of implementation are anticipated to result in the greatest impacts to jurisdictional areas. Subsequent years will involve maintenance that will not result in the same level of vegetation management requirements. To maximize the benefit of these activities and protect vital biological resources, long-term management will need to be adaptive to the conditions on site in any given year. An integral element of the WMP is a well-defined monitoring and response program that provides the data necessary, in a timely manner, to effectively manage the system. This document will guide long-term vegetation and sediment management within the project area.

This HMMP provides for minimization measures and Best Management Practices to minimize impacts to jurisdictional areas, and on-site mitigation for permanent and temporary impacts. Vegetation impacts, including both vegetation management activities and vegetation impacts which are associated with access, staging, and construction of other waterway management activity types will be mitigated primarily through a combination of revegetation, invasive plant management and encampment cleanup. Due to the goals and objectives of the proposed WMP, mitigation for both temporary and permanent impacts would be in-kind in order to manage vegetation within the channel to increase channel flood protection capacity while maintaining the functions and values of the riparian vegetation. In-kind and out-of-kind mitigation will result in the enhancement of habitat attributes including:

- A continuous riparian corridor within the Arroyo Grande Creek channel and Los Berros Creek diversion channel;
- An increase in plant species diversity within portions of both channels by planting a diverse palette of tree species;
- The establishment of riparian and scrub vegetation in areas that are currently devoid of vegetation;
- A decrease in the overall percent coverage of exotic invasive vegetation;
- Increased water quality with the removal of trash from the riparian areas;
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- Enhanced in-stream habitat through the introduction of log structures and alcoves.

2 COORDINATION AND COLLABORATION WITH OTHER WATERSHED IMPROVEMENT EFFORTS

Arroyo Grande Creek Watershed Management Plan

The WMP will implement a number of recommendations found in the Arroyo Grande Creek Watershed Management Plan (Plan). The Plan is a working documentation of history, information, and projects along the creek and its tributaries, and throughout the watershed. This plan describes the condition of the creek, identifies critical issues and limiting factors affecting steelhead in the watershed, and poses a set of recommendations to address the issues. The Plan was developed by Central Coast Salmon Enhancement, in association with a coalition of private landowners, as well as local, state and federal agency representatives. The Plan was funded through the California Department of Fish and Wildlife, Fisheries Restoration Grant Program to identify long term steelhead habitat restoration on public and/or private lands in the watershed by carrying out comprehensive watershed-wide planning activities.

Watershed MOU

Additionally, a Memorandum of Understanding (MOU) is in place that is designed to improve watershed conditions and limit sediment delivery from upslope areas to impacted reaches of Arroyo Grande Creek, such as the flood control reach of the proposed project, through coordinated efforts with several cities, resource agencies, and the District. The District became a signatory to the Arroyo Grande Creek Watershed MOU on April 22, 2008. The purpose of the MOU is to enhance an overall understanding of watershed issues and promote consensus between the parties in order to better protect, manage, and enhance the Arroyo Grande Creek watershed.

By signing the MOU, the District showed its support for collaborative watershed management. Other signatories of the MOU include: the City of Arroyo Grande, South San Luis Obispo County Sanitation District, San Luis Obispo Coastal Resource Conservation District (RCD), Natural Resources Conservation Service, and Central Coast Salmon Enhancement. The RCD and Central Coast Salmon Enhancement have become key advocates for the MOU and are working with other resource agencies to become signatories, including: US Fish and Wildlife Service, CA Department of Fish and Wildlife, and CA Department of Parks and Recreation. The Regional Water Quality Control Board was solicited for signature, but was unable to sign and instead endorsed the MOU.

San Luis Region Integrated Regional Water Management Plan

The Arroyo Grande Creek Channel WMP was identified as a high priority project in the San Luis Region Integrated Regional Water Management Plan (IRWMP) due to its ability to meet multiple goals and objectives in the IRWMP. The IRWMP identified five immediate term programs for implementation based on their ability to meet multiple goals and objectives and their readiness to proceed to implementation. These five programs are: the Water Quality Program, Water Supply Program, Ecosystem Preservation and Enhancement Program, Groundwater Monitoring and Management Program and Flood Management Program. The WMP helps benefit three of the five programs: Flood Management, Ecosystem Preservation and Enhancement, and Water Quality.

3 PROJECT AND SITE DESCRIPTION

Responsible Parties and Financial Assurances
As the project applicant, the party responsible for meeting the mitigation obligation pursuant to the special conditions of the Clean Water Act is:

San Luis Obispo County Flood Control and Water Conservation District
c/o Department of Public Works
976 Osos Street, Room 206
San Luis Obispo, CA 93408

The San Luis Obispo County Flood Control and Water Conservation District (District) has the financial and technical means to implement this Plan and any required contingency actions. Maintenance of the project and Plan, following construction, will be the responsibility of the County Flood Control and Water Conservation District Zone 1/1A, under the purview of the County Department of Public Works. The need to establish a performance bond for the actions outlined in this Plan or any subsequent contingency measure by the District is not anticipated at this time. The site is located entirely within a County-owned easement or right-of-way.

3.1 Location of Project

The proposed project is located within San Luis Obispo County, California, near the city of Arroyo Grande and the community of Oceano (refer to Figure 1). The project area is located entirely within the unincorporated areas of San Luis Obispo County.

Arroyo Grande Creek drains a 157-square-mile coastal watershed located in west-central San Luis Obispo County. Approximately 55 square miles of the watershed is downstream of Lopez Reservoir and drains directly into Arroyo Grande Creek, while approximately 34 square miles drains into the Los Berros Creek diversion channel, which outlets into the Arroyo Grande Creek channel. The main stem of Arroyo Grande Creek flows through the city of Arroyo Grande and unincorporated community of Oceano. It is an important regional waterway, providing agricultural and municipal water to the communities of Arroyo Grande, Grover Beach, Oceano, Pismo Beach, and Avila Beach by way of Lopez Reservoir.

The project area is a linear corridor with two segments: 1) Arroyo Grande Creek channel from approximately 700 feet north of the confluence with Los Berros Creek diversion channel downstream to the Arroyo Grande Creek adjacent to the Oceano Community Airport; and 2) Los Berros Creek diversion channel from approximately 300 feet north of the Century Lane Bridge to Arroyo Grande Creek channel (refer to Figure 2). The project area is within the County's Flood Control District Zone 1/1A. The total length of the flood control channels addressed in the WMP is approximately 3.5 miles. Impacts to jurisdictional areas and subsequent mitigation will be located entirely within the project corridor (refer to Appendices A and B).

The western boundary of the project area is located at -120°37'22" (longitude), 35°5'57" (latitude). The eastern boundary is located at -120°34'41" (longitude), 35°6'11" (latitude).

3.2 Brief Summary of Overall Project

The WMP is a comprehensive set of actions designed to restore the capacity of the leveed lower three miles of Arroyo Grande Creek Channel and the Los Berros Creek diversion channel (Figure 1) to provide flood protection up to a 20-year storm event while simultaneously enhancing water quality and sensitive species habitat within the managed channel. The WMP establishes a framework for how the lower portion of Arroyo Grande and Los Berros Creeks will be managed, long-term, to meet the goals established by Zones 1 and 1A (Zone 1/1A) of the San Luis Obispo County Flood Control and Water Conservation District (District). Management, within the context of the WMP, includes a combination of capital improvement projects, long-term maintenance activities, active restoration and enhancement projects, mitigation measures, performance monitoring, monitoring of implemented projects, programmatic elements, and adaptive management that responds to the performance monitoring activities.

The Project includes the following components:

- Annual vegetation management which consists of the removal of vegetation between the levees and the buffer areas along Arroyo Grande Creek and Los Berros diversion channels;
- An initial phase of sediment removal, conducted over two separate dry construction periods;
- Long-term sediment removal, which will occur when modeling/surveys indicate that less than 10-year protection is being achieved;
- The installation and maintenance of 36 log structures and alcoves for habitat for listed species;
- Patchwork to repair portions of levees to reinstate up to the existing grade of other properly functioning portions of the levee system (repair is needed due to damage from vehicular and horse traffic, along with natural elements/weather, have eroded the earthen levees); repairs will include adding six inches to one foot of material in designated areas along the levees (approximately 25,000 cubic yards of fill material); and
- Flood control wall installed adjacent to heavy residences and commercial use areas along the northern levee.

The Project will also include construction of habitat enhancement features including 36 log structures, alcoves within secondary channels, removal of invasive species, planting of native riparian species, and removal of trash and debris from the channel to promote the development of a healthy riparian corridor.

Work is not proposed to occur in a live stream and/or within wetted portions of either channel. The project is intended to enhance water quality and stream functions along the Arroyo Grande Creek and Los Berros Creek diversion channel and mitigation measures related to sedimentation or erosion have been identified in the EIR prepared for the WMP, including preparation of an erosion control plan and stormwater pollution prevention plan (SWPPP). The only work that will occur at or below Ordinary High Water Mark (OHWM) will be to create and maintain alcoves for steelhead habitat.

Post construction and in any given year, if the cross-section data and modeling results show a reduction in freeboard available to contain a 10-year event due to vegetation growth and sediment deposition, the District will submit to the regulatory agencies for approval a Sediment and Vegetation Management Work Plan (Work Plan) (refer to Appendix A for the template) to remove accumulated vegetation and sediment from secondary channels to maintain 10-year flood protection with freeboard. Maintenance on established habitat features (log structures and alcoves), and additional mitigation activities such as

riparian planting, invasive species control, and removal of trash and pollutants from homeless encampments, will also be described in the work plan and performed at the same time as sediment management activities. The agencies will have up to four weeks to review and respond to the annual plan.

The Work Plan is separate from the annual Mitigation and Monitoring Report that will also be submitted to agencies on an annual basis. The Mitigation and Monitoring Report will summarize the results of sediment and vegetation monitoring, compensatory mitigation measures implemented, and whether or not the project is meeting performance standards (refer to Appendix H for the template).

All work within jurisdictional areas that requires the use of mechanized equipment – i.e., sediment removal activities – will occur during the standard work window, from June 1st through October 30th. Hand removal of vegetation, removal of invasive species, installation of erosion and sediment control BMPs, and planting efforts may occur outside of the window; however, no mechanized equipment will be used outside of the standard work window. Refer to Table 1 for the anticipated annual project time line.

Table 1: Anticipated Annual Project Time Line

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Submit Sediment and Vegetation Management Work Plan submittal to and review by regulatory agencies		X	X									
Pre-Activity Surveys for Sensitive Species/Nesting Birds			X	X	X	X	X	X	X	X		
Vegetation Management Using Hand Tools				X	X	X	X	X	X	X		
Sediment Management using mechanized equipment*						X	X	X	X			
Installation of Erosion and Sediment Control BMPs										X	X	
Mitigation Plantings										X	X	X
Monitoring	No seasonal restrictions											

*Initial sediment management activities will be phased over two dry-season construction periods

Figure 1: Project Vicinity Map

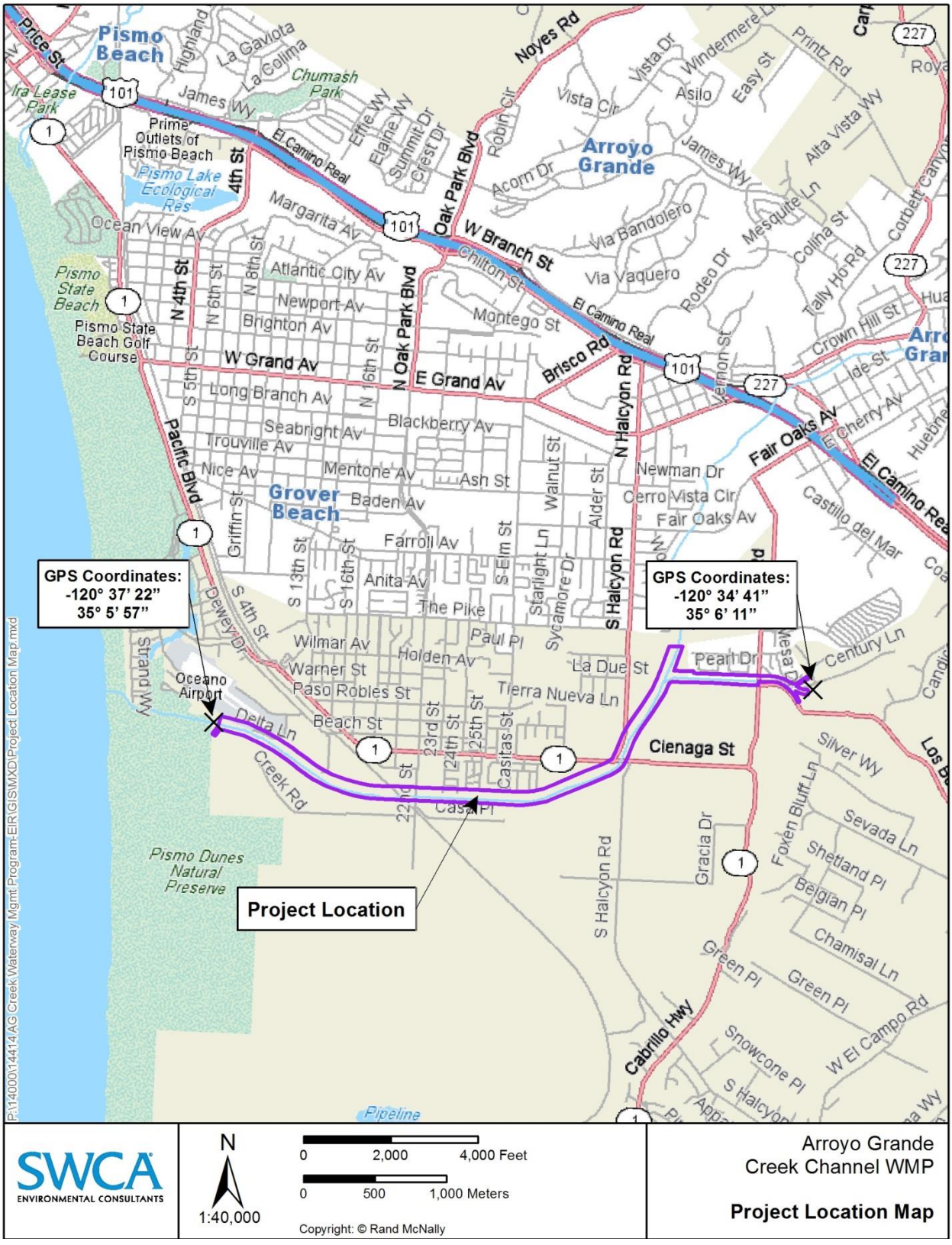

Figure 2: Project Location Map

3.3 Vegetation Management

The goal of the long-term vegetation management program and the mitigation approach is to maintain a balance between flood protection along lower Arroyo Grande Creek and protection of natural resources that rely on a healthy riparian corridor to protect important aquatic habitat. The vegetation management program will result in a continuous corridor of riparian vegetation along the established primary (low flow) channel. This coincides with a recommendation in the Arroyo Grande Creek Watershed Management Plan Update (Central Coast Salmon Enhancement 2009) which states that "the riparian corridor through the flood control reach of the Arroyo Grande should be managed to maximize channel shading and minimize overall channel roughness." The plan, prepared for CDFW, also recommends "Increase riparian corridor buffer width and complexity along Arroyo Grande Creek by planting appropriate native vegetation like willow, alder, sycamore and cottonwood. Plants are needed along the stream where shade canopy is not present and where the riparian buffer is very narrow." These two recommendations, among others, will be implemented as a result of the Arroyo Grande Creek Channel Waterway Management Program.

