Enclosure 2

WINZLER & KELLY

August 15, 2011

Mr. David Ammerman
U.S. Army Corps of Engineers
Eureka Field Office
601 Startare Drive, Box 14
Eureka, CA 95501

RE: Salt River Ecosystem Restoration Project Army 404 Permit – 404(b)(1) Alternatives Analysis

Dear Mr. Ammerman:

Winzler & Kelly, authorized agent for Humboldt County Resource Conservation District (HCRCD), the Applicant for the Salt River Ecosystem Restoration Project, is submitting the 404(b)(1) Alternatives Analysis according to the U.S. Environmental Protection Agency's guidelines for preparing alternatives analysis pursuant to the Clean Water Act Section 404(b)(1). This analysis is intended to replace the analysis previous submitted on September 30, 2010. This report should complete the HCRCD's primary responsibilities for the Army 404 Permit. Both Misha Schwarz and I are authorized to perform the duties of Agent for the HCRCD Applicant.

We look forward to your review comments and continued relationship during this important stage of the project.

Very truly yours,

Jeremy Svehla, P.E.
Project Manager

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SECTION 404(b)(1) ALTERNATIVES ANALYSIS

for the

SALT RIVER ECOSYSTEM RESTORATION PROJECT

HUMBOLDT COUNTY, CALIFORNIA

WINZLER & KELLY

PN: 10653-10001-11050

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Prepared for:

U. S. Army Corps of Engineers

Eureka Field Office

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1.0 INTRODUCTION

Humboldt County Resource Conservation District (RCD) proposes to guide a broadscale ecosystem restoration of the lower Salt River in Humboldt County, near Ferndale, California. The RCD has submitted an application for a Clean Water Act Section 404 Army Permit to excavate portions of the existing channel and to construct a setback berm to allow tidal influence to be restored on the property (referred to as Riverside Ranch) in the lower reach of the existing Salt River watershed while protecting adjacent properties from flooding. Regarding permits under the Clean Water Act, the U.S. Army Corps of Engineers (Corps) must determine whether the proposed activity complies with Section 404 (b)(1) Guidelines promulgated under the U.S. Environmental Protection Agency. Issues the RCD must address regarding compliance with 404 (b)(1) analysis include the requirement not to cause or contribute to significant degradation to wetlands or waters of the United States (WoUS). With regard to significant degradation, the RCD proposes to take practicable steps to avoid and minimize impacts to aquatic systems and then provide compensatory mitigation to address the remaining impacts. The practicability of an alternative to the proposed project is related to whether it is available to the project proponent and can be implemented after cost, existing technology and logistics are considered in light of the proposed project's purpose.

Federal law requires that "no discharge of dredged of fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." 40 CFR 230.10(a). The purpose of this 404 (b)(1) alternatives analysis is to:

- evaluate the range of alternatives
- determine their relative environmental effect
- screen the alternatives for practicability
- identify the least environmentally damaging practicable alternative and
- describe any additional mitigation to address residual effects on wetlands or WoUS.

2.0 PROJECT PURPOSE

The purpose of the Salt River Ecosystem Restoration Project (SRERP or Project) is to restore historical processes and functions to the Salt River watershed. These processes and functions are necessary for re-establishing a functioning riverine, riparian, wetland and estuarine ecosystem as part of a land use, flood alleviation, and watershed management program. The chronic aggradation of the Salt River channel and resulting flooding have led to loss of habitat, threats to public infrastructure such as the Ferndale Wastewater Treatment Plant and roads, diminished property values, and declining agricultural productivity.

The SRERP will re-connect the Eel River estuary via the historical Salt River channel, to a series of five streams draining the Wildcat Mountains. In order to do this, 7.7 river/riparian corridor miles and 400 acres (ac) of tidal wetlands will be restored to support a broad list of special-status and native species. The SRERP focuses on re-establishing hydraulic connections across the floodplain and will also serve community needs including water quality improvement, flood alleviation, and carbon sequestration. Specific goals of the SRERP include the following:

- Restore the Salt River channel and adjacent riparian floodplain by increasing hydraulic conveyance and constructing habitat features that re-establish ecological processes beneficial to fish and other native species;
- Restore historical estuarine habitat and tidal connectivity within the lower Salt River;
- Improve water quality and drainage efficiency across the floodplain;
- Manage excess sediment loads by maximizing fluvial and tidal channel sediment transport capacity;
- Design and maintain active and passive sediment management areas (SMAs) that minimize long-term impacts to land use and ecological function; and
- Initiate a long-term corridor adaptive management process that maximizes ecological restoration success in a working landscape by:
    - reducing headwater erosion and sediment delivery to the Salt River floodplain;
    - increasing the volume and efficiency of clear water drainage from the upstream watershed and adjacent agricultural land, and;
    - providing and maintaining sediment management areas that minimize impacts to land use and ecological function.

2.1 PROJECT OVERVIEW AND OBJECTIVES

The Salt River Ecosystem Restoration Project includes four project components:

1. Restoration of the Salt River channel and riparian floodplain
2. Tidal marsh restoration at Riverside Ranch
3. Adaptive Management: Riverside Ranch, Channel and Riparian Floodplain, Sediment Maintenance and Management
4. Upslope sediment reduction

Each component has a pivotal role in the success and long-term benefit of the project. Restoration objectives, outlined below, have been established for each project component in an effort to achieve the overall project goals. The project encompasses the lower reaches of the Salt River and parts of the tributaries that flow into the Salt River downstream to Cutoff Slough just upstream from the confluence with the Eel River. The Eel River feeds the 6th largest estuary on the west coast in Humboldt County, California (Project Vicinity Map attached).

