Item 6e - Exhibit 4: CEQA document
Mitigated Negative Declaration

PLANNING DIVISION
HUMBOLDT COUNTY PLANNING & BUILDING DEPARTMENT
3015 H STREET | EUREKA, CA 95501

FINAL Initial Study and Draft Mitigated Negative Declaration

1. **Project Title**: Martin Slough Enhancement Conditional Use Permit, Application Number 11085, Case No.: CUP-16-145, Assessor Parcel Numbers (APNs): 301-221-001, -006, -007, 302-161-003, 305-021-010, 305-021-011, 301-031-008, -013-, -018, and 305-031-001.

2. **Lead agency name and address**: Humboldt County Planning & Building Department, 3015 H Street, Eureka, CA 95501-4484; Phone: (707) 445-7541; Fax (707) 445-7446

3. **Contact person and phone number**: Michelle Nielsen, Senior Planner (707) 268-3708; fax: 707-445-7446; email: mnielsen@co.humboldt.ca.us

4. **Project Location:** The project is located in Humboldt County, in the Eureka area, on both sides of Fairway Drive, approximately 1.08 miles east from the intersection of Elk River Road and Herrick Avenue on the property known as 4750 Fairway Drive, also known as Eureka Municipal Golf Course; on both sides of Elk River Road, approximately 350 feet south from the intersection of Elk River Road and Pine Hill Road on the properties known as 5396 and 5431 Elk River Road; on the east side of Myers Avenue, approximately 0.35 miles east from the intersection of Elk River Road and Pine Hill Road on the property know as 6111 Meyers Avenue; and the properties known to be in Sections 3, 4 and 9 of Township 04 North, Range 01 West, HBM.

5. **Applicant**
Northcoast Regional Land Trust
Attn.: Michael Cipra
PO Box 398
Bayside, CA 95524

Owner
Northcoast Regional Land Trust
PO Box 398
Bayside, CA 95524

Agent
Redwood Community Action Agency
Attn.: Elijah Portugal
904 G Street
Eureka, CA 95501

Additional Owners:
Vroman Trueman E, 2950 E St, Ste C, Eureka, CA, 95501
Greg Shanahan et al, PO Box 6514, , Eureka, CA, 95502
City of Eureka, 531 K Street, Eureka, CA, 95501

6. **Zoning Designations(s):** Parcels located in the unincorporated area: Agricultural Exclusive, 60 acre minimum parcel size (AE-60), with combining zones for Flood Hazard Areas (F), and Transitional Agricultural Land; (AE-60/F,T); Residential Single Family-Minimum lot size 5,000 sq. ft. (RS-5), with combining zones for Manufactured Home (M), Flood Hazard Areas (F), Coastal Wetlands (W). Parcels located in the City of Eureka: Public ~~Recreation~~.

7. **General Plan Designation(s):** Parcels located in the unincorporated area: Agriculture Exclusive/Prime and Non-prime Lands (AE), Density: 160 to 20 acres per dwelling unit; Residential/Low Density (RL), Density: 3-7 dwelling units per acre; Humboldt Bay Area Plan (HBAP); Slope Stability: Relatively Stable (0) and Moderate Instability (2). Parcels located in the City of Eureka: ~~Public~~ Park and Recreation.

8. **Project Description:** The project involves the enhancement of approximately 8,000 feet of Martin Slough and its tributaries, starting at the tide gates at the confluence of Martin Slough and Swain Slough and extending upstream onto the Eureka Municipal Golf Course property. The project also includes enhancement of associated wetlands and riparian habitat, with the objectives of enhancing plant, fish, and wildlife habitat, improving water quality,