The **Buffer Zone** refers to those areas that are located directly adjacent to the low-flow channel of Arroyo Grande Creek and the Los Berros Creek diversion channel. The proposed Project will not remove any live or native vegetation within these buffer areas. The **Transition Zone** refers to spatial area between the boundaries of the Buffer Zone and the farthest extent of the woody vegetation canopy coverage (overstory) that originates from within the Buffer Zone. Woody vegetation that is located in the **Riparian Scrub Enhancement Area**, located outside of the aforementioned Buffer Zones (including the understory of the Transition Zone) will be converted to non-woody riparian vegetation. Refer to Figure 3 and Appendix B.

A District biologist along with a District engineer or District civil engineering technician will identify which trees should be removed each year prior to the onset of Project activities. The focus will be to thin the vegetation in the Transition Zone and enhance the vegetation in the Buffer Zone throughout Arroyo Grande Creek channel, and enhance both zones in the Los Berros diversion channel. In order to thin the vegetation within the Transition Zone along Arroyo Grande Creek, the District biologist and District engineer will identify willows that are stressed and damaged, or offer no shade benefits to the creek. These will include willows that are dead, broken, and leaning toward the outside of the levees. For vegetation management activities, a differentiation is made between the Arroyo Grande Creek channel and Los Berros Creek diversion channel. Because the relative size of these channels vary significantly and the flood control channel reach of Los Berros lacks any appreciable flow in the summertime, vegetation management activities need to be different to reflect site conditions, opportunities, and constraints.

Vegetation management activities will likely occur annually depending on the amount of re-growth and funding. Based on vegetation management activities that have occurred over the last few years, regrowth of managed vegetation during the spring and summer is heavy, requiring annual maintenance. Vegetation management to remove the invasive species would occur in early spring to prevent the vegetation from going to seed. Removing the invasive species prior to them going to seed will reduce vigorous regrowth during the following winter/spring and promote the growth of native species. Where there are gaps in the vegetation and shade structure along the low flow channel (i.e., within the Buffer Zone), trees will be planted to offset the loss of the trees in the Transition Zone. The trees planted will include sycamores, alders, box elders, and cottonwoods to increase diversity. Because Arroyo Grande Creek primarily consists of willows, few to no willows will be replanted in the Buffer Zone. However, arroyo willows will be planted along the Buffer Zone of the Los Berros Creek diversion channel.

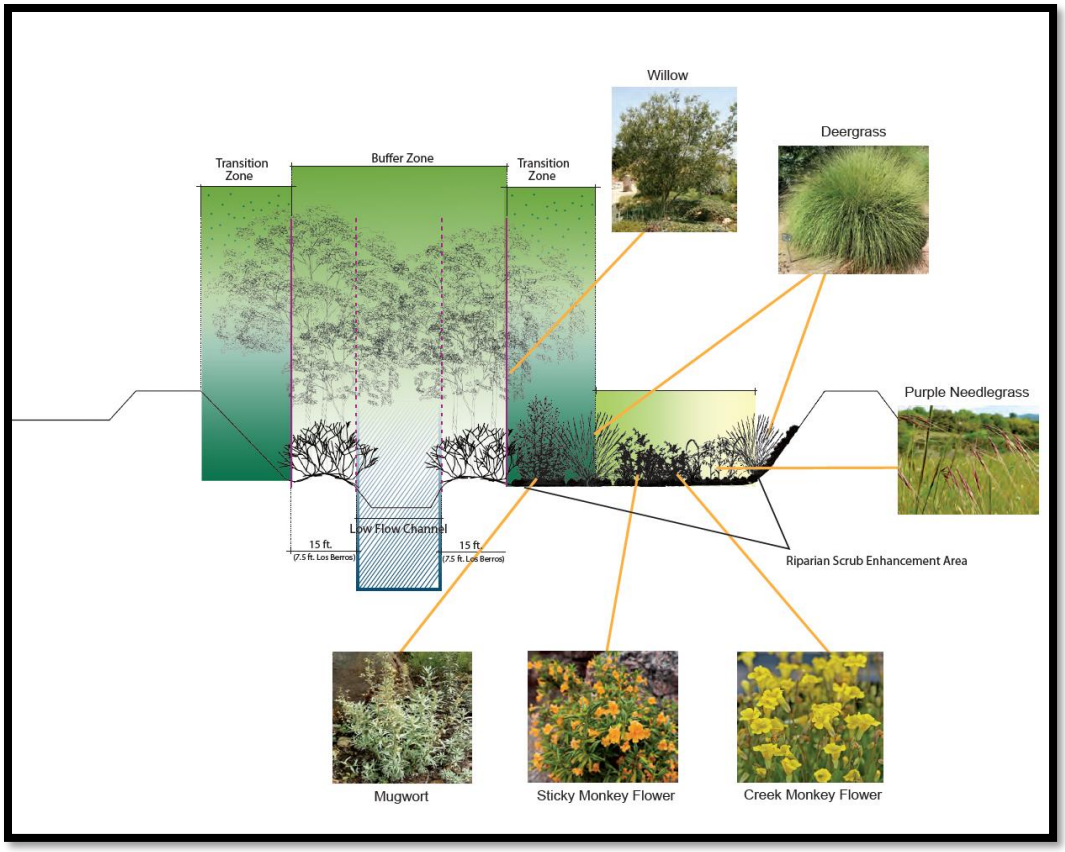

Figure 3: Buffer zone, transition zone, and riparian scrub enhancement area (also shown in Appendix B)

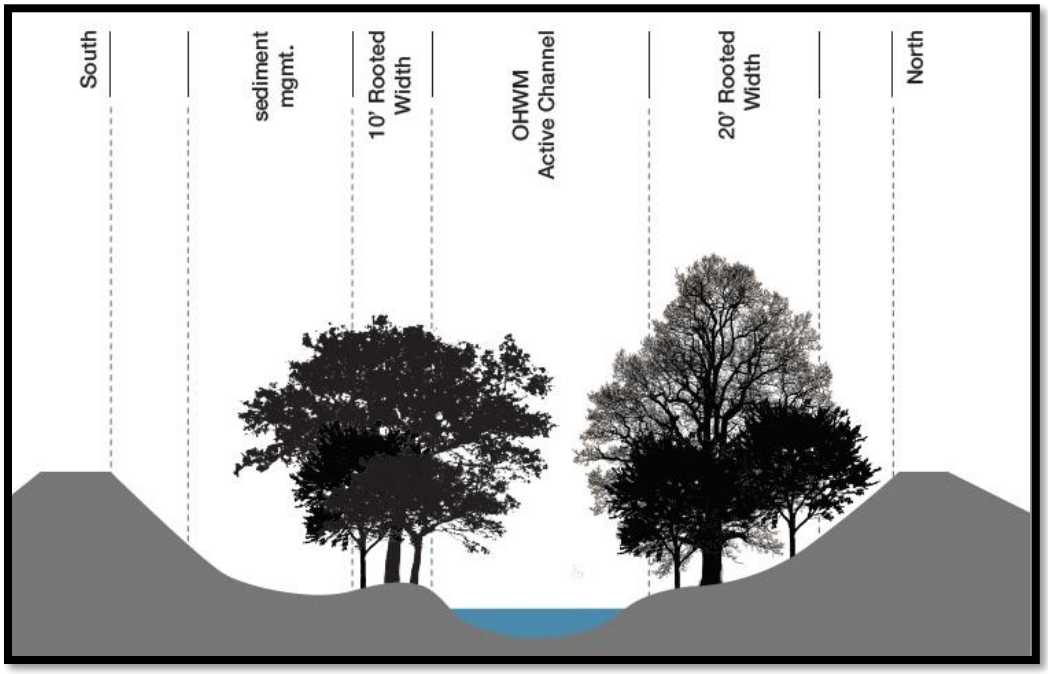

Figure 4: Primary channel (active channel), buffer zone shown with rooted widths, and transition zone where sediment management will occur between the north and south levees

Measures that will be implemented to minimize impacts include:

- Vegetation management would occur as late as possible in the summer and fall of each year to maximize stream shading during the warmer summer months.
- All work within jurisdictional areas that requires the use of mechanized equipment will occur during the standard work window, from June 1st through October 31st.
- Hand removal of vegetation, removal of invasive species, installation of erosion and sediment control BMPs, and planting efforts may occur outside of the window; however, no mechanized equipment will be used outside of the standard work window.
- If tree trimming activities occur prior to September 1, protocols to avoid impacts to nesting birds will be followed.
- To ensure that vegetation management activities are carried out in a consistent manner, all workers will need to be properly trained and abide to the protection measures proposed in the WMP, U.S. Fish and Wildlife Service's (FWS) Biological Opinion and amendment (8-8-15-F-4, May 2015 & June 2017), National Marine Fisheries Service's (NMFS) final Biological Opinion (SPL-2012-00317-JWM), and all other regulatory permits that will be received for the Project.

3.3..1 BUFFER ZONE

The Buffer Zone refers to those areas that are located directly adjacent to the low-flow channel of Arroyo Grande Creek and the Los Berros Creek diversion channel. The proposed Project will not remove any live or native vegetation within these buffer areas. Only non-native, invasive species will be removed in the Buffer Zones. Additionally, if dead willows lying across the channel are found, they may also be removed to prevent debris jams and increased flood threat.

The buffer will act to maintain a primary low-flow channel that has developed over the last several years by providing root strength along the low flow channel margins. Woody vegetation outside of the buffer would be removed to allow for high flows to access secondary channels (see sediment management program) and provide for increased conveyance and flood capacity. Non-woody herbaceous vegetation would not be removed as they are expected to lie down during a large flow event.

Management activities within the buffer will consist of the following:

- No trees will be removed within the buffer area with the exception of trees that have fallen over and are a risk to the integrity of the levee (e.g. – lodged against levee or bridge) or have the potential to increase the risk of flooding (e.g. – have fallen across the channel and are obstructing flow).
- Woody vegetation within 20 feet of existing bridges (20 feet upstream and 20 feet downstream) will be removed. Native seed mixes will be applied in these areas to offset the loss of woody vegetation.
- Vegetation management activities will be conducted by hand crews and will include the use of mechanized and non-mechanized hand equipment such as chainsaws, loppers, etc. No debris will be allowed to enter the stream channel and debris from invasive species will be separated,

bagged and disposed of at a designated landfill. Native vegetation cut from the channel will be mulched on site and either used as mulch on the back side of the levees or removed to a designated off-site area.

- No limbing will occur in the Buffer Zones, except to maintain clear flowpath in center of low flow channel. Dead, broken or low hanging limbs would be trimmed to maintain 6 feet of vertical clearance from the bed of the channel.

- Root balls within the Buffer Zones will be left intact to encourage spring/summer growth along the channel edge, maintain bank stability along the low-flow channel, stabilize soils, and provide cover for species such as California red-legged frog.

- The buffer zone for the Arroyo Grande Creek channel will consist of maintaining a minimum of 30 feet of buffer width in the buffer zone, with a minimum of 10 feet on any one side of the low flow channel.

- The buffer zone for the Los Berros Creek diversion channel will consist of maintaining a 15-foot rooted buffer zone, with a minimum of 5 feet on any one side of the low flow channel.

- Where there are gaps in the vegetation and shade structure within the Buffer Zone, trees will be planted to offset the loss of the trees in the Transition Zone.

Each buffer would be measured at breast height, similar to the technique of measuring tree trunk DBH and does not necessarily represent the width of the riparian canopy. The riparian buffer is anticipated to provide a canopy cover of up to 150 feet (Refer to the Ecological and Biological Justification for the Arroyo Grande Creek Waterway Management Program Revised Vegetation Buffer, Appendix C).

These widths are proposed to be consistent along the entire length of the Project (with the exception of "Bulb Outs"). Tree installation will be focused first on the south side or the west side of the channel to provide the most cooling effect, as a result of the way shadows fall at different times of the day. Improving the effectiveness of the canopy will help to maintain cool water temperatures and water quality needed by native fish.

Areas within the Buffer Zones that are currently devoid of trees will be utilized for the purposes of mitigating the loss of trees that will occur in the Transition Zone. Based on the Ecological and Biological Justification for the Arroyo Grande Creek Waterway Management Program Revised Vegetation Buffer (Public Works Environmental Programs Division, 2017), the average canopy coverage in the Arroyo Grande Creek channel would exceed the current average in the Project area. Trees are proposed to be planted at 7 to 10 feet on center to fill existing gaps. For the purposes of this Project, the maximum canopy cover is limited to an average of 150 feet, which is the average area between the north and south levees.

The main channel of Arroyo Grande Creek is characterized by nearly monotypic stands of willow (Salix sp.) that grow to an approximate height of 25 feet. One of the primary Project objectives is to improve the diversity of the riparian corridor by planting a mix of native riparian species. The proposed plantings, including sycamore, cottonwood, and box elder, have the capability to grow significantly larger crowns as well as grow to higher heights than the existing willow species prevalent in the channel. A wider and more continuous riparian corridor will be a significant improvement over existing conditions and will increase habitat for listed species.

3.3..2 TRANSITION ZONES

The Transition Zone refers to spatial area between the boundaries of the Buffer Zone and the farthest extent of the woody vegetation canopy coverage (overstory) that originates from within the Buffer Zone. Canopy coverage from vegetation that is originating from within the 15-foot buffer on each side of Arroyo Grande Creek channel and the 7.5-foot buffer on each side of Los Berros Creek diversion channel will be maximized. The overstory that originates from the woody vegetation in the Buffer Zone will not be removed as part of the vegetation management and will continue to provide ample canopy coverage beyond the Buffer Zone. However, the woody understory within the Transition Zone [i.e., coyote brush (*Baccharis pilularis*)] will be removed and replaced within non-woody riparian vegetation. A total of approximately 95 linear feet/ 0.09 acre will be impacted as a result of the removal of coyote brush.

Replacement of woody understory with non-woody understory will occur through two seed mixes. Refer to the Habitat Mitigation and Monitoring Plan (HMMP) prepared for the Project for specific seed mixes. These seed mixes include seep willow (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), sky lupine (*Lupinus nanus*), sticky monkey flower (*Mimulus aurantiacus*), and creek monkey flower (*Mimulus guttatus*). These species will provide similar cover, if not more dense, to the existing cover provided by the woody vegetation currently occupying the secondary channel (e.g., coyote brush). In addition to providing similar cover, shade and shelter for wildlife, these species will lie over during high flow events, rather than trap debris and/or significantly obstruct flows. Native vegetation that is not woody in nature will not be removed as it is expected to lie down during a large flow event. A portion of the Los Berros diversion channel is very steep with little to no Transition Zone. Some areas along the channel are devoid of vegetation and denuded in nature. These areas will be seeded with the Transition Zone Riparian Seed Mix.

3.3..3 RIPARIAN SCRUB ENHANCEMENT AREAS

Woody vegetation that is located outside of the Buffer Zone and Transition Zone will be converted to non-woody riparian vegetation. For example, coyote brush will be removed and replaced with monkey flower, various grass and rush species, and other native herbaceous species. These areas will be seeded with the Riparian Scrub Enhancement Seed Mix. The species that comprise this seed mix will function as wildlife habitat while allowing the secondary channel to maximize capacity during large storm events. It is intended and anticipated that the herbaceous vegetation will lie over during large storm events and not catch debris or block flows.

3.3..4 LONG-TERM VEGETATION MANAGEMENT

Long-term vegetation management will be conducted every 1 to 3 years through an adaptive management approach that will include reconnaissance surveys, application of herbicides approved for use near waterways, and possibly the use of grazing animals. Re-occurring vegetation management will include the same activities as the first-year management plan but on a much reduced scale and magnitude. To the extent possible, activities will only take place outside the established riparian corridor (low-flow channel and buffers) and will be conducted by hand crews using mechanized and non-mechanized equipment such as chainsaws, loppers, pruners, etc. Vegetation management, including tree trimming, will occur as late as possible in the summer and fall of each year to maximize stream shading during the warmer summer months and avoid impacts to nesting birds. Removal of invasive species prior to them going to seed will reduce re-growth during the next season and promote the growth of native species. It is anticipated that very few trees over 4” DBH will be removed after the first

year of activities is conducted. Because the project area will be evaluated on an annual basis, trees growing in the Transition Zone will likely be removed fairly soon after their detected, long before they reached 4" DBH. The majority of tree removal activities will occur during the first year of implementation of the WMP.