The proposed project was developed in close coordination with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), U.S. Army Corps of Engineers, California Coastal Commission, and other regulatory agencies. In addition, the County of Humboldt, State Coastal Conservancy, landowners, and others have played an important role in assisting the Humboldt County Resource Conservation District (HCRCD) to develop the project. The longevity of this project depends upon the successful restoration of natural ecological processes and the frequency and nature of maintenance activities, but would be heavily influenced by uncontrollable natural events within this highly altered and geologically unstable watershed.

3.0 ALTERNATIVES ANALYSIS

Alternatives to the Preferred Alternative (Alternative 1) were conceptually developed as part of a feasibility analysis conducted for the project. As required by the Clean Water Act Section 404(b)(1), the alternatives that were considered must examine the potential impact to waters of the State and the U.S. and include the preferred alternative, the No-Project Alternative (Alternative 2), and any other alternatives that may be practicable and have different potential impacts to waters. Alternative 3 includes maximum restoration of the channel, but no restoration of Riverside Ranch, and Alternative 4 includes restoration of the channel and upland erosion control projects. Alternative 5, consideration for an alternative project site for this project were not considered as the specific project purpose could not be met using an alternate location.

3.1 PROPOSED ALTERNATIVE – 1 (Full Ecosystem Restoration)

Alternative 1 Full Ecosystem Restoration includes significant restoration of the Salt River channel and Riverside Ranch, channel maintenance as well as upland erosion control projects.

The Proposed (or Preferred) Alternative is described in detail within the project description of the 404 Permit application. It includes maximum restoration of Salt River channel and Riverside Ranch, as well as an upland erosion control component that reduces sediment sources. The proposed project is deemed the least environmentally damaging because it provides for long-term improvement of flow and water quality throughout the lower Salt River Basin.

The proposed alternative would provide flood alleviation near the Salt River channel, as well as enhanced drainage during flood events by converting some agricultural lands to the new channel, and would convert some agricultural lands at Riverside Ranch to wetlands. Overall, drainage improvements would occur. This alternative would result in the conversion of seasonal wetlands to tidal marsh, riparian forest/scrub, open water, and/or freshwater marsh and would have short-term impacts to waters of the U.S. from upslope sediment reduction work, but this work would reduce fine sediment inputs entering the Salt River and its tributaries.

This alternative would provide restoration of tidal marsh and an increase in riparian forest/scrub, aquatic, and freshwater marsh habitats, but could result in short- and medium-term loss of wetland function due to construction disturbance and the length of time needed for restored wetlands to develop. Alternative 1 would reverse the ongoing gradual loss of aquatic and wetland habitat associated with the Salt River, which will continue to fill in with sediment if no action is taken. Alternative 1 provides a significant increase in tidal prism, restoring five miles of freshwater channel habitat along the main Salt River channel, and by restoring hydraulic connectivity with tributary streams, the project thereby also provides a net benefit to fish and the aquatic ecosystem.

3.1.1 Salt River Channel Corridor Restoration

The Salt River channel and riparian floodplain corridor restoration will re-establish a defined channel and riparian corridor from above the Salt River confluence with Williams Creek near Perry Slough, downstream to the confluence of the Salt River with Cutoff Slough, which is a total corridor length of approximately 7.7 miles. The corridor design, inclusive of active and passive sediment management areas, is intended to re-establish a functioning channel and floodplain corridor that integrates long-term sediment management and regional drainage needs, while restoring significant aquatic and riparian habitat value and ecologic function to the project area.

To attain the overall goals of the SRERP, the following Salt River Channel and Floodplain Corridor Restoration objectives are to:

- Establish and sustain a dynamic river corridor by optimizing flow and sediment conveyance, integrated with natural floodplain interaction and discrete active and passive sediment management areas.
- Integrate sediment capture and removal (sediment management) actions into the Adaptive Management Plan, to help sustain hydraulic conveyance and ecologic function.
- Minimize the cost, frequency and extent of required sediment management related maintenance activities which disturb the riparian corridor and disrupt ecosystem function.
- Maximize riparian habitat functions and values, extent and complexity by increasing plant species diversity, corridor shading, large wood recruitment, and minimizing invasive species.
- Optimize floodplain habitat complexity.
- Introduce instream salmonid rearing and refugia habitat where acceptable and sustainable within corridor design.
- Incorporate opportunities to re-connect the corridor to watershed tributaries, to improve fish access to spawning and rearing habitats.
- Improve and maintain adjacent land drainage.

- Integrate a Regional Landowner Drainage Management planning process into the Adaptive Management Plan, which establishes a framework for developing, coordinating and funding activities that enhance the integration of overland drainage with agricultural land practices adjoining the corridor.

3.1.2 Riverside Ranch Tidal Marsh Restoration

Riverside Ranch is an approximately 444-acre property with over 2.5-miles of frontage along the lower Salt River. The property was acquired in 2007 by the Western Rivers Conservancy with funding from USFWS, the Wildlife Conservation Board, and the State Coastal Conservancy. Western Rivers Conservancy is in the process of transferring the property to the CDFG for long-term management. Once transferred, it will become the Salt River Unit of the Eel River Wildlife Management Area.