increasing resiliency to climate change, and reducing flooding. Project components include enlargement of the Martin Slough channel; construction of several tidal marsh areas and tidal ponds; daylighting of a tributary channel currently routed into underground pipes; raising of some local low areas in the NRLT pasture and on the golf course within the Coastal Zone, and on the golf outside the Coastal Zone, to improve drainage and eliminate potential fish stranding areas; replacement of multiple agricultural-use and golf course stream crossings (including culverts in the pasture and bridges on the golf course); installation of large wood for habitat in some instream and pond locations throughout the project; and extensive planting of wetland and riparian vegetation. The project also includes installation of three scour protection devices around a 12-inch diameter natural gas line at three separate locations, two on NRLT property and one on City property. The gas lines are owned by Pacific Gas & Electric Co (PG&E). One-hundred and thirty feet (130) of six-inch diameter gas line on NRLT property will be re-located where it crosses Martin Slough by excavating and removing the old pipe and setting 130 feet of new pipe at a lower elevation (i.e., deeper) within the existing 10-foot wide gas line easement. A four-inch gas line will be de-commissioned. PG&E is a cooperating project partner. PG&E is paying for the design and implementation of the gas line de-commissioning and relocation and will implement the gas line decommissioning and relocation projects.

9. **Setting:** The project area is currently used as grazed pasture (NRLT and Vroman) and a public golf course (City of Eureka). The majority of the project area is classified as jurisdictional wetlands. Zoning includes Agricultural Exclusive (60 acre minimum – NRLT and Vroman) and Public Facility (City of Eureka – Eureka Municipal Golf Course).

10**. Surrounding Land Uses:** Residential, agricultural, timberlands, recreation, natural resources, and municipal infrastructure.

11. **Other Public Agencies whose Approval is, or may be Required** (*e.g. permits, financing approval, or participation agreement*): California Department of Fish and Wildlife (streambed alteration agreement, incidental take permit – section 15357 CA Code of Regulations); City of Eureka; Humboldt Bay Harbor, Conservation, & Recreation District; Army Corps of Engineers (Individual Permit); North Coast Regional Water Quality Control Board (401 Certification)

12. **Environmental Factors Potentially Affected:** The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Greenhouse Gas Emissions	☐ Population and Housing
☐ Agricultural and Forestry Resources		☐ Hazards and Hazardous Materials
	☐ Public Services	
☐ Air Quality	X Hydrology and Water Quality	☐ Recreation
X Biological Resources	☐ Land Use and Planning	☐ Transportation and Traffic
☐ Cultural Resources	☐ Mineral Resources	X Tribal Cultural Resources
☐ Geology and Soils	☐ Noise	☐ Utility and Service Systems
		☐ Mandatory Findings of Significance

Determination: On the basis of this initial evaluation:

❑ I find that the proposed project **COULD NOT** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

X I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

❑ I find that the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

❑ I find that the proposed project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

❑ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

	4/28/17
Signature	Date
Michelle Nielsen	Humboldt County Planning & Building Dept.
Printed name	For

PROJECT DESCRIPTION

1.0 BACKGROUND AND HISTORY

1.1 PROJECT AREA DESCRIPTION

The Martin Slough Enhancement Project is located in and adjacent to the southern portion of the City of Eureka and terminates with its confluence with Swain Slough as shown in Figure 1. Martin Slough is the last (most downstream) tributary to Elk River via Swain Slough. The mouth of Martin Slough is separated from Swain Slough by a berm and tide gates. The Martin Slough watershed includes both City and County jurisdictions, with the project area owned by the City of Eureka (approximately 120 acres) and two private landowners (approximately 39 acres and 110 acres) whose ownerships are comprised of multiple assessor's parcels. The project area is partially within the coastal zone.

The Martin Slough watershed land use includes a mix of residential, agricultural, timberlands, and municipal infrastructure. Humboldt County's Eureka Community Plan includes future residential development of the southeastern portion of the Martin Slough watershed in the Ridgewood Heights area. This currently forested area has been phased out of timber production zone (TPZ) status to allow for residential or mixed-use development. This conversion could modify the watershed hydrology and potentially result in increased storm water runoff. Its actual effect on peak flows within Martin Slough will be dependent on the measures taken by future development to address storm water runoff, currently set for no net increase by the County. Hydraulic modeling conducted during the development of the Martin Slough Feasibility Study

(Winzler & Kelly 2006) took into account future build-out and its effects on stream hydrology.