3.3..5 ADAPTIVE MANAGEMENT STRATEGY

It is important to state that the removal of riparian vegetation outside of the buffer areas will be adaptive and based on the field evaluation conducted during the time of the removal by an authorized District Environmental Resource Specialist or District-approved biologist. For instance, trees that are located adjacent to the buffer boundary that provide substantial shading to the creek will likely remain in place. In addition, trees that are located adjacent to the buffer boundary that contribute to the species diversity within the channel (e.g., cottonwoods) will also be evaluated by the District for consideration to remain in the channel. Therefore, the calculations within this report with respect to riparian vegetation removal are conservative. The impacts from vegetation removal are anticipated to be less than what is provided in Section 8 as a result of the adaptive approach by the District.

3.3..6 SEDIMENT MANAGEMENT

The Arroyo Grande Creek flood control channel currently lacks the secondary channels that are found in more natural, low gradient stream environments. Therefore, secondary, or overflow channels, will be excavated into areas in the channel that have accumulated excess sediment resulting in reduced flood capacity. The excavated secondary channels will crisscross with the primary channels to allow for complex flow conditions that will encourage scour and sediment transport and reduce the need for future sediment removal. Installation of natural log structures at the points of interconnection will keep the secondary channel and low-flow channel in place. No sediment in the primary low-flow channel will be excavated. Please refer to Appendix B for a cross-section view of proposed activities in the channel. Refer to Appendix D for plan view maps of the sediment management, buffer zone, transition zone, and riparian scrub enhancement areas. Prior to sediment management activities, representative sediment samples will be collected within the proposed secondary channel areas to be excavated for chemical analyses and physical characteristics testing. The results of the chemical analyses will be used to evaluate whether chemicals of potential concern (COPCs) are present in the sediment prior to off-site disposal or reusing sediment on- or off-site, and the physical characteristics testing results will be used for assisting the District with the final disposition of the excavated material. If the sediment meets design criteria, it may be reused on site to repair and raise the levees.

Sediment management activities will entail the following:

- Initial sediment management (phased over two dry-season construction periods) through removal of an estimated 25,000 cubic yards of sediment deposits from the Century Lane Bridge south along the Los Berros diversion channel to approximately AG Creek river station 36+00; and
- Establish secondary, or overflow, channels in designated off-channel areas to create overflow paths during high-flow events.

To enhance geomorphic function, improve flood conveyance, and "set" the flood control channel to an initial condition that will enhance sediment transport, a two-step process is proposed for sediment management within the project area. The two-step process consists of an initial phase of sediment removal that will be phased over the first two years, followed by a long-term sediment management program that will rely on periodic monitoring of sediment conditions in the channel and consultation

with permitting agencies to remove accumulated sediment from areas where modeling results show that sedimentation has reduced capacity beyond the defined freeboard (10-year flood protection).

Initial sediment removal activities will include removal of sediment on the levee side of the riparian buffers. Where excessive sediment has built up in the designated off-channel areas, sediment will be removed to a depth of 1.5-foot above the riffle crest, but not below the OHWM of the Arroyo Grande Creek Channel and 1-foot above the riffle crest, but not below OHWM in the Los Berros diversion channel. These depths were estimated as the appropriate bankfull depth for these channels based on field indicators. Sediment that has accumulated as a bar feature along the buffers will not be removed, thereby encouraging higher velocity flows along the primary and secondary channels and enhancing sediment transport conditions.

Sediment management activities will require mechanized equipment and will not move forward until June 1. First-year sediment removal will occur outside of the primary low-flow channel and the riparian buffers established as part of the first year vegetation management program. Sediment in off-channel areas will always be removed above the OHWM, specifically, to a depth of 1.5 feet above the thalweg elevation of the Arroyo Grande Creek channel and 1 foot above the Los Berros Creek diversion channel. These depths are above the OHWM and estimated to support a bankfull discharge to stabilize and restore the natural stream channel, thereby improving in-stream habitat. Sediment removal locations will become overflow or secondary channels that provide flow paths during high volume events.

The secondary channels will intersect the primary channel during high flow events to create localized eddies which encourages scour and sediment transport, thereby reducing future sediment removal efforts. In order to accomplish this initial sediment removal, construction equipment will be within the channel, but outside the low-flow channel and buffer zones, during initial sediment management and during installation of the log structures.

Long-term sediment management maintenance will be conducted based on periodic monitoring of sediment conditions in the channel in order to "reset" conditions to maintain 10-year flood protection. "Resetting" will be necessary due to the quantities of sediment and other fine materials that could be deposited in the secondary channels. The objective of the long-term management program is to keep the secondary channels open for flood flows. This will be achieved with adaptive management of the channel which will involve evaluating sediment deposition every 1 to 3 years via monitoring of cross-sections and consultation with permitting agencies. Cross-section monitoring will help define hydraulics and sediment transport conditions in this portion of the watershed in order to inform the decision and need to perform spot removal of accumulated sediment.

The volume of sediment removal will vary from year-to-year; however, it is expected to be considerably less than the initial removal because it will only be needed at specific locations and in some years may not be required at all. Long-term management of the secondary channels will consist of excess sediment removal by an excavator located on the top of the levee. Heavy machinery is not expected to be needed in the channel during the annual, long-term sediment management project.

The District proposes to restore all areas of sediment management with non-woody vegetation seed mix (Refer to Sections 7.2 & 7.3) to be applied in a hydroseed slurry mix. These areas may also be hand-seeded if hydroseeding is deemed infeasible and/or would result in impacts to the areas already disturbed by sediment management activities. Woody vegetation (e.g., trees) will not be re-planted

within these areas because replacement of woody vegetation in these areas would be counterproductive to the project goals and objective of maintaining adequate flood capacity.

After a period of time with consistent monitoring and adaptive management, the District anticipates that the channel will act like a natural stream in dynamic equilibrium, where delivery and transport of sediment into and out of the channel even out, requiring little to no maintenance.

3.3..7 LONG-TERM SEDIMENT MANAGEMENT

Sediment management activities will be necessary over the long term. The location and timing of future sediment management activities will depend on where and when sediment accumulates over time. Cross section monitoring of the project area will occur to evaluate the performance of the restored channel. The monitoring will be occur over one third of the project area every year at established cross sections. Collected data will be used to assess project performance and to determine where accumulated sediment is occurring and required to be removed. The area of disturbance and the volume of sediment removal will vary from year-to-year. However, both are expected to be considerably less than the initial removal and in most years may not be required at all. Sediment management of the secondary channels will consist of sediment removal by hand crews or equipment located on the top of the levee. Heavy machinery is not proposed to be located in the channel during the annual sediment management project. Removal of sediment within the sediment management areas is considered a temporary impact, as all sediment removal areas will be revegetated with a high habitat value and fast-growing riparian mix.

Not every sediment management area will require management activities on an annual or regular basis. The sediment management areas will not be managed every year. There will be years where the replaced vegetation (the vegetation that grows from the seed mixes) will be allowed to survive and flourish, offsetting impacts to habitat value for several years. Additionally, seep willow stakes will be used in addition to both seed mixes to ensure adequate canopy cover and wildlife habitat are replaced at an expedient rate post-sediment management activities.

Long-term sediment management would be conducted during the dry season, outside of steelhead migration season. Long-term sediment removal would only disturb dry areas down to 1.5’ above the riffle crest, but not below OHWM within the secondary channels. The same methodology would apply to the Los Berros diversion channel and dry areas would be disturbed to 1’ above the riffle crest, but not below OWHM. No work would occur in areas where water is present.

After areas where sedimentation has reduced capacity beyond the defined freeboard (reduced capacity to below 10-year flood protection) have been identified through survey data and modeling results, the District will prepare a work plan for sediment management activities to be submitted and approved by regulatory agencies prior to when activities are expected to occur (PM SED-1, WMP). The work plan will be guided by the following parameters intended to minimize sediment removal activity impacts contributing to the jeopardy determination.

The ongoing sediment removal plan will include discrete, short segments of sediment removal. Sediment removal shall not exceed 20% of the channel length in the action area in any consecutive 2-year period. In accordance with the 20% cap, the plan will set a yearly maximum linear foot disturbance of 2,740 feet for Arroyo Grande Creek and 640 feet for Los Berros diversion channel.

Each sediment removal project site may not exceed 500 feet along the channel bed and each sediment removal project site must be separated by a minimum distance of 500 feet where no sediment removal activities will occur in the same year.

3.3..8 SEDIMENT MANAGEMENT MONITORING

Goal of Sediment Management

The goals of sediment management activities are to increase and maintain flood capacity through the project reach while at the same time improving instream aquatic habitat and reducing the need for maintenance dredging in the future. These goals will be achieved through an initial dredging of previously built up sediment to create secondary channels and integration of habitat enhancement structures consisting of large wood. Sediment management activities, including Year 1 and future activities, incorporate best management practices, monitoring activities, and performance measures that are well tested and have proven to be important as part of an overall strategy to adaptively manage channel conditions.

Monitoring of the sediment management portion of the project is directly related to the performance of the elements of the sediment management plan. Secondary channels are being proposed to enhance sediment transport through the reach and reduce the frequency of dredging activities. Concerns were raised about the impact sediment management activities in the flood control reach will have on sediment transport into and through the lagoon.

Performance measures for the sediment management portion of the project are focused on preparation of the work plan and assessing the quality of instream aquatic habitat and how aquatic habitat function changes over time in response to sediment management activities. Aquatic habitat conditions were last surveyed in 2004 and relative fish abundance sampled in 2006. These studies will act as a baseline to evaluate the benefits of the proposed sediment management activities moving forward. The results from these studies suggest that the Arroyo Grande Creek Channel is primarily used by steelhead adults as a migratory corridor and marginally as rearing habitat for juveniles.

Cross-Section Monitoring

Cross-section monitoring will be conducted periodically in the flood control reach to determine if sediment accumulation in the secondary channels has reduced conveyance to the extent that additional sediment management is required. As identified in the WMP, cross-section monitoring and preparation of a sediment management work plan would consist of the following:

1. Permanent cross-section locations will be established and monumented along the project reach following Year 1 sediment management activities. Cross-sections will be established every 500 feet along the channel and at the upstream and downstream sides of each of the bridges.

2. All of the established cross-sections will be measured Year 1 and roughness will be estimated for each to establish a baseline. A report will be produced and a database established.

3. Periodically, at the discretion of the District, Zone 1/1A, a portion of the cross-sections will be re-surveyed to evaluate the degree of sedimentation. The cross-sections surveyed in any given year will be incorporated into the hydraulic model along with the roughness estimates and a determination will be made regarding the need for dredging of any secondary channels.

4. Re-surveying of established cross-sections should occur as early as possible following the cessation of winter rains (i.e. – April/May). A report cataloging the results of the survey will be used to determine if a sediment management plan is necessary.

5. If sediment management is required, a sediment management plan will be prepared outlining where sediment management is needed, what quantity of sediment will be removed, when the activity will occur, and what equipment and approach will be used. The sediment management plan will be submitted to the agencies for review and comment.

6. If a sediment management plan is prepared, it should be submitted for comment to the agencies by August 1 of the year prior to any proposed dredging activities. Agencies shall try to submit comments by August 15 following submittal of the sediment management plan, but shall submit comments no later than August 30.

Cross-section monitoring data will be used in conjunction with the hydraulic model to determine if the levee freeboard has been compromised. Accumulated sediment will be removed from areas where modeling results show that sedimentation has reduced capacity beyond 50% of the available freeboard (10-year flood protection).

Sedimentation of the lagoon is not expected as a result of the project because the post project channel will move less sediment in lower flows than in existing conditions; and will be more efficient at flushing the lagoon with the higher flows expected to be contained in the channel after project construction. If, however, it is determined that the project is resulting in increased sediment within the lagoon, then lagoon restoration would be pursued per sediment management methods and alternatives identified in the Arroyo Grande Creek Erosion, Sedimentation and Alternatives Study (Swanson Hydrology + Geomorphology, 2006) as wells as other enhancement projects to be developed as part of the Meadow Creek Lagoon Watershed Plan.

Mitigation of sedimentation of the lagoon would involve sediment source reduction strategies such as:

- Repair bank erosion and Incision on Mainstem Arroyo Grande Creek
- Floodplain restoration / sediment retention projects in the upper watershed to reduce sediment contribution (5 sites identified in the 2006 Alternatives Study)
- Repair of point source erosions sites (11 identified in the 2006 Alternatives Study)
- Mitigation of sedimentation of the lagoon may also require periodic dredging to reset the lagoon to pre-project conditions.

Annual vegetation and sediment management will need to be an on-going component of the Arroyo Grande Creek Waterway Management Program. A similar program has been successful on the San Lorenzo River in Santa Cruz County despite concerns about steelhead and Coho salmon (SH+G et al, 2002). In the case of the San Lorenzo River, secondary channels have developed a gravel/cobble surface due to scouring action and lack of fine sediment deposition.

3.4 Levee Raise and Repair Activities (Alternative 3a and Modified 3c)

Project implementation includes the Alternate 3a project, which results in 10-year flood protection and freeboard for the entire channel in the project area, and the Modified 3c project, which provides

additional freeboard along the north levee and results in increased protection for the dense residential areas and commercial properties located adjacent to the north levee. The activities associated with the Alternative 3a and Modified 3c projects entail the following:

WMP Alternative 3a:

a. Restoring both north and south levees throughout the flood control channel using earthwork to achieve a channel capacity that protects the adjacent community and agricultural fields up to a 10-year flood event with freeboard for both the south and north levees. Through negotiations with the Regional Water Quality Control Board, the material for levee repair will be permeable (vs impermeable).

   The levee restoration will occur in various locations along Arroyo Grande Creek channel from approximately river station 36+00 to upstream of the Hwy 1 Bridge at approximately river station 150+00, as well as along the Los Berros Creek diversion channel downstream of the Century Lane Bridge;

   The levees will be restored while maintaining and stabilizing a 2:1 slope on the levee interior and providing a minimum 15-foot top width to provide maintenance access and levee stability where possible; and,

   Approximately 18,000 cubic yards of fill material will be required to implement the project and provide the 10-year flood protection with freeboard.

b. Install interlocking concrete block as a permanent, pervious best management practice along the top and outside slope of the south levee between Highway 1 and Valley Road (approximately 4,100 feet) to reinforce the top of the south levee and mitigate erosion damage that could occur from an overtopping event.

WMP Modified 3c:

a. Restoring portions of the north levee through construction of flood walls from Arroyo Grande Creek river stations 74+00 to 100+00; 122+00 to 127+00; 132+00 to 134+00 as well as 500 linear feet of wall along private property and welding steel plates to enclose the 22nd Street bridge railing to provide 10-year flood protection with more freeboard to the high density residential and community facilities areas.

b. Protecting approximately 8,100 linear feet of the exterior slope of the south levee from erosion and overtopping damage through installation of turf reinforcement mats between river station 37+00 and 118+00 (downstream of the Highway 1 bridge).

c. In-place soil stabilization through the addition of interlocking permeable blocks, decomposed granite, or a similar pervious base material along approximately 17,500 linear feet of the 15-foot-wide north and south levee top access roads to allow for erosion stabilization and improved maintenance access.

3.5 Log Structures and Alcoves

The proposed project will include the installation of 36 log structures that will be installed within the 30-foot buffer area and within the in-stream wetland habitat of Arroyo Grande Creek channel. The Los Berros Creek diversion channel is too narrow to support log structures; therefore, no log structures are proposed for this stretch of the program. It has been estimated that the total area of disturbance will be approximately 0.52 acre (0.34 in USACE Other Waters and 0.18 in USACE Wetlands). These structures have a dual purpose of improving wildlife habitat within the channel by promoting pool scour, encouraging variability in substrate and flow condition, and providing pools and cover habitat for steelhead and California red-legged frog, while also discouraging the low-flow channel from migrating.