Restoration of Riverside Ranch will re-establish intertidal wetland habitat to the Eel/Salt River estuary. The increase in tidal exchange associated with a restored marsh will also help sustain a restored Salt River channel. Restoring the tidal prism to the lower Salt River, (i.e., increasing the volume of water exchanged on each tidal cycle) will increase channel scour and help maintain and equilibrate channel width and depth.
To attain the overall goals of the SRERP, the Riverside Ranch Tidal Marsh Restoration objectives are to:

- Use the increase in tidal prism to help maintain the constructed Salt River channel geomorphology and conveyance.
- Improve drainage and water quality in the lower Salt River and Eel/Salt River estuary.
- Restore tidal connectivity to historical tidal wetlands to allow for the natural evolution of diverse and self-sustaining salt- and brackish water tidal marshes, intertidal mudflat and shallow water habitats.
- Restore the marsh to include and expand the transition zone between tidal wetland and upland.
- Create a template for the natural evolution of a complex tidal drainage network. The network will maximize subtidal and intertidal habitats beneficial to target fish and wildlife species. This includes the enhancement of rearing and migration conditions for estuarine-dependent species including: coho salmon, Chinook salmon, steelhead trout, coastal cutthroat trout, tidewater goby, and commercially and recreationally valuable species such as redtail perch.
- Retain approximately 70 acres where agricultural management techniques can be used for short-grass Aleutian cackling goose habitat.
- Provide wintering habitat for migratory waterfowl and shorebirds.
- Provide public access to the extent feasible without compromising the physical and biological project objectives.

- Avoid adverse impacts to the existing drainage of adjacent parcels.
- Design site components that can support natural geomorphic response to sea-level rise.

Restoration of Riverside Ranch is intended to strike a balance between creating significant amounts of new tidal marsh habitat, retaining and enhancing some of the important existing upland features, preserving sufficient acreage for creation of short grass habitat, minimizing long-term site maintenance, and incorporating design features that accommodate sea-level rise.

3.1.3 Adaptive Management: Riverside Ranch, Channel and Riparian Floodplain, Sediment Maintenance and Management

Due to the history of alterations to the landscape, the scale of the project, the complexity and diversity of restoration activities to be undertaken, and the dynamic processes at work in the watershed, an adaptive management strategy will be used to ensure the long-term success of the project. Using adaptive management, restoration activities conducted under the project will be monitored and analyzed to determine if they are producing the desired results (i.e., properly functioning habitats).

Ongoing maintenance activities throughout the project area will be vital to ensuring lasting hydraulic and ecological function of the restored system. Maintaining the proposed project components, such as the channel, sediment management areas, drainage ditches, and the berms, will require optimizing overland drainage inflows to the system, and integrating land use with sediment and vegetation maintenance areas. Although minimized, and circumscribed as much as possible, these designated maintenance areas may require vegetation removal, ongoing riparian planting and/or repeated excavation or reworking of deposited sediments.

Most importantly, establishing a formal and predictable structure to adaptive management is fundamental to preserving the long-term social and biological integrity of the project. To this end, an Adaptive Management Plan (AMP) details the organizational structure for the adaptive management process to ensure that project goals and objectives are attained, while providing for ongoing, long-term input from local property owners and the regulatory community. The following elements are integral to the AMP:

- Specify the structure and responsibilities of the Project Management Team;
- Assign responsibility to identify/obtain funding for monitoring and adaptive management activities;
- Identify monitoring program components for use in evaluating the results of project implementation;
- Identify triggering mechanisms or early stress indicators that will be used to alert the project management team of the need to take action;

- Identify potential adaptive project management options once trigger thresholds have been reached;
- Develop an appropriate conceptual model of adaptive management process, which will:
    - outline a feedback loop between management actions and monitoring,
    - inform managers,
    - select adaptive management actions, and
    - refine the on-going monitoring program.

Natural ecosystems are dynamic and change over time. This is especially true in the SRERP area, where physical processes such as flow and sediment transport from tributary watersheds will likely influence the magnitude and frequency of maintenance activities at sediment management areas. Adaptive management may be necessary to minimize erosion and/or sedimentation that could adversely impact the success of the created and enhanced channel habitats. The AMP has been designed to provide a strong long-term adaptive management program while still providing flexibility within both the organizational structure and the monitoring program, to ensure that the SRERP goals and objectives are met.

3.1.4 Upslope Sediment Reduction

Upslope sediment reduction may include on- and off-channel sediment retention basins; debris basins; stream bank stabilization; and road improvements such as culvert replacement, revegetation of riparian habitat, rock armoring, stabilizing stream banks or small streamside landslides, road rehabilitation, watercourse-crossing improvements, ditch relief culverts and drainage ditches. These road drainage improvements will reduce sediment loading into the headwater streams. Using the information from an upslope erosion inventory in the Wildcat Mountain tributaries, sediment sources have been identified and prioritized. As opportunities arise and funding allows, Best Management Practices (BMPs) and other site-specific erosion control measures will be implemented to reduce fine sediments from upslope areas. Upslope activities are excluded from the AMP.

Upslope sediment reduction should extend the longevity of the proposed project. This component does not directly depend on or cause any further actions associated with the SRERP, although it may decrease maintenance frequency.

Within the Salt River tributaries, years of timber harvest and agricultural conversion, combined with earthquakes, flooding, high rainfall events, unstable slopes, and highly erosive soils have led to degradation of native habitats and beneficial uses of waters. Although natural or undisturbed sediment delivery rates from Salt River tributaries are high, human alterations and influences have increased these rates. In Francis Creek, Total Suspended Sediment concentrations measured during storm events often reach very high levels. The cumulative effects of both anthropogenic and natural conditions within the landscape have limited

anadromous fish survival and reproduction in coastal streams that historically supported large populations of salmon and steelhead.