The project area is currently zoned Agriculture Exclusive (60 acre minimum) and Public Facility. Municipal infrastructure directly within the project area includes the City maintained Fairway Drive, three natural gas lines, sewer lines and a pump station, and the Eureka Municipal Golf Course. The Humboldt Community Services District also has existing sewer infrastructure and water lines near Pine Hill Road.

Martin Slough has a watershed area of approximately 5.4 square miles, and natural channel length of over 10 miles with approximately 7.5 miles of potential salmonid fish habitat supporting coho salmon (*Oncorhynchus kisutch*), steelhead trout (*Oncorhynchus mykiss*), and coastal cutthroat trout (*Oncorhynchus clarkii*). The old tide gates partially blocked upstream salmonid migration. New tide gates were installed in 2014 (described below). The lower portion of the watershed flows through low gradient bottomland containing the golf course and pastureland. Many of the stream channels flow from gulches that contain mature second-growth redwood forests. The upper portions of the watershed are either in urban settings, or are recently harvested timber lands slated for future residential and commercial development.

The Martin Slough Enhancement Feasibility Study area consists of the Martin Slough flood plain between Swain Slough and the upper (second) Fairway Drive stream crossing in the lower Martin Slough watershed (Figure 1). Existing problems that have been identified in the Martin Slough study area include limited fish access, simplified fish habitat lacking diversity and habitat niches, large sediment loads, poor sediment routing, lack of riparian habitat, and frequent prolonged flooding that has a negative economic impact on current land use and which can cause fish stranding and predation as floodwaters recede and leave pools of water on pastures and fairways that become disconnected from the stream channel.

1.2 PROJECT AREA HISTORY

The Martin Slough and Elk River estuary are part of the larger Humboldt Bay ecosystem that accommodates a variety of waterfowl, wading birds and shorebirds, numerous species of fish and other aquatic organisms, passerines, and raptors. Not much is known about the historic composition of the lower portions of Martin Slough. However, it is apparent from its elevation relative to tidewater and its geomorphic features that the lower portions of Martin Slough consisted of estuarine habitat, likely composed of some salt marsh and slough channels in the lower project area along with other more brackish water habitats, transitioning to tidally-influenced-freshwater wetlands near the upstream end of the project area.

Although much of the historic estuary has been converted to other land use, some estuarine habitat still exists. That habitat has been severely degraded by the installation of tide gates at the confluence of Martin Slough with Swain Slough and other land management practices. These modifications also have had a pronounced effect on flood routing and sedimentation in the lower channel.

The pre-development vegetation of Martin Slough is presumed to have been a mixed Sitka Spruce (*Picea sitchensis*)/willow (*Salix* spp.) forest transitioning to tidal salt marsh. Extreme upper limits of the project area could possibly have been forested by coast redwood (*Sequoia sempervirens*). Transition areas between forest and tidal salt marsh would likely have been comprised of brackish to fresh water and high groundwater tolerant willows, sedges (*Carex* spp.), bulrush (*Scirpus* ssp.), and rush (*Juncus* spp.). Salt marsh vegetation probably dominated much of the study area prior to the construction of the berm along Swain Slough. The tidal marshes were likely vegetated by pickleweed (*Salicornia pacifica*) and salt grass (*Distichlis spicata*). In the non-forested transitional areas, brackish vegetation would have probably included soft rush (*Juncus effusus*), silverweed (*Potentilla anserina*), small-headed bulrush (*Scirpus*

microcarpus), and tufted hairgrass (*Deschampsia cespitosa*).

1.3 PROJECT PURPOSE AND GOALS

The purpose of the Martin Slough Enhancement Project is to improve aquatic and riparian habitat and reduce flooding throughout the project area. Specific goals of the Project include the following:

1. Improve fish access from Swain Slough,
2. Increase the amount of riparian corridor and riparian canopy,
3. Reduce flood impacts to current land use,
4. Improve sediment transport,
5. Improve water quality (decrease nutrient impacts, decrease sedimentation, salinity)
6. Improve and increase the diversity and amount of freshwater and saltwater wetland habitat.
7. Protect or relocate utilities to prevent negative project impacts where avoidance is not feasible.