Alcoves will also be created adjacent to log structures to provide steelhead habitat. The intent of the alcoves is to enhance rearing habitat and provide flood refuge for juvenile steelhead. A total of 18 alcoves would be constructed, one per management area. It is possibly that there may be 16 alcoves as two of the sediment management areas are short in length and it may not be feasible to construct alcoves in these two areas. The alcoves would be constructed to function as low energy, backwater areas, except during the highest flows. The alcoves would be temporary enhancement features as they will likely fill with sediment over time, but would be re-created by the District when the District conducts ongoing (maintenance) sediment removal in the vicinity of the alcoves.

Because of the dynamic nature in which each of these log structures and alcoves will perform in the long term, the estimated area of beneficial impact (mitigation) has been estimated to be an average of 1,500 square feet per structure. When grouped, these structures provide a cumulative benefit. The total mitigation area provided by these structures is approximately 1.22 acres.

4 IMPACTS TO JURISDICTIONAL AREAS

Plant communities within the project area have been documented and mapped on multiple occasions over the past several years. In 2006, a Final Biotic Assessment was prepared by Biotic Resources Group, Inc. In 2008, an updated habitat map of the project area was prepared by SWCA during the preparation of a Botanical Assessment Report. In 2009, SWCA also prepared a Preliminary Jurisdictional Determination for the project site which provided a delineation of jurisdictional areas for the USACE, CDFW, RWQCB, and CCC. The report was prepared based on the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987); *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (Environmental Laboratory 2008); *Definition and Delineation of Wetlands in the Coastal Zone* (CCC 2006); *Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone* (CCC 2007); and federal, state, and local guidelines for identification of wetland areas.

Calculations of permanent and temporary impacts to jurisdictional features were included within the Arroyo Grande Creek Channel WMP EIR. However, these calculations were based on a "worst case" scenario, where WMP Conceptual Plans were overlain with Geographic Information System (GIS)-based jurisdictional mapping data collected by SWCA. Since the certification of the EIR, the level of potential impact has been greatly reduced, partially due to the District no longer proposing to limb-up/thin willow vegetation within the buffer area. This change in scope resulted in changes to impact calculations. Additionally, one set of calculations submitted by SWCA used incorrect mapping; therefore, those calculations were incorrect. The calculations provided in this HMMP are up to date, based on draft 100% Administrative plans, and based on additional field work and data collection (i.e., surveys to count trees & calculations of impacts resulting from sediment management based on final plans). Therefore, the impact quantities within this Plan differ significantly from the original impact calculations included within the EIR. The quantified impact numbers within this Plan are considered to be accurate for the purposes of permitting the following components: Sediment Management, Vegetation Management, and Levee Restoration & Raising Activities (Alternative 3a only).

Table 2: Sediment Management Impact Calculations to Corps Jurisdiction – Arroyo Grande Creek

Jurisdiction	Temporary Impacts	Permanent Impacts	Log Structures
ACOE wetlands	0.18 acre	0	"beneficial fill"
ACOE other waters	0.34 acre	0	"beneficial fill"
RWQCB	0.19 acre	8.86 acres	No impacts
CDFW	0.19 acre	8.86 acres	
CA Costal Commission	0.025 acre	0.69 acre	

Table 3: Sediment Management Impact Calculations by Jurisdictional Category – Los Berros Creek Diversion Channel

Jurisdiction	Temporary Impacts	Permanent Impacts
ACOE wetlands	0	0
ACOE other waters	0	0
RWQCB	0.03 acre	0.54 acres
CDFW	0.03 acre	0.54 acres

Table 4: Tree Removal Proposed for the 1st year of Vegetation Management Activities

Tree species to be removed ≥ 4" DBH	# of trees
Arroyo willows, multi-trunk	3
Arroyo willows, double trunk	3
Arroyo willows	136
Red willows	4
Black cottonwood (8")	4 **
TOTAL	150

* This estimate is based on a 2016 field survey and updated to reflect estimated # of trees lost during storm events of 2017-2018
**cottonwoods located in the Transition Zone that cannot be saved will be transplanted within the Buffer Zone adjacent to current location

As discussed in Section 4.2, Replacement of woody understory with non-woody understory will occur through two seed mixes.

4.1..1 U.S. ARMY CORPS OF ENGINEERS – WETLANDS

Vegetation Management

No permanent impacts to wetlands are anticipated as a result of the vegetation management component of the project. Therefore, no mitigation is proposed for this action.

Sediment Management

The sediment management component will temporarily impact 0.02 acre of the USACE wetland area. This jurisdictional area consists of an adjacent wetland habitat that is located within Arroyo Grande Creek channel near the Pismo Sands Recreational Vehicle (RV) Park. Vegetation within this area includes plant species such as red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), willow herb (*Epilobium ciliatum*), and bur reed (*Sparganium eurycarpum* ssp. *eurycarpum*). It is expected that sediment management activities within this area will only cause temporary impacts to this wetland area, as the hydrological functions within the wetland impact area will remain and vegetation and hydric soils will return.

Log Structures

Installation of log structures will cause temporary impacts to USACE wetlands. A total of 36 log structures are proposed to be installed within the channel. These impacts are estimated to total 0.18 acre of USACE wetlands. The impacts are considered to be "beneficial fill" by the USACE and not seen as permanent impacts by the Regional Board based on emails and discussions between District staff and staff from both agencies. The log structures will improve habitat value within the channel. It is estimated that a total of 1.22 acres of active channel (USACE jurisdiction) will be enhanced as a result of the log structure installation.

4.1..2 U.S. ARMY CORPS OF ENGINEERS – OTHER WATERS

Vegetation management

No impacts to USACE "Other Waters of the U.S." are anticipated as a result of the vegetation management component of the project. Therefore, no mitigation is proposed for this action.

Sediment management

No impacts to USACE "Other Waters of the U.S." are anticipated as a result of the sediment management component of the project. Therefore, no mitigation is proposed for this action.

Log Structures

As proposed, there will be 0.34 acre of temporary impacts, also deemed "beneficial fill," to USACE "Other Waters of the U.S." as a result of the installation of the 36 log structures. However, it is expected that the hydrological functions within the impact area will remain and vegetation and hydric soils will return. The log structures will provide scour pools and refugia for semi-aquatic and aquatic wildlife. It is anticipated that these log structures may influence the development of additional wetland areas following the first heavy rainfall events. The approximate total area that each log structure will influence will be approximately 50 feet by 30 feet, and varies based on the width of the channel. In locations where log structures are closely associated with each other, the net benefit of these structures will be somewhat increased. In total, the 36 log structures will provide a beneficial impact to approximately 1.22 acres of the active channel (USACE jurisdiction).

4.1..3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE/REGIONAL WATER QUALITY CONTROL BOARD

CDFW jurisdiction is clearly defined within the project area by the area located between the top of bank of each levee. Within this jurisdictional area are several habitat types, including: willow riparian woodland, riparian scrub, ornamental, and non-native grassland. The jurisdictional impacts will occur from two project components, described below.

The RWQCB adheres to the delineation protocols set forth by the USACE and CDFW. Potential Waters of the State under the jurisdiction of the RWQCB include all potential USACE and CDFW jurisdictional areas. Therefore, RWQCB jurisdictional areas include all channel features within the levee banks, and areas where riparian habitat exists. Because the impact areas identified for the RWQCB jurisdiction overlap with CDFW and USACE jurisdiction, mitigation for impacts to RWQCB jurisdiction are considered to be satisfied with implementation of the USACE and CDFW mitigation proposed.

Permanent Impacts (Tree Removal)

The project boundary itself contains approximately 42 acres. As proposed, the vegetation management activities will result in the loss of approximately 150 trees within the 9.4 acres of sediment management areas. This will occur to facilitate the sediment management activities in each of the 22 individual sediment management areas. The first year of implementation is anticipated to result in the greatest impacts to jurisdictional areas. Consecutive years will involve maintenance and will not result in the same level of vegetation management requirements.

Additionally, the loss of approximately 95 linear feet/ 0.09 acre of woody vegetation (i.e., coyote brush) will occur within the Transition and/or Riparian Scrub Enhancement Zones.

Temporary Impacts (Vegetation Management and Sediment Management Activities)

The calculations provided in Tables 2 and 3 are based on negotiations with regulatory agencies, plans, and based on additional field work and data collection (i.e., surveys to count trees & calculations of impacts resulting from sediment management based on 100% Administrative Draft Plans). Therefore, the impact quantities within this document and permit applications differ significantly from the original impact calculations included within the EIR. The quantified impact numbers within this document and individual permit applications are considered to be accurate.

Impacts to CDFW and RWQCB jurisdictions as a result of sediment removal activities is anticipated to result in 9.7 acres of temporary impacts. Of this acreage, approximately 8.86 acres will occur within Arroyo Grande Creek and approximately 0.72 acre will occur within the Los Berros Creek diversion channel. The sediment management component of the proposed project will result in the removal of sediment within the proposed excavation areas as graphically shown in Appendices A and B. The initial sediment management activities will include the excavation of overflow “secondary” channels, and, at this time, the log structures will also be installed. All work that might require equipment within the secondary channels will occur at the same time in order to limit disturbance to one time period.

Impacts to these jurisdictions would occur as a result of the sediment management activities. These activities include the conversion of woody vegetation to non-woody riparian vegetation within the Transition Zone, which may be considered to be a permanent impact. However, trees removed will be replaced at a greater than 2:1 ratio, and all other vegetation will be replaced with similar species that

are anticipated to lay down during high flows. Therefore, it is anticipated that impacts as a result of this activity will be temporary. No impacts to these jurisdictions would occur within the buffer areas.

The areas between the levee and the Transition Zone that will receive the Riparian Scrub Enhancement seed mix will not require complete vegetation removal. Only woody vegetation will be removed for the purposes of achieving sufficient channel capacity for high flow events. Also important to note is the fact that the Riparian Scrub Enhancement areas will not be frequently disturbed by long-term sediment management activities.

4.1..4 CALIFORNIA COASTAL COMMISSION

Like CDFW, CCC considers any area that supports one or more of the three wetland indicators to be a state wetland. As a result, all USACE and CDFW jurisdictional areas within the Coastal Zone fall under CCC jurisdiction. The portion of the project west of the UPRR crossing is within the Coastal Zone, and all channel features within the levee banks within this area fall under CCC jurisdiction. Because the impact areas identified for the CCC jurisdiction overlap with CDFW and USACE jurisdiction, mitigation for impacts to CCC jurisdiction are considered to be satisfied with implementation of the USACE and CDFW mitigation proposed.

5 MINIMIZATION MEASURES/BEST MANAGEMENT PRACTICES

A variety of minimization measures and/or best management practices (BMPs) will be implemented to minimize project impacts on jurisdictional areas and/or trust resources. These are outlined in Table 5.

Table 5: Acreage Improved with Minimization Measures/Best Management Practices

Arroyo Grande Creek	Native seed mixes applied to areas disturbed by sediment management activities	8.86 acres
	Vegetated buffer strips	1.72 acres
	Bulb Outs	0.015 acre
Los Berros Creek	Native seed mixes applied to areas disturbed by sediment management activities	0.54 acres
	TOTAL	**11.14 acres**

Bulb-Outs will be preserved in the Transition Zone to create a meandering Buffer Zone and to increase habitat. A few locations have cottonwood, alder, and/or sycamore trees that are 6 inches diameter at breast height (DBH) or greater in the Transition Zone. These are referred to as "Bulb Outs" and consist of trees that will not be removed during sediment management activities. These areas will be shown on Project plans as "Bulb Outs" that locally increase the buffer width. The bulb outs are generally located on the north side of the active channel and will assist in creating additional vegetative buffer along the north side. In these areas, the canopy cover would be even greater than the standard buffer zone width. These activities are discussed more thoroughly in the following sections, with the exception of tree replanting and bulb outs, which are described above in the Vegetation Management section.

Where sediment removal is performed, the County will revegetate with seed mixes shown in Tables 6 and 7. In addition to mitigation activities, the following minimization measures will reduce impacts to jurisdictional areas and/or trust resources.

- **Monitoring to ensure that impacts are reduced to maximum extent practicable:**
  - Cross-section monitoring will be conducted periodically in the flood control reach to determine if sediment accumulation in the secondary channels has reduced conveyance to the extent where additional sediment management is required. Cross-section monitoring data will be used in conjunction with the hydraulic model to determine if the levee freeboard has been compromised
  - Permanent cross-section locations will be established and monumented along the project reach following Year 1 sediment management activities. Cross-sections will be established every 500 feet along the channel and at the upstream and downstream sides of each of the bridges
  - To monitor potential impacts to the lagoon, a total of four cross-sections will be established, approximately equally spaced throughout the lagoon
  - A performance goal is to not reduce allow a reduction in lagoon volume by more than 25% from the baseline based on a six-year moving average of measured conditions

- **BMPs to avoid erosion/turbidity/protect water quality:**

1. The contractor shall only use the approved access routes shown on the plans. No persons, equipment, or material shall be allowed outside the designated limits of disturbance.
2. The stockpile areas for removed sediment that are adjacent to the levee and have potential for entering the active channel shall be fully enclosed with silt fence and boundary fence.
3. All equipment shall be stored, maintained and refueled in a designated portion of the stockpile area. The contractor shall adhere to a spill prevention plan, to be prepared by the contractor and submitted for review by the engineer.
4. Contractor shall immediately stop all operations and devote all on-site personnel to the containment and clean- up of any fuel, fluid or oil spill, to the satisfaction of the engineer.
5. The contractor shall be responsible for continuous dust control in accordance with the conditions of the permits. The contractor shall be responsible for the regular cleaning of all mud, dirt, debris, etc., from any and all adjacent roads and sidewalks.
6. All excess soil shall be disposed of off-site or at locations to be designated in the permit documents.
7. No debris, rubbish, creosote-treated wood, soil, silt, sand, cement, concrete, or washings thereof, or other construction-related materials or wastes, oil, or petroleum products or other organic material or earthen material shall be allowed to enter into, or be placed where it may be washed by rainfall or runoff into the creek. Any of these materials placed within or where they may enter the creek shall be removed immediately. When construction is complete, any excess material shall be removed from the work area so that such materials do not wash into the creek.
8. Adequate erosion control measures shall be constructed and maintained to prevent the discharge of earthen materials to the creek from disturbed areas under construction and from completed construction areas. All disturbed areas of bed and bank shall be stabilized, winterized, and vegetated with appropriate native vegetation prior to the end of the work window.
9. No equipment shall be operated in areas of flowing or standing water. No fueling, cleaning or maintenance of vehicles or equipment shall take place within any areas where an accidental discharge to the creek may occur; construction material and heavy equipment must be stored outside of the OHWM. All work done within the creek shall be completed in a manner that minimizes impacts to beneficial uses and habitat; measures shall be employed to minimize disturbances along the channel that will adversely impact the water quality of the creek.

5.1 Transition Zone Minimization Measures

Transition Zones refer to the area immediately adjacent to the Buffer Zones. The Transition Zone for the Arroyo Grande Creek channel is approximately 15 feet, and 12 feet for Los Berros Creek diversion channel. The Transition Zone is the area where vegetation is proposed for removal or transplanting (in the case of cottonwoods with 6” DBH or larger) to facilitate high flows in the secondary channel. As proposed, native non-woody understory vegetation will remain intact within this area to ensure erosion control and to maintain cover for wildlife species. Non-woody vegetation less than approximately 3 feet in height located outside of the sediment management areas will not be removed to ensure the stability of soils within the area and to reduce the impact on existing wildlife habitat.