In the Francis Creek watershed, an Upslope and Instream Erosion Hazard Assessment and Inventory was completed in 2009, and identified 170 sites with potential for sediment delivery. Of those 170 sites, 132 sites either were currently delivering or had the potential to deliver sediment to the Francis Creek Watershed. Fifty-six sites were deemed high priority, meaning that the sites were not adequate for peak storm events and would likely contribute 50+ cubic yards of sediment to a watercourse if complete failure occurred. To date, HCRCD has successfully partnered with a private landowner to treat 10,234 feet of road and 37 specific erosion sites with best management practices, including shaping and surfacing of the roadway, installing adequately-sized culverts, rock armoring the inlets and outlets, installation of critical dips, rocked rolling dips, rolling grade breaks and performing inside ditch work, preventing 6,334 cubic yards of sediment from entering the Creek.

In the Williams Creek watershed, an Upslope and Instream Erosion Hazard Assessment and Inventory was completed in 2010, and identified 164 sites with potential for sediment delivery; 49 sites were deemed high priority.

The HCRCD has worked with private landowners to implement a variety of erosion control activities over the past several years and proposes to conduct additional sediment control and erosion reduction actions within the upper watersheds of Williams Creek, Francis Creek, and Reas Creek tributaries of the Salt River as part of the proposed project and dependent on landowner participation. The purposes of these actions include improvement of water quality, improvement of anadromous fish habitat in the Salt River watershed, and reduction of erosion and sediment deposition on the Salt River delta, thereby extending the longevity of the proposed channel excavation.

Sediment and erosion reduction measures include road improvements, drainage improvements, crossing upgrades, bank and slope stabilization, livestock fencing, revegetation, off-channel natural sediment detention areas, and off-channel watering site development. Sediment sources targeted for action are prioritized based on previous and ongoing assessments. Treatment priority is based on the expected volume of sediment available to be delivered to a stream (cubic yards), geographic location and accessibility, and cost-effectiveness. Actions are taken as opportunities arise, landowner permission allows, and funding becomes available. The SRERP includes sediment reduction projects that would augment work already performed to reduce current or potential fine sediment delivery to the Salt River tributaries.

Specific activities would include road improvements such as culvert replacement, revegetation of riparian habitat, or rock armoring, stabilizing stream banks or small streamside landslides, road rehabilitation, watercourse-crossing improvements, ditch relief culverts and drainage ditches. All work would be conducted during the summer and fall (low flow period) and would be

completed before the first significant seasonal rainfall. Typically, the dump trucks would be used to deliver logs, root wads, or quarry rock to staging areas and front-end loaders to deliver material to restoration sites. In most cases, existing stream crossings would be used to access the stream. If stream crossings do not exist, the least damaging access point would be selected based on the size, type and density of riparian vegetation. All road upgrading or decommissioning would be done in accordance with techniques described in the "California Salmonid Stream Habitat Restoration Manual" (CDFG 2010).

In addition, community education efforts will be implemented to encourage voluntary best management practices related to sediment and erosion reduction. The sediment reduction projects are designed to increase populations of wild anadromous fish within the watershed by restoring habitat directly and indirectly; this would include improving spawning success for adult salmon and steelhead as well as increasing survival for eggs, embryos, rearing juveniles, and downstream migrants.

A program comprised of a number of small projects to reduce upslope erosion within the upper Francis Creek watershed is included in the first phase of this larger restoration effort. The upslope projects are funded through the State Water Resources Control Board. Some erosion control and streambed restoration projects in the Francis Creek watershed have also been, and are continuing to be, funded by the CDFG. Those projects have undergone separate California Environmental Quality Act (CEQA) review in the Initial Studies and Negative Declarations prepared by CDFG for its annual Fisheries Restoration Grant Program and are considered herein only for the purposes of evaluating cumulative impacts of proposed watershed improvements.

The HCRCD continues to reach out to landowners in the Williams, Francis and Reas Creek watersheds to build interest in performing sediment control and erosion reduction work on their lands. Projects are typically implemented under a cost-share agreement with the landowners providing materials and/or equipment.

3.2 NO ACTIONALTERNATIVE - 2 (No Action)

This alternative involves maintaining existing conditions in the lower Salt River with no channel restoration, no Riverside Ranch tidal marsh restoration, no upslope sediment erosion control projects; hence, there would be no discharges either on-site or off-site, but would not meet any of the project purposes. Maintaining the current hydraulic dysfunction of the Salt River will continue to cause significant problems related to barriers to fish passage, flooding, discharge of wastewater treatment plant effluent, and overall water quality. These problems will continue and increase each winter as the sediment continues to fill drainages. Thus, the no action alternative will result in significant adverse environmental consequences and will not realize the benefits of reduced flood impacts, improved fish passage, improved water quality, improved and expanded

habitat for riparian and wetland species, improved dilution of sewage treatment plant discharges, and improved sediment transport.

Taking no action would assure ongoing sediment deposition, aggradation of the main channel and continued flooding. In the short-term, within 15 years, the little remaining aquatic area would diminish as the channel further aggrades. In the longer term, the trend towards reduction in aquatic habitat would be at least partially offset by increases in sea level, but the rate of that relationship has not been calculated relative to this project. Current projections suggest a possible rise in sea level of one meter by the year 2100. Most of the project area, indeed much of the historic Eel River estuary, would be underwater at that level of increase. In short, no action would result in a gradual increase in the duration and frequency of flooding in the entire project area.