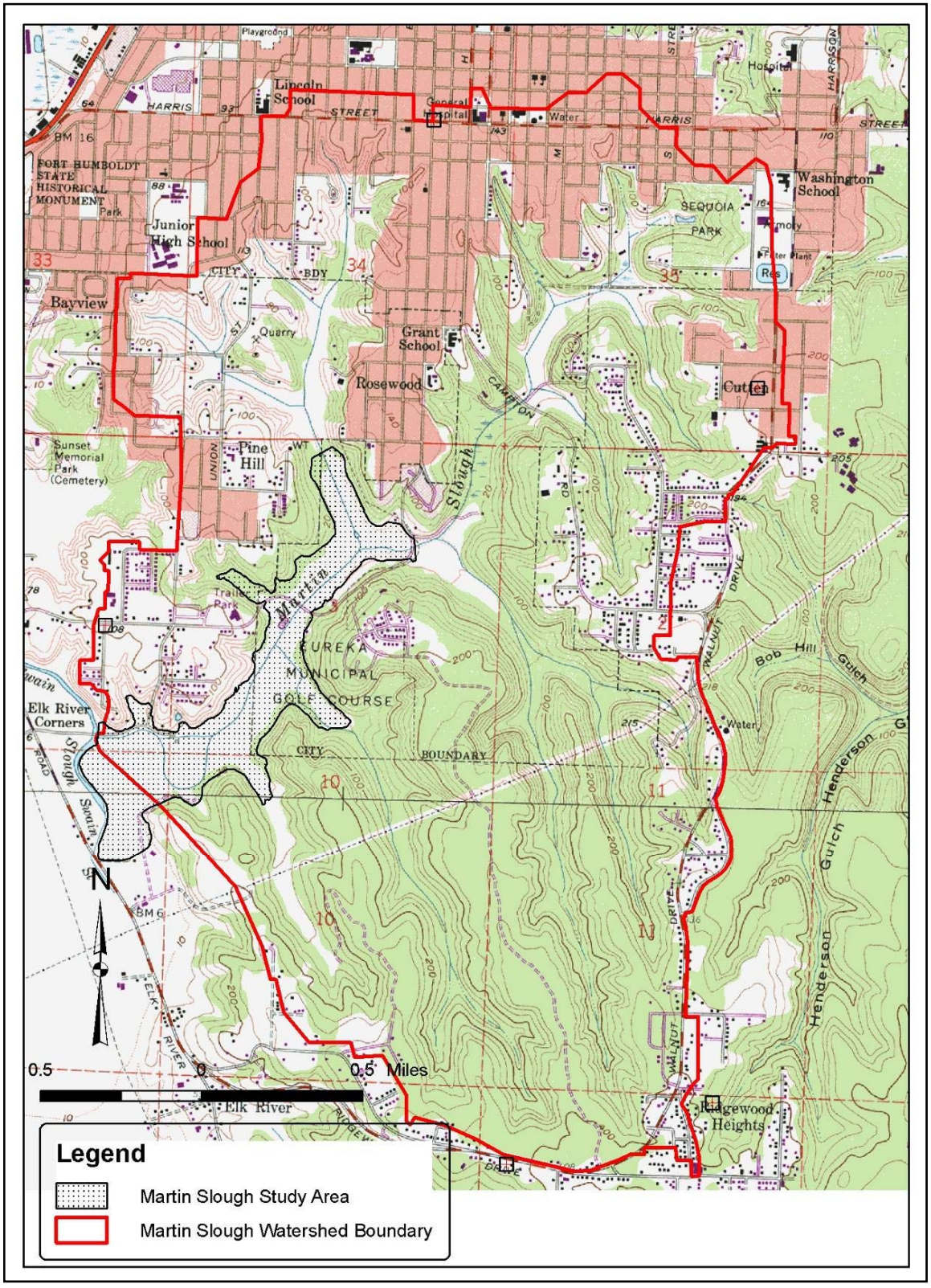

Figure 1. Martin Slough Enhancement Project Site and Watershed Boundary

1.4 PROJECT DEVELOPMENT

In 2001, the Natural Resources Division of Redwood Community Action Agency (RCAA) hired Winzler & Kelly (W&K), now called GHD, to conduct a feasibility study for an enhancement plan to improve fish access, expand and enhance aquatic habitat, improve sediment transport, and reduce flooding impacts on land use activities within Martin Slough. Michael Love & Associates (MLA), Graham Matthews & Associates (GMA), and Coastal Analysis, LLC (CAL) also participated in conducting early hydrologic and hydraulic assessments for the feasibility study. RCAA managed the study and was responsible for the Technical Advisory Committee (TAC) and landowner coordination. The TAC was comprised of agency representatives, land owners, and land managers plus the team of consultants and representatives of RCAA. The TAC had the following entities represented at one or more meetings:

- City of Eureka
- CourseCo (golf course lessee)
- County of Humboldt (Planning and Public Works)
- CA Department of Fish & Game (Wildlife)
- State Coastal Conservancy
- CA Department of Water Resources
- US Army Corps of Engineers
- NOAA Fisheries
- US Fish & Wildlife Service
- Winzler & Kelly (W&K)/ GHD
- Michael Love & Associates
- Landowners (City of Eureka, Gene Senestraro, Bob Barnum, Northcoast Regional Land Trust)

W&K , MLA, and CAL prepared a planning level report for the project, entitled Martin Slough Enhancement Feasibility Study, Eureka California (W&K et al., 2006). The Feasibility Study characterized current conditions and limiting factors within Martin Slough, developed four alternative enhancement approaches that enhance aquatic and riparian habitat, and conducted hydrologic and hydraulic analyses of the proposed project alternatives.

1.5 PROJECT ALTERNATIVES CONSIDERED

The following four alternatives were identified and development in the Feasibility Study:

Alternative 1: The No Action Alternative (Existing Conditions)
The No Action Alternative would leave the system as it exists today. This alternative is important for permitting considerations and also for comparing alternatives, allowing a familiar starting point for comparisons to be made.