Several non-native invasive species occur within the Transition Zone, including giant reed, cape or German ivy, English ivy, greater periwinkle, castor bean, poison hemlock, and sweet fennel. Areas where

vegetation is removed will be replaced with native seed mixes (Tables 6 & 7). Native, non-woody vegetation outside of the sediment management areas will not be removed in order to ensure the stability of soils within the area and to reduce the impact on existing wildlife habitat. Removal of exotics within both channels will also result in an improvement to the functions and values of the system. A total of approximately 3.7 acres of non-native invasive species will be removed.

Although the majority of mitigation within the Transition Zone will not be disturbed by long-term vegetation management activities, there is a potential that the area may be disturbed by long-term sediment management where these areas overlap with proposed sediment management areas. Should sediment management be needed, only the understory of these areas will be temporarily impacted (as needed) and restored with the native seed mix of riparian species. Enhancing floral species richness within the channel is anticipated to increase the "edge effect," allowing for more habitat structure complexity and encouraging increased biodiversity within the project area.

Compensatory mitigation for the loss of trees within the Transition Zones will be achieved by the planting of replacement trees (on-site, in-kind) at a ratio greater than 2:1 within the Buffer Zones. Approximately 150 trees will be removed during the first year's activities and the District has estimated that approximately 400 trees can be planted within both Buffer Zones in the project area. The District is proposing additional habitat enhancement activities to further offset impacts to jurisdictional areas as a result of project activities. These other mitigation activities including log structures, planting or seeding bare areas between the levees, trash removal, and invasive species removal.

Additionally, the District proposes to set the success criteria for tree replacement at 90%. The District anticipates that the combination of in-kind and out-of-kind mitigation proposed will offset project impacts and result in higher functioning habitat for wildlife and increased water quality within the project boundaries. Enhanced and restored riparian habitat (as a result of additional trees and removal of trash) will further trap sediment and increase canopy cover and shade along the low flow channel. The topography within the waterway is anticipated to be stabilized with the log structures as well as the hydroseed mixes proposed for the secondary channels. Geomorphological benefits are anticipated to result from the log structures as well.

Additionally, approximately 4.74 acres in Arroyo Grande Creek and 1.54 acres in the Los Berros Creek diversion channel of currently bare area between the Transition Zone and levee tops will be hydroseeded with the mixes to stabilize soils and reduce fine sediment erosion and provide wildlife habitat where currently none exists (Table 6). This will significantly increase the function and value of habitat and provide for additional water quality of this acreage within the project boundary. This area will count as mitigation for the project as riparian & riparian scrub habitat will be created within these areas that are currently devoid of habitat.

Table 6: Transition Zone Riparian Seed Mix

Common Name	Scientific Name	Average Height (feet)	Suggested lbs/acre
deergrass	*Muhlenbergia rigens*	2.5	1
meadow barley	*Hordeum brachyantherum*	3.0	3
salt grass	*Disticlis spicata*	0.5	2

Common Name	Scientific Name	Average Height (feet)	Suggested lbs/acre
Mexican rush	*Juncus mexicanus*	2.0	0.5
fescue	*Festuca microstachys*	1.0	6
alkali barley	*Hordeum depressum*	1.0	2
creek monkey flower	*Mimulus guttatus*	3.5	0.5
Tomcat clover	*Trifolium wildenovii*	0.5	2
fireweed	*Epilobium ciliatum*	2.5	0.5
sky lupine	*Lupinus nanus*	1.2	2
mugwort	*Artemisia douglasiana*	2.5	1

5.2 Riparian Scrub Enhancement Measures

The Riparian Scrub Enhancement Areas are those located outside of the buffer areas in which woody vegetation will be converted to non-woody riparian vegetation. Not all vegetation within non-sediment management locations of the Riparian Scrub Enhancement Area will have been removed as a result of the proposed project. Only woody vegetation will be removed for the purposes of achieving sufficient channel capacity for high flow events.

Opportunity to increase species diversity exists within this area where woody vegetation will be removed. These areas will be replaced with non-woody vegetation included in the Riparian Scrub Enhancement Seed Mix (refer to Table 7). These areas will not be frequently disturbed by long-term sediment management activities. However, in terms of long-term monitoring, it is important to mention that they may be prone to impacts from high-flow events within the channel.

Some of this area is currently dominated by non-native species. These areas provide very little habitat value to the channels and consist primarily of non-woody vegetation. Proposed weed removal activities will enhance the habitat value within the channel.

To remedy the loss of wildlife habitat with in-kind species, seep willow was added to the Riparian Scrub Enhancement seed mix to offset the impacts resulting from the loss of arroyo willow and woody species such as coyote brush. Additionally, seep willow stakes will be planted in coordination with the hydro-seeding of seed mixes to ensure that habitat value and canopy cover are replaced at a faster rate than sprouting seed mix alone. Seep willow and arroyo willow exhibit similar physical characteristics; seep willow is often mistaken for ‘true’ willows. Coyote brush and seep willow are in the same genus and possess similar plant characteristics by nature; therefore, they provide similar habitat value. Transitioning from either species to seep willow is not anticipated to impact the function or value of wildlife habitat within the project area. Areas where coyote brush is replaced by seep willow are anticipated to provide higher habitat function and value since seep willow is better adapted to wetted habitats.

The District proposes that the replacement of arroyo willow and coyote brush with seep willow be considered in-kind mitigation; therefore, impacts as a result of vegetation removal is considered to be

temporary since native seed mixes will grow into woodland riparian habitat and replace the vegetation removed after project activities (non-native invasive removal and/or sediment management) occur.

Table 7: Riparian Scrub Enhancement Seed Mix

Common Name	Scientific Name	Suggested lbs/acre
deergrass	*Muhlenbergia rigens*	1
California poppy	*Eschscholzia californica*	2
goldfields	*Lasthenia californica*	1
Seep willow	*Baccharis salicifolia*	1*
fescue	*Festuca microstachys*	6
melic	*Melica imperfecta*	2
sky lupine	*Lupinus nanus*	3
sticky monkey flower	*Diplacus aurantiacus*	1
mugwort	*Artemisia douglasiana*	1

**seep willow stakes will also be planted to replace habitat function and value at an expedient rate post-construction*

5.3 Vegetated Buffer Strips

Where bare areas exist adjacent to and outside of the levees, these areas will be planted with a native grass such as *Carex praegracilis* (or similar drought tolerant native species) to create a vegetated buffer area between the levee and adjacent land use, which is primarily agricultural fields. This species does not spread readily and will not invade the adjacent agricultural fields. Planting these areas will decrease sedimentation and erosion issues during storm events by converting bare soil areas to vegetated areas alongside the levees. This coincides with a recommendation noted in the Arroyo Grande Creek Watershed Management Plan prepared for CDFW (Central Coast Salmon Enhancement 2009). It states that "vegetated buffer strips along farm roads…should be encouraged to reduce fine sediment erosion from these features." This will occur along approximately 7,500 linear feet by 10 feet along the south levee (1.7 acres).

5.4 Minimizing Impacts to Wildlife Habitat/Removal of Woody Vegetation

To minimize the loss of wildlife habitat with in-kind species, seep willow, also known as mulefat, was added to the Riparian Scrub Enhancement seed mix. Seep willow stakes will also be planted at the same time as seeding. Seep willow is woody in nature and will replace arroyo willows and coyote brush in function and value. This species will also facilitate flood control as it will lie over during high flows more readily than coyote brush. Seep willow is a large, native bush with sticky foliage which bears plentiful small, fuzzy, pink or red-tinged white flowers which are highly attractive to butterflies. It is most common near water sources. Seep willow is found in coastal sage scrub, foothill woodland, valley grassland, and wetland-riparian communities and can grow up to twelve feet tall. Seep willow is present within Arroyo Grande Creek.

Arroyo Grande Creek is dominated by arroyo willows. Seep willow is often mistaken for a willow due to its similar physical characteristics (hence the common name, 'seep willow'). Seep willow can grow as a

tree or as a shrub. Seep willow resembles a true willow tree and is often found in the same habitat. Both the seep willow and arroyo willow exhibit similar plant characteristics by nature and provide similar habitat value. Coyote brush is found in a variety of habitats, from coastal bluffs, oak woodlands, and grasslands, including on hillsides and in canyons. Coyote brush is known as a secondary pioneer plant in communities such as coastal sage scrub and chaparral. The coyote brush along the project area occurs most commonly around the bridges and secondary channels of the levees in the non-native grassland habitat.

Both coyote brush and seep willow are in the genus of perennials and shrubs in the aster family, *Baccharis*. The leaves of *Baccharis* species are borne along the stems in alternate fashion. Flowers are usually white or pinkish. There are no ray flowers, but many disk flowers (which are staminate) and pistillate flowers. The two genera of *Baccharis* exhibit similar plant characteristics by nature and provide similar habitat value. Transitioning from arroyo willow or coyote brush to seep willow is not anticipated to impact the function or value of wildlife habitat within the project area. Areas where arroyo willow or coyote brush are replaced by seep willow is anticipated to function equally for wildlife benefits. Because seep willow is better adapted to wetted habitats, it is anticipated to provide better habitat that coyote brush for the wildlife associated with the riparian habitat within the project area. By adding seep willow to the Riparian Scrub Enhancement mix, the District proposes that the replacement of arroyo willows and coyote brush with seep willow be considered in-kind mitigation; therefore, impacts as a result of vegetation removal is considered to be temporary since native seed mixes will grow into woodland riparian habitat and replace the vegetation removed after project activities occur.

Figure 5: Coyote Brush

Figure 6: Seep willow

Figure 7: Arroyo Willow

6 MITIGATION ACTIVITIES

The goal of the proposed Plan is to restore and enhance the functions and values of the existing riparian corridor, while also allowing for the effective flood control management of the sections of Arroyo Grande Creek and the Los Berros diversion channel within the Zone 1-1A flood control channel for the safety of the general public. To achieve the goal of improving habitat and water quality within both channels, the District proposes to conduct restoration and enhancement activities:

- Increase diversity of tree species and increase shade/cover within the buffer areas along both channels;
- Enhance habitat diversity and wildlife habitat through non-native invasive species removal activities;
- Enhance water quality and wildlife habitat through regular trash removal;
- Enhance instream habitat and provide cover/shelter for listed species through log structures and alcoves.
- Buffer Zones have been widened to maximize habitat for steelhead;
- Trees will be replanted within the Buffer Zone at a ratio greater than 2:1 to offset the loss of the trees in the Transition Zones; and
- Non-native species will be removed on an annual basis.

Table 8: Sediment Management Impacts vs Total Acreage within WMP Boundary

	Arroyo Grande	Los Berros	Total
Acreage within WMP Boundary	37.32	5.44	**42.76**
Acreage Permanently Impacted by Sediment Mgmt	8.86	0.54	**9.49**

9.49 acres of impacts of the 42.76 acres within the project boundary = ~22% of the area will be permanently impacted by sediment management activities. The following mitigation activities are proposed to mitigate for permanent impacts as a result of project activities within the sediment management areas.

1. *Non-native invasive species removal*

Non-native invasive species removal efforts will require considerable time and money, special permits, and result in large-scale beneficial impacts to both waterways. Currently, 3.7 acres within the project boundary are impacted by non-native species. Each species requires specific removal efforts (manual labor, herbicide application, or a combination of both) during specific times of year. Refer to the below table from the Aquatic Pesticide Application Plan prepared by the RCD, 2016.

Table 9: Schedule and Time of Year for Non-Native Invasive Species Removal Efforts

	Winter	Spring	Summer	Fall
English Ivy	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)
Cape Ivy	None	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)
Giant Reed	None	(Spray)	(Spray)	None
Periwinkle	(Spray)	(Spray)	(Spray)	(Spray)
Castor Bean	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)
Fennel	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)	(Manual + Spray)
Hemlock	(Manual + Spray)	(Manual + Spray)	None	None

2. Trash removal activities

Transient activity is impacting natural habitats throughout California. It is resulting thousands of dollars in time and labor to remove trash left behind. Some of the trash encountered in the WMP boundary is hazardous in nature, posing an elevated threat to the natural environment. Buckets of human waste and hypodermic needles have been removed on a number of occasions.

3. Installing Trees in Buffer Areas

Negotiations with NMFS resulted in expanded vegetative buffers, from 20’ to 30’ along Arroyo Grande Creek, and from 10’ to 15’ along the Los Berros diversion channel. Along with this benefit, an increase in species diversity will occur as new trees planted along both waterways will include tree species other than or in addition to willows. Planting both channels with additional species to increase diversity will result in a larger canopy cover (refer to the Ecological and Biological Justification for the Arroyo Grande Creek Waterway Management Program Revised Vegetation Buffer, County Environmental Programs Division 2017). Trees such as cottonwoods and sycamores provide a larger crown spread than willows. A wider and more continuous riparian corridor will be a significant improvement over existing conditions and will increase habitat for growth and survival of migrating smolts/juvenile steelhead.

4. Seeding bare areas

Seeding bare areas is a significant ecological enhancement and will result in an increase in streamside vegetation (above existing conditions) which will function to provide climate, habitat and nutrients necessary for wildlife. Seed mixes include native grasses, herbs, and non-woody shrubs such as seep willow and monkey flower which will create cover for wildlife. Increased vegetation will also translate to increases in organic leaf and woody material available as a food resource for terrestrial insects and aquatic macroinvertebrates – the primary source of food for listed species such as California red-legged frog, tidewater goby, and steelhead.

Table 10: Mitigation Activities and Equivalent Acreage

	Arroyo Grande	Los Berros	Total
Non-native invasive species removal	3.6 acres	0.10 acre	3.7 acres
Trash Removal (yearly avg)	1.75 acres	0.25 acre	2 acres
Log Structures	1.22 acres	0	1.22 acres
Installing Trees in Buffer Areas	2.6 acres	0.85 acre	3.45 acres
Seeding areas that are currently bare and/or not proposed for sed. mgmt. with native seed mix	4.74 acres	1.54 acres	6.28 acres
		TOTAL	**17 acres**

Additionally, trees lost as a result of sediment management activities within the Transition Zones will be replanted within the Buffer Zones along both Arroyo Grande Creek and the Los Berros diversion channel at a ratio larger than 2:1.

During the first year of WMP implementation, trees removed will be replaced on-site at a ratio that is greater than 2:1. To ensure survival of the newly planted trees, trees will be spaced between 7 and 10 feet apart. To improve riparian habitat and increase species diversity throughout both channels, existing gaps in the riparian buffer will be revegetated with native riparian species including cottonwood, sycamore, alder, box elder, and willows (the latter within the Los Berros channel only). Success criteria for replanted trees will be set at 90% survival.

The Transition Zone Riparian seed mix and Riparian Scrub Enhancement seed mix (Refer to Sections 7.2 & 7.3) will be used to replace woody riparian understory vegetation [e.g., coyote brush] with native scrub and riparian species that are not woody. The seed mixes include species that will provide equal or superior habitat value to wildlife such as seep willow, mugwort, sky lupine, sticky monkey flower, and creek monkey flower. These species will create a mid-level canopy structure similar to the coyote brush. Additionally, they will provide native species diversity that the Arroyo Grande Creek channel is currently lacking. An additional benefit is that these species will lie over and allow storm flows to pass by more readily than coyote brush would. Both the seep willow and sticky monkey flower will function equal to coyote brush for wildlife habitat.

During subsequent years, the District's goal is to replace vegetation impacted during annual management activities at a 2:1 ratio; however, the expectation is that climax species will begin to dominate and fewer impacts/management will be necessary over time. Additional mitigation efforts include the installation of log structures, non-native invasive species removal, trash removal, and the creation of vegetated buffer strips along the outside of the levee. Instream habitat will be improved by the installation of approximately 36 natural log structures at the primary and secondary channel intersections. These structures enhance and encourage cover habitat for steelhead, California red-

legged frogs and other species, as well as aid in the maintenance and stability of the low-flow and secondary channels.