3.3 ON-SITE REDUCED ALTERNATIVE – 3 (Channel only)

This alternative involves the channel restoration component and upslope erosion control projects but without restoration of Riverside Ranch. Channel excavation is the main project element, described in Alternative 1 above, and its purpose is to increase public safety, minimize effects on development (i.e., roads, structures) by decreasing flooding, improve dilution of sewage treatment plant discharges, and improve sediment transport. Alternatives 1, 2, and 3 would result in the conversion of seasonal wetlands to tidal marsh, riparian forest/scrub, open water, and/or freshwater marsh. All three alternatives would have short-term impacts to waters of the U.S. from upslope sediment reduction work, but this work would reduce fine sediment inputs entering the Salt River and its tributaries. These short term impacts would also be mitigated by using best management techniques for erosion control and water quality protection.

This alternative does not meet the tidal marsh restoration element of the project. Without the Riverside Ranch restoration component, tidal exchange and associated scouring would occur through a narrower tidal prism, and would not have benefits for migratory waterfowl, shorebirds, fish and other wildlife species. The continued low level tidal exchange would diminish tidal scouring of the channel, thereby increasing the need for and frequency of channel maintenance over time. This repetitive and more frequent disruption of the newly modified channel would more frequently disrupt the wetland, riparian, and aquatic habitats in the Salt River channel.

3.4 ON-SITE REDUCED ALTERNATIVE – 4 (Reduced Berm Footprint)

This alternative differs from the proposed alternative in that the setback berm would be reduced in size. This would result in less fill material being placed within the floodplain and more material would instead need to be applied to agricultural lands and other upland locations or hauled off to other locations. Maintenance needs of a reduced setback berm would likely be increased over time from tidal scour. Under a reduced footprint alternative, the proposed berm would be the same length as the proposed Alternative 1, approximately 9,060 feet long and

constructed on the eastern boundary of Riverside Ranch. With a crest elevation of 14.75 ft (NAVD88) and outboard slope of 3H:1V, the width and interior slope would be narrower. Although this option has a smaller footprint within the wetlands, it would likely be subject to higher wave erosion and could have higher incidence of failure under certain storm events. Additionally, the habitats that would occupy the proposed gently slope berm would be greatly reduced in both available area and diversity. Under the proposed alternative, the saline-sodic soil excavated from the Salt River will be utilized to construct the berm. Because the construction of the berm is the only beneficial reuse of the saline-sodic material within the proposed project, a reduced berm size would require off-site disposal of the excess saline-sodic material.

3.5 ON-SITE EXPANDED ALTERNATIVE – 5 (Expand restoration to historical levels)

This alternative is a larger, more expanded project involving larger levees and longer/wider channel excavations to restore the Salt River to its historic tidal prism. Channel excavation would be extended further upstream including Reas Creek, Francis Creek and Williams Creek tributaries and expanded laterally to further expand tidal exchange and convey a greater flood flow. There would be a considerable increase in excavated fill material, which would be used to build larger levees/berms, applied to additional agricultural lands, and/or exported off site. This expanded work would encroach into the adjacent agricultural lands and the developed areas of lower Francis Creek in the City of Ferndale.

3.6 OFF-SITE ALTERNATIVE – 6 (No On-site reuse of Excavated Sediment)

This alternative would involve the channel restoration and Riverside Ranch component explained above, but excavated material would not be used for the setback berm on Riverside Ranch or application on agricultural uplands. Thus, this alternative may result in less adverse impact to waters of the U.S. as excavated channel material would be applied only to off-site upland disposal locations (including but not limited to the Connick Ranch and a borrow pit associated with the Highway 101 Alton interchange construction. Not using fill for the setback berm in Riverside Ranch would lead to tidal encroachment and flooding of adjacent agricultural lands.

3.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

Several alternatives were considered but dismissed as they do not address the project purposes of reducing flooding, improving water quality, and minimizing sedimentation accumulation:

- **On-Site Reduced Partial Restoration of Riverside Ranch Only** - An on-site reduced alternative that involves only partial restoration of the Salt River channel would at least temporarily improve habitat in the lower reaches of the Salt River. Fewer improvements to drainage and main-channel habitat quality would preclude full hydrologic connectivity

to Salt River tributary streams, limiting the beneficial effects of the restoration that did occur and creating the need for more frequent channel maintenance over the long-term.

- **On-Site Reduced by Elevating Roads** - An on-site reduced alternative that protects roads and structures within the flood zone by elevating them. This alternative would not involve channel restoration or restoration of Riverside Ranch.
- **On-Site Expanded Footprint with Taller Levees/Berms** - An on-site expanded alternative that protects roads and structures from flooding by building new and enlarging existing levees around the roads and structures and along affected agricultural lands. The larger levees would dominate both banks of the Salt River channel and occupy private waterfront property through the City of Ferndale and the flood-affected agricultural areas.
- **Off-Site Alternative** - An off-site alternative that restores/excavates channels in other river basins or tributaries. Restoration of tidal marsh and wetland habitat could potentially occur at other locations, such as the northern part of the Eel River estuary or Connick Ranch, but would require similar methods to change hydraulic pathways: diking, berm breaching, berm lowering, creation of new channels, etc. Further, the need to acquire/secure the private property to excavate and fill or flood, make this alternative infeasible.
- **On-Site Reuse of Excavated Sediment for Channel Confinement Fill Areas** - An on-site expanded alternative that includes reuse of excavated sediment for channel confinement fill areas was considered during previous channel design development efforts. The channel confinement fill areas would help maintain a specific design flow (i.e. 2-year recurrence flow) within the channel prior to inundating adjoining agricultural lands. The confinement fill areas would however include placing fill in wetlands and WoUS. Additionally and through subsequent hydraulic and sediment transport modeling and design, it was determine the channel confinement fill areas would preclude flow from interacting with the adjoining floodplain allow the deposition to occur on more frequent flows (i.e. 1-year recurrence flow).