Alternative 2: No Tide gates or Levee (Full Tidal Influence)
Alternative 2 would result in removing the existing tide gates and the berm along Swain Slough. Based on land and tidal elevations, this alternative would open the majority of the project area to full tidal influence, allowing the system to transform back towards its pre-development state.

Alternative 3: New Tide gates and New Ponds (Muted Tide)
This alternative would consist of removing the existing tide gates, installing new tide gates with a habitat door designed to create a muted tidal prism and facilitate fish passage, increasing the size of existing ponds, and creating new ponds.

Alternative 4: New Tide gates, New Ponds, and Modified Channel (Muted Tide)
This alternative is similar to Alternative 3, but includes improvements to the existing channel and a corresponding larger habitat door to accommodate the larger available tidal prism. This

alternative consists of removing the existing tide gates, installing new three new 6' x 6' tide gates in addition to a 2' x 2' habitat door. The 2' x 2' habitat door will be controlled by a muted tide regulator (MTR) and one of the 6' x 6' side hinge doors will be controlled by a separate MTR. The MTRs are used to create a muted tide cycle and facilitate fish passage. Other project actions include increasing the size of existing ponds, creating new ponds, making channel modifications, installing fish and wildlife habitat structures (woody debris), and re-vegetation throughout the project area.

Alternative 4 was selected by the TAC, RCAA, Mr. Senestraro (then owner of the NRLT property), and the City of Eureka to move forward into design and environmental compliance and permitting.

Several different approaches were used to evaluate the alternatives. A simplified numerical model of tide gate hydraulics was created in a spreadsheet to allow for rapid analysis of the effectiveness of different tide gate designs in providing fish passage and flood routing within the project area. Fish passage analysis of the tide gates was conducted for each alternative. Passage conditions were evaluated using the stream crossing design criteria developed by NOAA Fisheries (2001) and CDFW (2003).