A part of the mitigation strategy includes an active non-native, invasive species removal program. Non-native species to be actively removed include: English ivy, fennel, weeping willow, giant reed, castor bean, poison hemlock, and geranium. Non-native species management activities could include use of goats, application of herbicides, or removal by hand of plant and root ball. Non-native vegetation removed from the channel will be disposed of appropriately to limit their spread. Non-native vegetation will be replaced with native vegetation to enhance habitat at a 1:1 ratio. Also, as a part of the vegetation management activities, trash will be removed from the project area on a regular basis and ahead of winter storms. This will improve the water quality and enhance habitat in both waterways as trash is currently a significant problem.

6.1 Buffer Area Mitigation

Mitigation plantings will be installed within the buffer areas along Arroyo Grande Creek and the Los Berros Creek diversion channel, increasing canopy coverage over each channel. The main channel of Arroyo Grande Creek is characterized by nearly monotypic stands of willow (*Salix* sp.), whereas the Los Berros Creek diversion channel is nearly devoid of willow vegetation. As proposed, the project will maintain a 30-foot rooted-width buffer of mixed riparian vegetation along the low-flow channel of the main stem of Arroyo Grande Creek, and a 15-foot rooted-width buffer along the Los Berros Creek diversion channel.

Historically, the area along Arroyo Grande Creek channel has been maintained by limbing the willows up to 6 feet from the ground to reduce debris jams during flood events, while still retaining the wildlife habitat benefits that the overstory provides. Under the proposed project, these willows within the buffer will no longer be limbed. As a result, these areas within the buffer area for the Arroyo Grande Creek channel are expected to increase in size and in habitat value as the previously limbed areas bud new limbs and increase riparian complexity. Mitigation opportunities within the buffer areas include enhancing the existing habitat by increasing tree species diversity in Arroyo Grande Creek, and increasing shade along the Los Berros diversion channel. Areas along both channels will be planted with a diversity of trees including sycamores, cottonwoods, alders, and box elders, as well as willows. Trees will be planted in areas that are currently devoid of vegetation. Mitigation activities within the buffer area of both channels is particularly important for creating riparian overstory along Los Berros Creek diversion channel, which currently lacks woody vegetation or overstory. Establishment of overstory in Los Berros Creek diversion channel and enhancement within Arroyo Grande Creek channel will provide an opportunity to increase wildlife cover and nesting opportunities, and provide shade to maintain cool water temperatures for steelhead. This mitigation will be on-site, in-kind, and will replace lost trees at a ratio that is greater than 2:1.

Revegetation will establish and/or enhance habitat for native wildlife species while providing shade, sources of organic matter and coarse woody debris, improved root and soil structure and other water quality benefits to aquatic species. The planting palette for the revegetation program is shown in Table 11. Figure 3 presents an example of a revegetation plan cross-section.

Table 11: Riparian Woodland Species Palette

Common Name	Scientific Name	Size	Spacing (feet OC*)	Comment
Arroyo willow	*Salix lasiolepis*	Cuttings	7-10	Planted in random distribution (not rows). Spacing is provided to assist in developing a materials inventory. Species should be distributed in a patchy mosaic that emulates natural patterns and increases species diversity.
Red willow	*Salix laevigata*	Cuttings	7-10	
Black cottonwood	*Populus trichocarpa*	Cuttings/ 1-Gallon Stock	7-10	
White alder	*Alnus rhombifolia*	1-Gallon Stock	7-10	
Western sycamore	*Platanus racemosa*	1-Gallon Stock	7-10	
Box elder	*Acer negundo*	1-Gallon Stock	7-10	

* OC = on center

6.2 Bulb-Outs and Replanting

The buffer area along both channels will not be perfectly straight in alignment, but will bulb out to capture adjacent large trees within the Transition Zone (e.g., cottonwoods over 6" DBH adjacent to the Transition Zone). The Buffer Zone and will meander with the channel to mimic a more natural environment. An effort will be made to save all trees over 6" DBH that are not willows that are within the Transition Zone. In some cases, transplanting may be an option. For example, a large cottonwood in the Transition Zone on the north levee south of the railroad bridge will be transplanted a few feet north of its current location, within the Buffer Zone adjacent to the bridge (20' upstream and downstream of the bridge). Similarly, a group of 3 cottonwoods located in the Transition Zone along the north bank of the levee east of 22nd Street Bridge will remain in place and the Buffer Zone will "bulb out" to capture these trees. A total of 4 cottonwood trees over 6" DBH are proposed for transplanting because they are located in areas of the Transition Zone where they pose debris jam risks where the Buffer Zone cannot bulb out to capture them without posing additional flood risks.

6.3 Non-Native Invasive Species Removal

Vegetation management activities will be combined with an active program to remove non-native vegetation from the flood control channel. Non-native invasive plant species have been identified and mapped throughout Arroyo Grande Creek and the Los Berros diversion channel (Appendix F). Non-native invasive plant species to be removed include, but are not limited to: giant reed (*Arundo donax*), cape or German ivy (*Delairea odorata*), English ivy (*Hedera helix*), greater periwinkle (*Vinca major*), castor bean (*Ricinus communis*), bristly ox-tongue (*Helminthotheca echiodes*), cheeseweed (*Malva parviflora*), poison hemlock (Conium maculatum), Italian thistle (*Carduus pycnocephalus*), sweet fennel (*Foeniculum vulgare*), and star thistle (*Centaurea solstitialis*). These exotic plant species will be removed during vegetation and sediment management activities; however, additional weed abatement within all restoration/enhancement areas will be required during the establishment period and throughout the life of the monitoring program. Non-native species management activities could include use of goats, application of herbicides, or removal by hand of plant and rootball.

Mitigation for impacts by controlling the population of invasive plant species has a two-pronged approach: 1) a systematic program to control priority invasive plants; and 2) an opportunistic program to manage invasive plants within active individual sediment management zones. These two approaches

will dovetail together to enhance the overall ecological health of the creek. Removal or treatment of invasive species from buffer zones where no further impacts would occur would count as mitigation credit. Removal of invasive species during sediment removal activities would be considered neutral impacts and would not require additional mitigation. Some invasive species require greater effort to achieve effective eradication or containment.

Staff will work to encourage natural revegetation/recruitment at treatment sites, including suppression of other weed species. In areas where revegetation does not occur naturally within one to two years, a biological/horticultural assessment will be made to determine what impediments may exist to natural revegetation. In areas where revegetation potential exists, the County will develop a plan to install site-appropriate vegetation.

A total of approximately 3.7 acres will be restored during invasive species removal efforts (Tables 12 & 13). Of this acreage, 3.6 acres occur within Arroyo Grande Creek, and 0.10 acre occurs within the Los Berros Diversion Channel. In order to use herbicides near the waterways, the District was required to prepare an Aquatic Pesticide Application Plan (APAP) by the Regional Water Quality Control Board for a spray permit. The APAP was prepared by the Coastal San Luis Resource Conservation District (RCD) (Coastal San Luis Resource Conservation District 2016). Non-native vegetation removed from the channel will be bagged and disposed of accordingly to limit their spread.

Herbicide application will occur after a Weed Spray General Permit is obtained for the project from the State Water Resources Control Board. Herbicide application will be conducted by an individual holding a valid Qualified Applicators License. The Qualified Applicator must use herbicides that are approved for use in and adjacent to aquatic areas (i.e., Aminopyralid, Rodeo® or similar). Weeding activities will be performed quarterly until District staff determines that the plantings are self-sustaining. Weeds will be killed or removed before they grow higher than the adjacent native plantings and prior to going to seed.

The District anticipates that the combination of in-kind habitat enhancement onsite (additional plantings within the buffer areas) and out-of-kind habitat enhancement activities (log structures, planting of bare areas, trash removal, invasive species removal) will result in higher functioning habitat for wildlife and increased water quality within the project boundaries as discussed in this HMMP.

Table 12: Total Area of Weed Infestation in Los Berros Diversion Channel

Species	Cover Density			Individual Occurrences[1]		Total
	Low 1-33%	Medium 34-66%	High 67-100%	Points	Points x 10 sq ft	
English Ivy	--	--	--	--	--	--
Cape Ivy	--	--	--	--	--	--
Giant Reed	--	--	--	--	--	--
Greater Periwinkle	--	--	--	--	--	--
Castor Bean	--	--	--	--	--	--
Poison Hemlock	--	--	2,369	7	70	--
Sweet Fennel	--	--	1,847	5	50	--
--	--	--	--	--	--	**4,278 sq ft (0.10 acre)**

[1] – Occurrences approximating 10 square feet were recorded as points.

Table 13: Total Area of Weed Infestation in Arroyo Grande Creek Channel

Species	Cover Density			Individual Occurrences[1]		Total
	Low 1-33%	Medium 34-66%	High 67-100%	Points	Points x 10 sq ft	
English Ivy	7,197	9,767	10,514	20	200	27,678
Cape Ivy	0	0	22,418	0	0	22,418
Giant Reed	0	1,719	0	5	50	1,769
Greater Periwinkle	0	2,282	7,743	9	90	10,115
Castor Bean	19,847	6,721	0	29	290	26,858
Poison Hemlock	9,467	13,103	0	4	40	20,241
Sweet Fennel	791	29,687	18,269	40	400	47,301
--	--	--	--	--	--	**156,438 sq ft (3.6 acres)**

[1] – Occurrences approximating 10 square feet were recorded as points.

6.4 Trash Removal

As a part of the WMP, trash will be removed from the project area on a regular basis and ahead of winter storms. The transient population is significant in and along Arroyo Grande Creek, creating vast amounts of trash and human hazardous material within the waterway. This presents a threat to water quality and has resulted in the disturbance of wildlife habitat, including habitat for listed species. The District will regularly remove trash as a part of the WMP which will improve water quality/prevent degradation of water quality. Approximately 2 acres of riparian habitat is currently degraded by active transient camps and/or trash (Appendix E). This is a growing problem but implementation of the WMP will ensure that maintenance activities occur to remove trash on a regular (yearly) basis.

Figure 8: example of transient activity in Arroyo Grande Creek

Figure 9: example of transient camp and trash in Arroyo Grande Creek

Encampment cleanup mitigation will include removal of human-caused, inorganic trash that is in or positioned to enter aquatic and riparian habitats. In recent years, an increase in trash has been observed on the creek banks and in the creek. This increase in trash is thought to be primarily due to the massive recent increase in unauthorized encampments.

6.5 Log Structures and Alcoves

During high flow events, the intersection of the primary and secondary channels are expected to be areas of complex flow conditions that will create localized eddies, backwaters, and scour. To take advantage of these high energy areas and encourage development of complex cover habitat for

steelhead and California red-legged frogs, two types of large woody structures will be constructed at these locations (see Appendix G for details on the proposed log structures).

One type of large wood structure will be placed at the downstream end of each secondary channel at its confluence with the primary channel. The structure will provide protection from any head cutting into the secondary channel and therefore stabilize the location of the primary channel. The structure has also been designed to encourage pool scour at the confluence and mimic an undercut bank (similar to lunker structures traditionally used to enhance fish habitat). Because pool habitat and escape cover is lacking through the flood control reach, improvements to these physical habitat characteristics are expected to greatly improve aquatic habitat. In addition, these structures will provide escape cover for adult steelhead migrating through the reach to preferred spawning and rearing habitat areas that occur upstream of the flood control reach. When the water levels are low within the channel, these structures will provide escape and shelter for California red-legged frogs.

The second type of large wood structure will protect the head of bar that will exist at the downstream side of the confluence. This structure will also enforce maintenance of the primary and secondary channel locations and create a hard point that will encourage turbulence and creation of a pool at the confluence of the channels. Although both types of structures are designed to meet different habitat and channel stability objectives, they will promote pool scour, encourage variability in substrate and flow field conditions, and provide deep pools and cover habitat for steelhead and California red-legged frogs.

During low-flow events, these structures will provide retention of water within the channel as a result of the scoured pools that they are designed to provide. These pool features do not currently exist within the channel. This will allow for increased groundwater retention and development of wetland habitat which will attenuate pollutants within the watershed. During high-flow events, these structures will provide refugia for wildlife species, including migrating steelhead. Log structures are expected to also provide waterfall features that will increase dissolved oxygen within the system. It is anticipated that these log structures may influence the development of additional wetland areas following the first heavy rainfall events.

Alcoves will also be created adjacent to log structures to provide steelhead habitat. The intent of the alcoves is to enhance rearing habitat and provide flood refuge for juvenile steelhead. A total of 18 alcoves would be constructed, one per management area. It is possibly that there may be 16 alcoves as two of the sediment management areas are short in length and it may not be feasible to construct alcoves in these two areas. The alcoves would be constructed to function as low energy, backwater areas, except during the highest flows. The alcoves would be temporary enhancement features as they will likely fill with sediment over time but would be re-created by the District when the District conducts ongoing (maintenance) sediment removal in the vicinity of the alcoves.

To ensure that the log structures function as steelhead habitat, all structures will be monitored on an annual basis, and photo stations will be established at 4 of the 36 log structures - 2 stations at each type (structures that promotes an undercut bank and structures that promote pools. If the log structures are no longer functioning as habitat as intended (i.e., buried, dislodged, etc.), long-term sediment management activities will include the maintenance activities to restore their function. For example, the repair and/or replacement of said structures would occur at the same time as the long-term sediment management activities.

Because of the dynamic nature in which each of these log structures and alcoves will perform in the long term, the estimated area of beneficial impact (mitigation) has been estimated to be an average of 1,500 square feet per structure. When grouped, these structures provide a cumulative benefit. The total mitigation area provided by these structures is approximately 1.22 acres.

7 SPECIFIC FUNCTIONS AND VALUES OF HABITAT TYPES TO BE ESTABLISHED, RESTORED, ENHANCED, AND/OR PRESERVED

The Arroyo Grande Creek area has been channelized since the mid-20th century when adjacent agricultural uses actively managed the flood plain by clearing and ditching the channel to provide a predictable flow path to allow for homesteading, farming, dairy activities, and cattle ranching. This channelization and the construction of the levee system in the late 1950s changed the natural flow of Arroyo Grande Creek.

The goal of this Plan is to increase the vegetative structure and diversity within both the Arroyo Grande Creek channel and Los Berros Creek diversion channel, providing additional habitat for special-status wildlife, while also increasing the rate at which water flows through the channel during high rainfall events. This is a key element to the proposed project in order to ensure the safety of the public and for the protection of adjacent agricultural land. Habitat functions and values that will be enhanced through the implementation of this HMMP include:

- A continuous riparian corridor within the Arroyo Grande Creek channel and Los Berros Creek diversion channel;
- An increase in plant species diversity within portions of both channels by planting a diverse palette of tree species;
- The establishment of riparian and scrub vegetation in areas that are currently devoid of vegetation;
- A decrease the overall percent coverage of exotic invasive vegetation;
- Increased water quality with the removal of trash from the riparian areas;
- A reduction in fine sediment erosion by vegetating buffer strips along the levee; and
- Enhanced in-stream habitat through the introduction of log structures and alcoves.

Log structures and alcoves will provide sinuosity and complexity to the channel, refugia for sensitive species, and improve water quality. Creation and enhancement of the buffer zones will bring increased biological diversity and productivity through the “edge effect” which offers easy access to adjacent communities. Therefore, it can support more species from these adjacent communities, which can adapt and increase the area’s biodiversity. The log structures will also act as refugia for migrating steelhead as well as California red-legged frogs.

7.1 Quantitative Habitat Analysis

The California Rapid Assessment Method for wetlands and riparian areas (CRAM) has been developed as a tool for standardized and cost-effective assessment of wetland condition. CRAM has been developed as a cost-effective and scientifically defensible Level 2 method for monitoring the conditions of wetlands throughout California. The District will employ two certified individuals to use CRAM to establish a revised baseline for the portions of both Arroyo Grande Creek and the Los Berros diversion channel that occur in the project boundary during the summer of 2016. The certified CRAM practitioners will also conduct annual monitoring efforts as a part of the WMP one the project is permitted and underway.