4.0 ENVIRONMENTAL IMPACT

This section addresses the viability of each alternative to meet the practicability test under the Clean Water Act. It is prudent to examine first if an alternative would result in no identifiable or discernable difference in impact on the aquatic ecosystem. Both adverse and beneficial effects of each alternative on the aquatic ecosystem are shown in Table 1.The Army 404 Permit describes the restoration/creation of wetlands and aquatic ecosystems. The relative amount of wetland restoration/creation and WoUS creation in the channel are considered for each of the proposed alternatives and the net acreage change of aquatic ecosystems is shown in Table 1.

Tables 2 and 3 displays the relative differences among the alternatives for their capacity to reduce flood impacts, improve fish passage, improve water quality, improve and expand habitat

for riparian and wetland species, improve dilution of sewage treatment plant discharges, and improve sediment transport.

Table 1. ACOE Jurisdictional Wetlands/WoUS[1] Permanently Impacted and/or Created

ALTERNATIVE	RIVERSIDE RANCH (AC)		SALT RIVER (AC)		OVERALL PROJECT (AC)
	Filled	Created	Filled	Created	Projected Change
1-Full restoration	12.7	12.7	0.5[6]	1.6	+1.1
2-No action	0	0	0	0	0.0
3-Channel only	0	0	0.5[6]	1.6	+1.1
4-Reduced Berm Footprint	10	14	0.5[6]	1.6	+5.1
5-Expanded to Historical Tidal Influence	Est. 20	Est. 5	Est. 20	Est. 5	Est. -30.0
6-Off-site Reuse of Excavated Sediment (no Berm)	0	12.7	0.5[6]	1.6	+13.8

[1] Upland Delineation for the Salt River Restoration Project Mapping and Report, Prepared by the ACOE, HCRCD and Winzler &Kelly, December 2010. Amended April 2011

Table 2. Comparison of Alternatives to Meet Project Purpose

ALTERNATIVES CONSIDERED	PROJECT GOALS				
	Decreases flooding	Improves water quality	Increased sediment transport	Improves fish passage	Increases marsh habitat
1-Full restoration	+	+	+	+	+
2-No action	--	--	--	--	--
3-Channel only	+/-	+	+/-	+	--
4-Reduced Berm Footprint	--	+/-	+/-	+	+/-
5-Expanded to Historical Tidal Influence	+	+	+	+	+
6-Off-site Reuse of Excavated Sediment (no Berm)	--	+/-	--	+	+/-

+ does contribute
-- does not contribute
+/- limited contribution

Table 3. Comparison of Alternatives

EVALUATION CRITERIA	ALTERNATIVE					
	1-Proposed	**2- No action**	**3- Channel only**	**4- Reduced Footprint**	**5- Expanded**	**6-Off-site Reuse of Excavated Sediment**
Meets Project Purpose	Yes	No	Partially	Partially	Yes	No
Practicability						
Availability of Land	Yes	Yes	Yes	Yes	No	Yes
Cost	Viable	Viable	Viable	Viable	Not viable	Not Viable
Existing Technology						
Logistics	Viable	N/A	Viable	Viable	Viable	Viable
Access	Viable	N/A	Viable	Viable	Viable	Viable
Transportation needs	Minimal-	None – flood event will increase transportation needs for emergency actions	Intermediate – may require hauling if no land application is identified within the project	Minimal	High – Hauling excess material to off-site locations	High - Hauling of material to off-site locations
Utilities/ Topography	N/A	N/A	N/A	N/A	N/A	N/A
Construction Technique	Viable	N/A	Confined	Confined	Viable	Confined
Environmental Damage						
Geology/Soils	-- channel sediment will be impacted by removal. In channel erosion possible. Minimal instability effects.	-- channel sediment would not be removed, but more sediment likely to accumulate	-- channel sediment will be impacted by removal. In channel erosion possible. Minimal instability effects.	-- channel sediment will be impacted by removal. In channel erosion possible. Minimal instability effects.	-- channel sediment will be impacted by removal. In channel erosion possible. Minimal instability effects.	-- channel sediment will be impacted by removal. In channel erosion possible. Minimal instability effects.
Water Quality	M, increased turbidity during construction, but can be mitigated with BMPs. + long-term, as better circulation increases dissolved	+ short-term, minimal turbidity increases, but – long-term, as poor circulation decreases dissolved oxygen and increases temperature; deposited	-- unrestored reaches could become sediment contributors to restored reaches, limiting the beneficial effects of the restoration that did occur	-- channel sediment will be impacted by removal. In channel erosion possible. Minimal instability effects.	M, increased turbidity during construction, but can be mitigated with BMPs. + long-term, as better circulation increases dissolved	-- unrestored reaches could become sediment contributors to restored reaches, limiting the beneficial effects of the restoration that did occur