The geomorphic stability of enlarging the Martin Slough channel within the project area to increase conveyance area for both flood flows and a diurnal tidal exchange was analyzed using design guidelines developed for tidal channels. This was done because reintroducing a muted tide cycle into the project area would result in large volumes of water flowing up and down the channel with each tide cycle, changing the fluvial processes that maintain the channel with the potential and likelihood of scouring the channel bed and banks, which could cause erosion that could affect existing infrastructure.

The new and expanded ponds would create additional habitat for rearing salmonids, waterfowl, and other aquatic and semi-aquatic species. The ponds would also provide additional storage capacity for storm flows, reducing the amount of time higher ground is inundated. This alternative would increase the size of three existing ponds on the golf course. Two new ponds would be added, one on the golf course and one on the NRLT property. It is anticipated that this alternative would provide a range of estuarine habitat with varying salinity values. The highest salinity values would be adjacent to the tide gates, and the lowest salinity would be found farther upstream. Salinity values would likely fluctuate from summer to winter months, being higher in the summer when less fresh water is entering the drainage. The golf course would likely need to use the upper irrigation pond as their primary irrigation source or use well water. The additional ponds with varying salinity values would be a large benefit for juvenile salmonids and other species. The ponds would be planted with a variety of wetland and riparian vegetation. The new riparian and marsh vegetation in the pasture would be protected by cattle exclusion fencing.

To assist in determining potential impacts and evaluate potential permitting issues for the different alternatives, a wetland and biological reconnaissance investigation was conducted to determine the extent and location of wetlands, and sensitive plant and animal habitats within the potential footprint of the alternatives developed (Winzler & Kelly 2011).

1.6 PROPOSED PROJECT

Summary of Project Actions:

- Installation of erosion control measures (as per approved Storm Water Pollution Prevention Plan)
- Fish screen installation and fish relocation
- Coffer dam installation
- Stream flow bypass installation
- Construction area stream and pond dewatering

- Temporary construction access installation (including temporary bridges)
- Interior road hardening (installation of filter fabric, geo-grid, and road base)
- Removal of old culverts and installation of new culverts
- Installation of sheet piles along Martin Slough at the barn on NRLT property
- Replacement of the barn culvert with a bridge (including installation of bridge footings)
- Replacement of golf course bridges, including footings
- Installation of gas line scour protection
- Relocation of 130 feet of 6-inch natural gas line
- Decommission and abandonment of a 4-inch natural gas line
- Channel excavation
- New pond excavation
- Existing pond enlargement
- Installation of large wood habitat features in ponds and along channel margins and marsh plains
- Temporary stockpiling of spoils
- Hauling of spoils
- Placement of spoils to repair up to 50% of the berm separating Martin and Swain Slough
- Placement of spoils to fill low spots in the pasture and golf course to create positive drainage to prevent ponding on the floodplain and fish stranding during flood events
- Removal of temporary roads and access points and restoration of pasture areas and golf course fairways to pre-project conditions
- Removal of coffer dams, stream bypass structures, and fish screens
- Installation of cattle exclusion fencing (NRLT property only)
- Installation of wetland & riparian plantings

The proposed project includes multiple components that are all interrelated. These include a new tide gate structure (completed in 2014 but since it is critical to the functionality of the rest of the project a description of it is included here), enlargement of the Martin Slough channel, relocation and decommissioning of buried natural gas lines, installation of scour protection over buried natural gas lines under channels or marsh plains, construction of several tidal ponds, raising of some local low areas on the golf course to elevation 7.0 feet (NAVD88), replacement of multiple agricultural-use and golf course stream crossings (including culverts in the pasture and bridges at the golf course), installation of large wood habitat structures throughout the project, and extensive planting of wetland and riparian vegetation. Hydraulic, hydrologic, and geomorphic analysis were used to develop the interrelated project components through an iterative design process. The total volume excavated and the disposition of the spoils from the expansion of the channel, ponds, and creation of new ponds is presented by phases in the Table 1, Cut and Fill Volumes.