CRAM yields an overall score for each assessed area based on the component scores for the attributes and their metrics. The alternative narrative description for each metric has a fixed numerical value. An attribute score is calculated by combining (methods vary by attribute type) the values of the chosen

narrative descriptions for the attribute's component metrics, and then converting the result into a percentage of the maximum possible score for the attribute. The overall score for an area is calculated by averaging the four final attribute scores. The maximum possible score represents the best condition that is likely to be achieved for the type of wetland being assessed. The overall score for a wetland therefore indicates how it is doing relative to the best achievable conditions for that wetland type in the state. Local conditions can be constrained by unavoidable land uses that are considered when comparing wetlands from different land use settings.

CRAM also provides guidelines for identifying stressors that might account for low scores. Evident stressors are characterized as present or present and having a significant negative effect on an attribute score. The stressor checklist allows researchers and managers to explore possible relationships between condition and stress, and to identify actions to counter stressor effects. Not only can CRAM be used to establish baseline conditions, it can also be used to monitor project impacts and to identify protection and restoration activities. CRAM embodies the basic assumption of most other rapid assessment methods that ecological conditions vary predictably along gradients of stress, and that the conditions can be evaluated based on a fixed set of observable indicators.

CRAM development involved creating conceptual models of wetland form and function, defining key terms, developing the wetland typology, identifying the attributes, and formulating metrics that describe each attribute. Each CRAM attribute is represented by a set of metrics (Figures 10 and 11 below), and each metric is represented by a set of mutually exclusive narrative descriptions of alternative states. In aggregate, the alternative states of all the metrics for any type of wetland represent its full range of visible form and structure. Certified CRAM practitioners will visit the monitoring locations (established during the summer of 2016 when the baseline was established) on an annual basis to determine how the project is impacting the attributes of CRAM/impacting the waterways within the WMP boundary.

Arroyo Grande Creek

Arroyo Grande Creek is characterized as a perennial drainage with a defined riparian corridor.

Scoring Sheet: Riverine Wetlands

AA Name: AG Creek @ 22nd Street - WMP (baseline)				**Date:** June 16. 2016	
Attribute 1: Buffer and Landscape Context (pp. 11-19)				**Comments**	
Stream Corridor Continuity (D)			Alpha. A	Numeric	no non buffer upstream 95 m non-buffer downstream
Buffer:					
Buffer submetric A: Percent of AA with Buffer	Alpha. B	Numeric 50%			
Buffer submetric B: Average Buffer Width	D	29			
Buffer submetric C: Buffer Condition	B				
Raw Attribute Score = D+[C x (A x B)½]½					**Final Attribute Score = (Raw Score/24) x 100**
Attribute 2: Hydrology (pp. 20-26)					
			Alpha.	Numeric	
Water Source			C		
Channel Stability			A		managed channel
Hydrologic Connectivity			B	1.4	
Raw Attribute Score = sum of numeric scores					**Final Attribute Score = (Raw Score/36) x 100**
Attribute 3: Physical Structure (pp. 27-33)					
			Alpha.	Numeric	
Structural Patch Richness			D	5	
Topographic Complexity			B	(B2)	1 bench
Raw Attribute Score = sum of numeric scores					**Final Attribute Score = (Raw Score/24) x 100**
Attribute 4: Biotic Structure (pp. 34-41)					
Plant Community Composition (based on sub-metrics A-C)					tall - nettle
Plant Community submetric A: Number of plant layers	Alpha. A	Numeric 4			Short, med, very tall
Plant Community submetric B: Number of Co-dominant species	B	9			
Plant Community submetric C: Percent Invasion	B	22%			
Plant Community Composition Metric *(numeric average of submetrics A-C)*					
Horizontal Interspersion			C		
Vertical Biotic Structure			A		
Raw Attribute Score = sum of numeric scores					**Final Attribute Score = (Raw Score/36) x 100**
Overall AA Score (average of four final Attribute Scores)					65

Figure 10: CRAM Score, Arroyo Grande Creek (Baseline)

Los Berros Creek Diversion Channel

Los Berros Creek diversion channel is an intermittent drainage with very little riparian vegetation present.

Scoring Sheet: Riverine Wetlands

AA Name: Century BR @ Los Berros Div. Channel - WMP (baseline)					**Date:** June 22. 2016
Attribute 1: Buffer and Landscape Context (pp. 11-19)					**Comments**
Stream Corridor Continuity (D)			Alpha. B	Numeric	
Buffer:					
Buffer submetric A: Percent of AA with Buffer	Alpha. A	Numeric			
Buffer submetric B: Average Buffer Width	D				
Buffer submetric C: Buffer Condition	C				
Raw Attribute Score = D+[C x (A x B)½]½					**Final Attribute Score = (Raw Score/24) x 100**
Attribute 2: Hydrology (pp. 20-26)					
Water Source eco-atlas			Alpha. C	Numeric	
Channel Stability			B		managed channel
Hydrologic Connectivity			A	2.3 m	
Raw Attribute Score = sum of numeric scores					**Final Attribute Score = (Raw Score/36) x 100**
Attribute 3: Physical Structure (pp. 27-33)					
Structural Patch Richness			Alpha. D	Numeric 1	
Topographic Complexity			C		1 bench
Raw Attribute Score = sum of numeric scores					**Final Attribute Score = (Raw Score/24) x 100**
Attribute 4: Biotic Structure (pp. 34-41)					
Plant Community Composition (based on sub-metrics A-C)					
Plant Community submetric A: Number of plant layers	Alpha. A	Numeric 4			
Plant Community submetric B: Number of Co-dominant species	C	8			
Plant Community submetric C: Percent Invasion	D				
Plant Community Composition Metric *(numeric average of submetrics A-C)*					
Horizontal Interspersion			C		
Vertical Biotic Structure			B		
Raw Attribute Score = sum of numeric scores					**Final Attribute Score = (Raw Score/36) x 100**
Overall AA Score (average of four final Attribute Scores)					53

Figure 11: CRAM Score, Los Berros Creek Diversion Channel (Baseline)

Currently, the Los Berros Creek diversion channel (within the project boundaries) functions as an intermittent riverine system that provides an opportunity for groundwater recharge. Vegetative diversity and woody riparian species within the channel is minimal. As a result, wildlife usage is expected to be low due to the lack of riparian vegetation. The expected improvement of the habitat functions will be determined through a combination of field observation and the results of the long-term monitoring that will evaluate portions of the project.

7.2 Time Lapse Between Jurisdictional Impacts and Expected Compensatory Mitigation Success

Once sediment and vegetation management activities begin, annual maintenance activities are expected to continue on a yearly basis as long as permits are valid (approximately 16 years) and are proposed to be adaptive. Implementation of this Plan will occur following the initial vegetation removal and sediment removal from the channel. Implementation of the Plan will also occur following each sediment removal activity that occurs in subsequent years. Activities within the channel are anticipated to only occur in the summer of any given year. Because the mitigation will be located within a channel that is highly prone to flooding, successful mitigation will be measured by a proposed success threshold. The time needed to reach this threshold may be several years. Success criteria must be met after a 10-year monitoring period which will begin the first fall/winter after project activities commence. The project will actually be monitored for more than 10 years as implementation of the program will occur for 16 years. Each year, the program area will be analyzed for proposed sediment and vegetation management activities, as well as mitigation opportunities. Additionally, previous mitigation actions will continue to be monitored and maintenance will occur as needed. Table 14 provides the projected schedule for project activities over the first 5 years. It is assumed that years 6 through 16 will look very similar, if not identical to, the tasks outlined in year 5 below.

Table 14: Estimated Mitigation and Monitoring Schedule

IMPLEMENTATION TASKS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Prepare Planting Areas										X		
Install and Irrigate Plantings										X	X	X
Construction Completion Report												X
FIRST YEAR TASKS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Weeding/Maintenance/Watering		X		X		X		X		X		X
General Site Monitoring	X		X		X		X		X		X	
Biological Monitoring Data Collection												X
Annual Report												X
SECOND YEAR TASKS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Weeding/Maintenance/Watering		X		X		X		X		X		X
General Site Monitoring			X			X			X			X
Biological Monitoring Data Collection												X
Annual Report												X
THIRD YEAR TASKS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Weeding/Maintenance/Watering		X		X		X		X		X		X
General Site Monitoring			X			X			X			X
Biological Monitoring Data Collection												X
Annual Report												X
FOURTH YEAR TASKS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
General Site Monitoring			X			X			X			X
Biological Monitoring Data Collection												X
Annual Report												X
FIFTH YEAR TASKS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Site Monitoring				X								X
Biological Monitoring Data Collection												X
Mitigation Completion Report												X

7.3 Overall Habitat and Water Quality Improvements to be Gained

Implementation of this Plan will provide for the establishment of native vegetation and a reduction of non-native habitat within Arroyo Grande Creek and Los Berros Creek diversion channel. Maintaining a buffer of trees and other vegetation along the low-flow creek channels and increasing species diversity along both channels will provide a wildlife corridor, adequate nesting habitat for migratory bird species, cover for aquatic and semi-aquatic species, and will serve to keep water temperatures cool in times of direct sunlight.

The log structures and alcoves will provide scour pools and refugia for semi-aquatic and aquatic wildlife. It is anticipated that these log structures and alcoves may influence the development of additional wetland areas following the first heavy rainfall events. During low-flow events, these structures will provide retention of water within the channel as a result of the scoured pools that they are designed to provide. These pool features do not currently exist within the channel. This will allow for increased groundwater retention and development of wetland habitat which will attenuate pollutants within the watershed. During high-flow events, these structures will provide refugia for wildlife species, including migrating steelhead. Log structures are expected to also provide waterfall features that will increase dissolved oxygen within the system.

It is anticipated that habitat and water quality within both waterways will also be improved by regularly removing trash resulting from human activities (e.g., transient activities). Areas currently devoid of vegetation and/or invaded by exotic, weedy vegetation will be replaced with native riparian and scrub habitat. Maintaining a riparian buffer will create a continuous riparian canopy through the project area which will provide benefit to terrestrial and aquatic species that rely on cover habitat, cool water temperatures, and other functions provided by a continuous and diverse riparian corridor. It is also anticipated that the overall function and value ratings for both waterways (Figures 10 & 11) will increase as a result of the removal of non-native, invasive species and the increased cover resulting from native trees planted in both Buffer Zones and riparian and riparian scrub species that will grow as a result of the seed mixes within both channels.

Implementation of this Plan will also allow both channels to improve their existing capacity to convey water during high rainfall events by nearly 92% while reducing the possibility of a catastrophic failure to the existing levee structures, reducing the potential for severe water quality impacts. Should these levees fail or be breached in any way, there will be a net decrease in water quality as a result of elements such as increased turbidity, an increase in pollutants from neighboring agriculture and residential uses, loss of soils, loss of riparian and wetland habitat, an increase in erosion, etc. The proposed revegetation with native species will provide important water quality attenuation as well as erosion control.

7.4 Rationale for Expecting Implementation Success

Based on the hydrology, existing vegetation communities, and soils on the project site, it is expected that the overall requirements of the mitigation program will be attained. The hydrology on the project site is maintained by precipitation, regulated flows from Lopez Dam, and stormwater flows from the surrounding hardscape. These water sources result in seasonal saturation of the mitigation areas within Arroyo Grande Creek, which should provide a reliable water source for the restoration plantings. However, if these sources are not enough to sustain mitigation plantings and/or allow for the growth of the seed mixes, supplemental water will be applied to assist with plant survival and establishment. The Los Berros diversion channel is sustained by precipitation and stormwater flows and will likely require supplemental watering during the first few years to establish mitigation plantings/seed mixes.

Implementation of the restoration and mitigation activities will be overseen by District staff and a contractor will implement the program (Refer to Section 10). For the Los Berros diversion channel, the contractor will provide supplemental water as needed as a part of his regularly conducted maintenance activities after seed mixes are dispersed and mitigation plants are installed. Refer to Figure 12 that shows the Los Berros diversion channel in June of 2000 (Essex Environmental 2000). This area is currently devoid of most vegetation but has the ability to sustain riparian and wetland vegetation. It is anticipated that tree installation along this reach will also be successful. The current lack of vegetation could be attributed to drought conditions and/or adjacent land use practices. All vegetation is expected to survive under similar hydrologic conditions since communities proposed to be established in this Plan currently exist within the watershed.

Arroyo Grande Creek Habitat Assessment

Photo 3: Segment 2. Downstream view of Los Berros Creek overflow channel from Valley Road bridge crossing. Sediment with riparian/ruderal scrub on right side of photograph is proposed for removal in work area 6.

Photo 4: Segment 3. Upstream view of Arroyo Grande Creek flood control channel from Highway 1 crossing. Sediment with riparian/ruderal/channel bank scrub along right side to center of photo is proposed for removal from work area 11. Steelhead observed along boulders in center of photo.

Figure 12: Downstream view of Los Berros Diversion Channel from Valley Road Bridge (photo 1) and upstream view of Arroyo Grande Creek from Highway 1 crossing (Photo 2), June 2000

8 MITIGATION AND RESTORATION IMPLEMENTATION

The District Grounds Restoration Specialist holds a degree in horticulture, natural resource management, forestry, or a closely related field and oversees, organizes and performs specialized landscaping, horticulture, and restoration of native environments. He develops planting schemes/layouts from general guidelines, works from plans, blueprints and specifications, identifies ornamental and native species, and propagates and cares for native species. The District Grounds Restoration Specialist leads work crews in the preparation of soil and the maintenance, planting, and cultivation of native landscapes. He coordinates and/or performs irrigation, application of fertilizers, weed control and pesticides, and other labor, applications and/or maintenance necessary to facilitate the restoration and vitality of native environments. The District Grounds Restoration Specialist will be available to coordinate with District staff and the contractor to implement mitigation plantings and maintenance of mitigation areas for the Arroyo Grande Creek Channel WMP project area.

Implementation of the restoration and mitigation activities will be overseen by District staff with assistance from the District Grounds Restoration Specialist. A contractor will implement the program. The contractor will utilize this Plan and appropriate project grading plans for staking the revegetation areas and detailing plant locations or hydroseed application. District staff will oversee all site preparation, plant salvage, and plant installation, and will ensure conformity with this Plan.

Qualified District environmental staff will oversee the contractor as they collect and evaluate data indicating the relationship between actual site conditions and the performance criteria. Field monitoring and sampling will be followed by preparation of brief reports that include photo-documentation and evaluation of the success of the mitigation effort based on whether or not the annual performance goals for that year were met.

Schedule

Implementation of the Plan will commence immediately following the initial vegetation and sediment removal activities. Project construction activities will occur during the non-rainy season. Mitigation plantings and hydroseed will be planted thereafter due to the exposed soil and the risk of erosion. These plantings and hydroseed will be irrigated until the rainy season begins. Weed control will likely be confined to the dry season, June through October, but will be monitored to ensure non-native weeds do not take over the mitigation areas.

Site Preparation

Site preparation will be largely completed in conjunction with the proposed project activities. Specifically, those areas where vegetation management will occur will be cleared by hand tools during the removal of basal woody vegetation. During this time, the interior slopes of the levees may also be prepared to receive riparian species and seed application, along a 2:1 slope. Non-woody vegetation within this vegetation management area will remain. Areas that are disturbed and re-shaped will receive an application of erosion control mix that will consist of species found in the Riparian Scrub Enhancement seed mix. These areas are not expected to require additional erosion control efforts. Weed abatement will be performed with hand tools and small gas-powered equipment such as weed whackers or chainsaws. If required, Rodeo® herbicide will be applied to facilitate the removal of noxious weeds.