	oxygen, and decreases temperature Temperature will also be reduced in the long-term by increased shading from riparian forest habitat..	sediment stored within channel corridor remains susceptible to re-mobilizing into the 303(d)-listed Eel River during high flows			oxygen, and decreases temperature Temperature will also be reduced in the long-term by increased shading from riparian forest habitat..	
Hydrology	+ flow paths and direction will be restored to condition closer to historical	-- flow paths will continue to be shallow until a very large flood event occurs that can remobilize sediment out; this assumes upslope sediment reduction is successful.	+ flow paths and direction will be restored to condition closer to historical	+ flow paths and direction will be restored to condition closer to historical	+ flow paths and direction will be restored to condition closer to historical; tidal prism could reach 2miles upstream from Eel River confluence	-- flow paths will continue to be shallow until a very large flood event occurs that allows flooding to occur on adjoining lands
Land Use	+ Flood Protection of private property	Property damage would continue from flooding and habitat loss	+Flood Protection of Private property	+Flood Protection of Private property	+Flood Protection of Private property	Property damage would continue from flooding and habitat loss
Cumulative	+ cumulative effects of greater connectivity and habitat diversity would be beneficial to aquatic and riparian resources	-- cumulative adverse effects of habitat loss , property damage due to floods would continue	+ cumulative effects of greater connectivity and habitat diversity would be beneficial to aquatic and riparian resources	-- cumulative effects of greater connectivity and habitat diversity may be temporary as flood risk would remain high with smaller levees	+ cumulative effects of greater connectivity and habitat diversity would be beneficial to aquatic and riparian resources	-- cumulative effects of greater connectivity and habitat diversity may be temporary as property damage due to floods would continue

4.1 LEAST ENVIRONMENTALLY DAMAGING

The Proposed Alternative 1 will more adequately address a long-term permanent solution to ongoing deposition and poor water quality present at the site. As important is the availability of the land and the public acceptance of the proposal for a solution to recurrent flooding. On-site alternatives that do not construct the adequate size berm or do not construct Riverside Ranch

restoration will require off-site locations for the excess channel excavation material. The energy required for hauling and upland disposal and identifying sufficient upland property to receive the dredged material is deemed an adverse environmental impact. The Proposed Alternative provides a long term minimal cost solution that meets the purpose, goals and objectives of the project, i.e., reduce flood impacts, improve fish passage, improve water quality, improve and expand habitat for riparian and wetland species, improve dilution of sewage treatment plant discharges, and improve sediment transport. In addition, the cost is viable, the technology and access available and the other environmental impacts temporary and short duration. Construction impacts will be mitigated as described in the following section while post-construction activities are adaptive and manageable across the entire project spectrum of habitats. The project has a versatile set of possibilities for material handling and disposal that will keep the ongoing operations and maintenance costs to a minimum.

5.0 MITIGATION

Mitigation is a three-tiered sequence: avoidance and minimization, reduction of impacts, and compensation of impacts through creation restoration or enhancement of the wetlands or Waters of the U.S./State. The design is intended to restore the Salt River and improve the downstream water quantity and quality that flows to the Eel River Estuary. Therefore the project is a mitigating measure for long-term degradation of the system. Temporary impacts that would occur as the project is constructed require mitigation; this section describes those planned mitigations specific for water quality protection and for minimizing channel and bank erosion.

5.1 Proposed Minimum Erosion Control Measures During Construction

Sediment reduction and erosion control is one of the four primary components of the proposed project description; erosion control measures will also be applied during project construction and post-construction. Upslope sediment reduction activities are described above in the Project Description. The benefits of future upslope sediment reduction activities include decreasing aggradation of the Salt River channel, which will then better support desired aquatic and riparian species. Applicable erosion control BMPs include: seeding; mulching; erosion control blankets; plastic coverings; and geotextiles.

The primary pollutant and sources that are associated with this project are sediment/turbidity from excavated areas or from materials reuse areas. Fertilizers and pesticides are not proposed as chemicals to be used in the re-vegetation actions of the Project. Other less likely pollutants and sources include oil and grease from heavy equipment; construction BMPs addressing oil and grease will be followed and will be described in the SWPPP.

Earthwork activities are phased to occur outside of the wet season (October 15 – April 15). Construction activities during the wet season will require the use of BMPs to reduce erosion and control sediment. The earthwork activities will be conducted per the construction documents and subject to project permits including a Stormwater Pollution Prevention Plan (SWPPP) administered by the State General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities (Order No. 2009-0009 DWQ, NPDES No. CAS000002). The SWPPP shall be developed by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner to ensure that receiving waterbodies are not impacted as a result of erosion and sedimentation during construction activities, until the disturbed areas are stabilized and sheet and rill erosion potential are minimized, and until a Notice of Termination of the general permit has been filed with the Regional Board. Because of the proximity of the proposed grading activities to the Eel River, which is a 303(d) listed waterbody impaired by sediment and has beneficial uses related to Cold Freshwater Habitat specifically for spawning, reproduction, early development, and migration of aquatic organisms such as salmonids, the project will be subject to turbidity and pH monitoring through site stabilization.

The SWPPP will detail the location and type of erosion and sediment control BMPs. Sediment source control BMPs applicable for this project include: silt fencing; fiber rolls; temporary sediment basins; and check dams. These will be implemented prior to or during grading activities and removed once the site has stabilized. Applicable erosion control BMPs include: seeding; mulching; erosion control blankets; plastic coverings; and geotextiles. Erosion control BMPs including seeding and mulching will be implemented upon completion of the grading activities. The SWPPP will detail erosion and sediment BMPs that will be implemented to prevent entry of storm water runoff into the excavation site, entrainment of excavated contaminated materials leaving the site, and entry of polluted storm water runoff into coastal waters during transportation and storage of excavated materials. BMPs that will be implemented as part of the SWPPP include:

- Coffer dams or other temporary fish barriers/water control structures will be placed in the channel during low tide, and will only be removed during low tide (if possible), after work is completed.
- Because coffer dams will be installed and the channel will be dewatered prior to excavation, equipment will not be operated directly within tidal waters or stream channels of flowing streams, after fish removal efforts have been completed.
- Silt fences and or silt curtains will be deployed in the vicinity of the coffer dams and at excavation of sloughs at culvert installation and removal areas to prevent any sediment from flowing into the creek or wetted channels. If the silt fences are not adequately containing sediment, construction activity will cease until remedial measures are implemented that prevents sediment from entering the waters below.