Those areas that are identified as sediment management areas will be excavated during the initial sediment removal event using an excavator within the channel. This excavator will access the sediment removal sites by walking down the levee slope. These slopes will be restored upon completion. Future sediment management activities will be achieved by the use of a long-reach excavator from the levee road. Sediments from these areas will be removed from the site and the areas will be re-contoured with the use of the excavator. A track wheel will be used to compact the area and contour where necessary prior to the application of hydroseed.

Planting Plan

The objective of the planting plan will be to restore and enhance native riparian habitat on the project site. Components of the plan are included in Tables 6, 7, and 8. Plant species in the impacted areas that can be salvaged for use will be identified by District staff with the help of the District Grounds Restoration Specialist. Whenever possible, the mitigation areas will be planted with cuttings, plugs, and divisions of native riparian scrub species found in the project impact area and/or same watershed. All other plant materials will be obtained from local reputable nurseries or contract growers. In addition, native seed mixes (Tables 7 & 8) will be applied to all disturbed areas, and *Carex praegracilis* (or a similar native, drought-tolerant grass species) will be planted along the south levee as described in Section 6.2.

Plant Salvage

To the extent feasible, these plant materials will be salvaged from the anticipated impact areas prior to initial disturbances. Prior to sediment management activities, the contractor will salvage any non-woody riparian species located in the impact area. The species that have a favorable response to division and local adaptations will help provide for an increased success rate among the restoration plantings. The salvaged plant materials will be placed in pots immediately after removing them from the ground, transferred to a holding area, and maintained until they are ready for reintroduction into the restoration areas. Salvage activities will be conducted pursuant to the following guidelines:

- Available materials, including cuttings, divisions, and plugs, may be collected from adjacent drainage areas and wetland areas within the same watershed, within County right-of-way.
- Material should be excavated by hand.
- All implementation of planting/collecting efforts will be overseen in the field by the restoration specialist.

The contractor will attempt to salvage and divide enough plantings to implement the restoration program; however, salvaging enough species to fulfill all planting requirements may be difficult. If salvaging and dividing enough materials is not feasible, the contractor may purchase additional materials from a reputable nursery.

In addition, the contractor will obtain willow stakes from the adjacent willow thicket for inclusion into the restoration areas. Willow cuttings will be installed immediately within the 10-foot buffer area following their collection. All willow collection activities will be conducted pursuant to the following guidelines:

- Seep willow, arroyo willow, and/or red willow stakes will be installed within 72 hours of collection. Cuts will be made with sharp, clean tools. Willow stakes will be reasonably straight, 18 to 36 inches in length, and not less than 5/8 inch in diameter at the base of the cutting.

- The top of each willow cutting will be cut square above a leaf bud, and the base of each willow cutting will be cut below a leaf bud at an approximately 45-degree angle.

- Willow cuttings will have all leaves and branches trimmed off flush with the stem.

As-Built Conditions

Within 45 days of Plan implementation, an as-built planting plan will be prepared and submitted to the USACE, CDFW, and RWQCB. The plan will illustrate the final construction of the mitigation area, and show planting locations and any final modifications not included in this Plan. Should adaptive management be needed, amendments to the as-built plans will be updated with approval from USACE, CDFW, and RWQCB until the success threshold is reached.

8.1 MAINTENANCE ACTIVITIES DURING THE MONITORING PERIOD

Vegetation Management Maintenance Activities

Maintenance during plant establishment is necessary to ensure success of the mitigation effort. Maintenance will be conducted bi-monthly until the performance standard is met or until the District staff determine that the plant species are self-sustaining and further maintenance is not required. The maintenance period will begin immediately upon completion of the mitigation planting, and will continue for a minimum of 10 years. Once the performance standard is reached for a minimum of 2 years, the appropriate regulatory resource agencies will review the monitoring reports, evaluate whether the performance standards have been met, and determine whether the maintenance period will be ended or extended.

It is expected that management/maintenance within the channels will occur indefinitely until the success threshold is met. This process is expected to be adaptive due to the dynamic nature of the channel and the flood potentials that occur yearly which could damage the plantings. Because of the long-term and dynamic elements involved with the project, the District anticipates that consultation with the resource agencies and adaptation of this Plan will be necessary until the success threshold is met.

The maintenance program will ensure that watering of installed plants, weed control, debris removal, vandalism control, replanting, plant protection, and site protection are performed adequately. The District will be responsible for maintenance of new vegetation during the plant establishment period. This will include watering and weeding, as necessary.

Watering

The natural water source for the mitigation area is the existing water that flows through the Arroyo Grande Creek channel and Los Berros Creek diversion channel. Supplemental irrigation will be supplied to planted materials within the vegetation management area during the initial planting period. Supplemental water will be supplied on an as-needed basis until District staff determines that the plantings are self-sustaining. Due to periodic high flows that will damage drip irrigation systems, installation of a permanent irrigation system is not proposed. Supplemental water will be administered to the plantings by hand. Hand watering will be performed in a manner that ensures deep penetration of water to the soil around the plant rootball (not on plant foliage). Water will be carried to the site by a

water truck which will utilize the levee roads for access to each site. The need for supplemental water applications will be determined by District staff or the contractor based on weather patterns and soil moisture.

Weed Control and Herbicide Use

Weed control will be necessary to minimize competition from invasive and exotic plants. Exotic species will be indirectly removed during sediment management activities; however, additional weed abatement within all restoration/enhancement areas will be required during the establishment period and throughout the life of the monitoring program. Weeds will be removed by hand, through herbicide application, and possibly by the use of grazing animals. More information about permits required to use herbicide and target species can be found in Section 6.1.

Debris Removal and Vandalism

Removal of trash and litter will occur on a regular basis during the maintenance period. Per Section 6.3, this could be a time consuming and expensive effort if the homeless activity continues at its current pace. Non-fruiting organic debris created from hand removal of weeds may be left on-site if it will not significantly impact the establishment of native seedlings. However, noxious weed debris will be disposed of off-site to avoid further invasions of the exotic species.

Although unlikely, vandalism may be a problem due to the proximity of the mitigation area to the existing residential areas. The tops of the levees are frequented by citizens for recreational purposes (although no trespassing signs are posted). If vandalism occurs at the site and plants are removed or trampled, the District will replace the vandalized plants and erect exclusion fencing to discourage further vandalism. As such, incidents shall be recorded and reported to regulatory agencies within the annual reports to be produced per this Plan.

Replanting

The District will adjust specific replanting requirements if needed, including species, quantities, and schedules. Species selection will be consistent with those in the plant palette of the Plan and at the direction of District staff. Any replanted vegetation will be monitored until District environmental staff, with the help of the District Grounds Restoration Specialist, determines the plantings are self-sustaining.

8.2 Monitoring

Vegetation Management Monitoring

Certified CRAM practitioners will visit the monitoring locations (established during the summer of 2016 when the baseline was established) on an annual basis to determine how the project is impacting the attributes of CRAM/impacting the waterways within the WMP boundary. Biological attributes of the mitigation and restoration areas will be monitored annually until the success thresholds of 70% native cover for understory and 90% native cover for overstory are reached and the resources agencies agree that mitigation is complete. The objective of the monitoring program is to ensure that the mitigation efforts achieve the established performance standards. In order to achieve this, the mitigation area will be assessed for plant survivorship, general health, and percent cover.

Percent Cover

Percent cover of native and non-native species will be obtained annually until the success threshold of 70% native cover is met for understory and 90% native cover is met for overstory. The percent cover calculations will be utilized to determine the success of the restoration project. Additionally, the percent cover of non-native species (excluding annual grasses) should not exceed 35%.

Other Attributes to Monitor

Another important monitoring activity is to detect the presence and advance of invasive plant species, such as introduced pioneer species commonly found on disturbed seasonally wet areas. Monitoring activities will determine the presence of such species and if action is required to control their advance.

All wildlife observed in and around the mitigation areas will be documented as to species, number, and functional use of habitat (e.g., feeding, nesting, roosting, etc.) during monitoring visits. Observations of the general habitat quality will be documented in the annual report.

Permanent photo points will be established throughout the mitigation site to assist in tracking the success of the mitigation program. Permanent photo points will be established during the preparation of the as-built planting plan, and ground view photos will be taken during each monitoring year from the same vantage point.

Monitoring Schedule

At a minimum, District staff and/or the contractor will perform site visits for maintenance activities bi-monthly (every two months) during the first three years after planting and semi-annually until the success criteria are met (refer to Tables 12 & 13). District staff will perform biological monitoring data collection annually throughout the life of the monitoring program which will occur for a total of 16 years, which is as long as the WMP will be implemented based on regulatory permits. Successful maintenance may require more frequent visits, depending on site conditions. After large storm events that inundate the site, District staff will inspect the site for damage. District staff will ensure that the project is maintained as necessary during the monitoring period.

Annual Monitoring Reports

The various regulatory agencies having discretionary approval over the project have different reporting requirements for the revegetation efforts. The District will ensure that the appropriate agencies receive the required reports on a timely basis. The District will follow all reporting requirements outlined in the 404 Authorization, 401 Certification, and 1600 Agreement. The District will also comply with any reporting requirements that may be included with the Coastal Development Permit for the project.

9 SUCCESS CRITERIA & TARGETS

In order to accomplish project goals and objectives, a monitoring program will provide both quantitative and qualitative data to be used to determine the success of the mitigation area, and to identify the need for subsequent mitigation.

The contractor will collect and evaluate data indicating the relationship between actual site conditions and the performance criteria. Field monitoring and sampling will be followed by preparation of brief

reports that include photo-documentation and evaluation of the success of the mitigation effort based on whether or not the annual performance goals for that year were met.

Performance Standards for Target Dates and Success Criteria

According to the USACE *Final Rule for Compensatory Mitigation for Losses of Aquatic Resources* (2008), mitigation plans must include ecologically based success criteria. This Plan includes annual performance standards to ensure a successful mitigation effort (refer to Table 13). The performance standards are based on the vegetative structure found on-site prior to construction related disturbances.

The mitigation areas will be monitored yearly, as necessary, until the final success criteria of 70% native understory vegetation within impacted areas are met, and 90% area cover for overstory is met. The 90% criterion is based on the fact that some sun light is required within the project area for vegetation growth and for California red-legged frog basking. However, 90% survival of new trees planted within the buffer zones will be required. It is anticipated that after this point has been reached for minimum of 2 years, the site will be self-sustaining for the long term. For those years where the performance threshold has not been met, the contractor will recommend to the District appropriate adaptive management solutions. The mitigation site will not be considered successful until USACE has provided written verification that the final success criteria have been met.

Target Hydrological Regime

Upon implementation of the Plan, the mitigated areas will be sustained by surface and sub-surface flows from Arroyo Grande Creek and local rain events.

Target Jurisdictional and Non-Jurisdictional Acreages to be Restored

Upon implementation of the Plan and completion of the 10-year maintenance and monitoring period, approximately 24.32 acres of the total 42.76 acres of jurisdictional riparian habitat will be restored and enhanced.

Table 15: Anticipated Annual Performance Standards

Performance Standards	Year 1	Year 2	Year 3	Year 4	Year 5
Total Percent of Native Cover for Understory	30%	40%	50%	60%	70%
Total Percent of Native Cover for Overstory	50%	60%	70%	80%	90%
Percent of Non-Native Cover for Understory* (excluding annual grasses; no greater than what is observed adjacent to the site)	<60%	<60%	<45%	<35%	<35%
Percent of Non-Native Cover for Overstory	20%	15%	10%	5%	0%
Plant Survival for Understory	90%	85%	80%	80%	80%
Plant Survival for Overstory	90%	85%	80%	80%	90%

Notes:
The mitigation site must be self-sustaining (i.e., no maintenance or artificial irrigation) for a minimum of two years to be considered successful. Nursery stock plant survivorship may include original plantings, remedial plantings, or volunteers. Any remedial plantings will be monitored until District environmental staff determines that they are self-sustaining.
*Percent non-native cover calculations exclude non-native annual grasses; however, includes non-native perennial grasses. The final goal for percent non-native cover is less than 35% (excluding annual grasses).

10 COMPLETION OF COMPENSATORY MITIGATION NOTIFICATION

The District will notify the USACE, CDFW, and RWQCB in writing upon completion of the monitoring period and attainment of the success criteria. When the success criteria have been met for a period of two years after a minimum of eight years of monitoring (for a total of ten years of monitoring), the District will submit a final monitoring report requesting agency verification that the final success criteria have been met. Following receipt of the final monitoring report, the District understands that the agencies may request a site visit to confirm the completion of the compensatory mitigation effort.

CONTINGENCY MEASURES

If it becomes apparent that the on-site mitigation will not attain the final success criteria, the District will begin an assessment of reasons for failure and will work with the USACE, RQWCB, and CDFW to determine an acceptable solution. If the site trends indicate that the success criteria will eventually be met but in a longer timeframe than anticipated, maintenance and monitoring will continue until the criteria have been satisfied. If a total site failure is evident, the USACE, RWQCB, and CDFW will determine what alternative compensatory mitigation will be required. If replanting is determined to be necessary, the replanted areas will be monitored and maintained for a period of 5 years from the date of planting, or for a period agreeable to the USACE, RWQCB, and CDFW. Any species substitutions proposed for contingency planting due to low survival of originally planted species must be approved in writing by the three aforementioned agencies. The mitigation site should be self-sustaining (i.e., no maintenance or artificial irrigation) for a period of two years to be considered successful.

11 REFERENCES

Central Coast Salmon Enhancement. 2009. Arroyo Grande Creek Watershed Management Plan Update. Prepared for the Department of Fish and Game, State of California.

Close, Bobby Jo and Stacey Smith. 2004. Stream Inventory Report Arroyo Grande Creek Summer 2004. Prepared for Central Coast Salmon Enhancement.

Coastal San Luis Resource Conservation District. 2016. Aquatic Pesticide Application Plan for San Luis Obispo County Flood Control and Water Conservation District Zones 1 and 1A.

Environmental Laboratory. 1987. U.S. Army Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Environmental Laboratory. 2008. U.S. Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual; Arid West Region (Version 2.0). ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-06-16, U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Essex Environmental. 2000. Habitat Assessment for the Arroyo Grande Creek Flood Control Project. Prepared for San Luis Obispo County, July 26, 2000. 30 pp.

San Luis Obispo County Public Works Department. 2013. Addendum to the Arroyo Grande Creek Channel Waterway Management Program Final Environmental Impact Report Certified on November 2, 2010, SCH No. 2009061030. 10 pp.

Swanson Hydrology + Geomorphology. 2006. Arroyo Grande Creek Erosion, Sedimentation and Flooding Alternatives Study. Prepared for Coast San Luis Resource Conservation District.

SWCA Environmental Consultants (SWCA). 2009. Preliminary Jurisdictional Determination for the Arroyo Grande Creek Channel Waterway Management Plan, San Luis Obispo County, California.

SWCA Environmental Consultants. 2010. Final Arroyo Grande Creek Channel Waterway Management Program Environmental Impact Report. Prepared for the County of San Luis Obispo, Department of Public Works. 873 pp.

U.S. Army Corps of Engineers (USACE). 2008a. Checklist for Compensatory Mitigation Proposals, Compensatory Mitigation Checklist – Page 1 of 5. Charleston District, Regulatory Branch, Charleston, South Carolina.

USACE. 2008b. Final Rule for Compensatory Mitigation for Losses of Aquatic Resources. April 10, 2008.

Waterways Consulting, Inc. 2010. Arroyo Grande Creek Channel Waterway Management Program, Final Report. Prepared for San Luis Obispo County Flood Control and Water Conservation District Zone 1/1A Flood Control District. 55 pp.

Waterways Consulting, Inc. Flood Control Zone 1/1A Waterway Management Program Alternative 3A and Modified 3C Project on the Arroyo Grande Creek Channel. 100% Administrative Draft Plans. 36 pp.