- Sediment sources will be controlled using fiber rolls, sediment basins, and/or check dams that will be installed prior to or during grading activities and removed once the site has stabilized.
- Erosion control may include seeding, mulching, erosion control blankets, plastic coverings, and geotextiles that will be implemented after completion of construction activities.
- Excess water will be pumped into the surrounding fields to prevent sediment-laden water from entering the stream channel. When internal sloughs are connected to the mainstem Salt River, excavation will occur during a rising tide so that water flows into the marsh and sediment has a chance to settle out, allowing impacts of turbid water generated from excavations necessary for connection of the sloughs to the mainstem to be minimized by settlement and dilution.
- Appropriate energy dissipation devises will be utilized to reduce or prevent erosion at discharge end of dewatering activity.
- Exposed surfaces above high marsh and down to 7-8 ft elevation (NAVD88), will be mulched and seeded with appropriate seed after the work has been completed.
- Construction materials, debris, and waste will not be placed or stored where it can enter into or be washed by rainfall into waters of the U.S./State.
- Upland areas will be used for equipment refueling. If equipment must be washed, washing will occur where wash water cannot flow into wetlands or waters of the U.S./State.
- Operators of heavy equipment, vehicles, and construction work will be instructed to avoid sensitive habitat areas. To ensure construction occurs in the designated areas and does not impact environmentally sensitive areas, the boundaries of the work area will be fenced or marked with flagging.
- Equipment when not in use will be stored outside of the slough channel and above high tide elevations.
- All construction equipment will be maintained to prevent leaks of fuels, lubricants or other fluids into the slough. Service and refueling procedures will be not conducted where there is potential for fuel spills to seep or wash into the slough.
- Extreme caution will be used when handling and/or storing chemicals and hazardous wastes (e.g., fuel and hydraulic fluid) near waterways, and any and all applicable laws and regulations will be followed. Appropriate materials will be on site to prevent and manage spills.
- All trash and waste items generated by construction or crew activities will be properly contained and remove from the project area
- After work is completed, project staff will be on site to ensure that the area is recontoured as per approved specifications. If necessary, restoration work (including revegetation and soil stabilization) will be performed in conformance with the Revegetation and SWPPP plans.
- Per section ii,c,1,b of the State Water Resources Control Board NPDES General Permit for Storm Water discharges (Order No. 2009-0009 DWQ, NPDES No. CAS000002), activities associated with disturbance to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation are not covered under the general permit and therefore the SWPPP is not anticipated to be

required for the sediment application activities on agricultural uplands. Standard erosion control BMPs will be implemented during the hauling, windrowing and placement of the excavated sediment on the agricultural uplands to prevent wind and rain induced erosion.

5.2 Post Construction

Annual performance criteria specified in the Adaptive Management Plan (AMP) will be monitored. If criteria are not met, a report shall be prepared analyzing the cause of failure and any remedial action necessary for agency approval. Hydrologic modification by sediment removal will be necessary if it is deemed that no other procedure could be employed to restore the target habitat to meet monitoring criteria.

5.3 In-stream Habitat Features – Salt River Channel

Habitat features targeting specific species such as tidewater goby and salmonids have been design and incorporated into the design drawings. These features include juvenile salmonid refugia in the form of off-channel habitat alcoves, in-stream wood structures and tidal marsh panes. These features have been discussed with multiple agencies and designed to meet the requirement of the individual species' recovery plans adopted by the USFWS and NMFS (Kamman 2011).

5.3 Habitat Features – Riverside Ranch Tidal Marsh Restoration

Habitat features will be integrated into the final design for the Riverside Ranch Tidal Marsh Restoration design targeted at creation of diverse aquatic habitat for tidewater goby and salmonid rearing and refugia. Design objectives include:

• Low-velocity/low-energy environments that are permanently flooded to provide low-tide refugia;

• Close proximity and/or connectivity of slack water habitats that promote mixing of goby populations throughout the Riverside Ranch project area;

• In-channel and off-channel habitat areas that pool at a variety of tidal datum elevations during ebb tide;

• Tidal exchange to habitat areas on a daily to near-daily frequency;

• In-channel structures (e.g., large wood) and bed forms (esp. channel complexity) that provide channel and habiate complexity (e.g., resting, rearing and refugia habitat).

Habitat features will include tidal marsh panes, in-channel ponding, reduced ditch filling, increase complexity of channel geometry, construction of wood structures (Kamman 2011).

5.4 Habitat Mitigation and Monitoring Plan

The Habitat Mitigation and Monitoring Plan (HMMP) includes multiple habitat restoration, conservation, and management elements as compensatory mitigation for potential project impacts. This plan serves as a companion document to the CEQA document and permit applications. The HMMP contains a detailed description of the project impacts to vegetation and a conceptual plan to mitigate for those impacts, including planting plans for revegetating the project area. The HMMP also includes a description of the project's long-term mitigation site monitoring and maintenance requirements, and provides recommendations for ongoing maintenance during the mitigation monitoring period. The Adaptive Management Plan (AMP) further supports project permitting by allowing for flexibility in addressing changing conditions at the site while ensuring compliance with project goals and objectives.

6.0 SUMMARY AND CONCLUSIONS

After considering system alternatives, the Alternative 1was determined to be the least environmentally damaging location that would still meet the purpose and need. Implementation of this alternative would provide the greatest benefit while maintaining the greatest amount of individual's property values.

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