Project Phasing

The project implementation will likely occur in up to 6 or more phases. Phase 1, the Tide Gate Replacement, occurred in 2014. All phases include placement of large wood to enhance habitat, installation and removal of fish exclusion screens, fish capture and relocation, installation and removal of coffer dams, installation of stream bypass equipment (pumps and/ or gravity flow pipes), installation of erosion control measures, and re-vegetation.

Phase 2 implementation will take 3 to 4 weeks and is proposed for the summer of 2017. Phase 2 includes excavating the Martin Slough channel and adjacent Marsh Plain A from the tide gates (station 0+00) to station 9+50, and excavating the southeast tributary and pond. Phase 2 will also include gas line relocation (6-inch line) and decommissioning of the 4-inch line (collectively called the gas line project). The gas line project is described under section 1.6.2 below. The gas line project is being designed by PG&E with the expectation that it will occur in 2017 and would therefore occur in conjunction with phase 2.

Phases 3 through 6 do not have funding yet so their timeline for implementation is uncertain but

each phase will take one construction season (June 15 – October 15) with each construction season having a duration of 4 to 12 weeks. As planned, Phase 3 is on City of Eureka property and will include excavation of a new channel for the North Fork, filling in portions of the old channel, excavation of Pond G, and placing fill to eliminate depressions on the floodplain adjacent to the channel that currently pond up and present potential fish stranding opportunities. Phase 3 will create new freshwater-tidally-influenced habitat (Pond G) that California Department of Wildlife biologists have observed to provide ideal rearing conditions for juvenile area is considered to be "replacement" habitat for habitat that will become seasonally brackish habitat upon implementation of all phases and operation of the muted tide regulator and tidal prism at full design level. CDFW biologists have observed that juvenile coho have the highest abundance in winter months in tidally influenced reaches and off-channel ponds that have low levels of salinity (less than 5 parts per thousand – pers. comm. Michael Wallace). Currently Pond E, also known as the 17th hole irrigation pond, provides this type of habitat and CDFW fish sampling has revealed that the juvenile coho from that pond have the highest growth rates of any of their sampling sites around Humboldt Bay. Therefore, the North Fork and Pond G enhancements have been proposed as Phase 3 so the use of the habitat by juvenile coho can be verified and observed before Pond E becomes seasonally brackish marsh. However, even under operation of the design muted tide, Pond E will likely exhibit low salinity due to increased freshwater input from seasonal rains and groundwater inflow during the main time of the year when juvenile coho have been documented using Martin Slough (December to June). During the summer months some coho juveniles do reside in Martin Slough and it is expected that freshwater habitat in Ponds D, E, and F will be maintained in the upper layers as the water stratifies, as has been observed during fish sampling and water quality monitoring conducted between 2006 and 2016. Stratification causes a layering effect with the brackish water being heavier and occupying the bottom of the pond and fresh water being lighter and occupying the upper part of the water column. Pond E will provide low-salinity habitat during most of this period, even at full design operation of the MTR. Pond F is further upstream and it will have very low salinity or be primarily freshwater during the rainy season, with increasing salinity during low flow times of year but maintaining some freshwater habitat due to stratification. Pond G is expected to remain fresh throughout the year.

Phase 4 implementation will occur on Northcoast Regional Land Trust (NRLT) property and will include excavation of the Martin Slough channel from station 9+50 to 30+50, Marsh Plain B and meander stations M 0+00 to M 20+46; replacement of the culverts at meander station M 0+45 and M 20+10; and excavation of Pond C. An existing 5-foot-diameter by 40-foot-long culvert at station MS 13+65 to MS 14+05 will be replaced with a bridge. The old culvert will be removed and disposed of at a metal recycling facility. Sheet piles will be installed on both banks from

Figure 2. Summary of Martin Slough Enhancement Project Activities

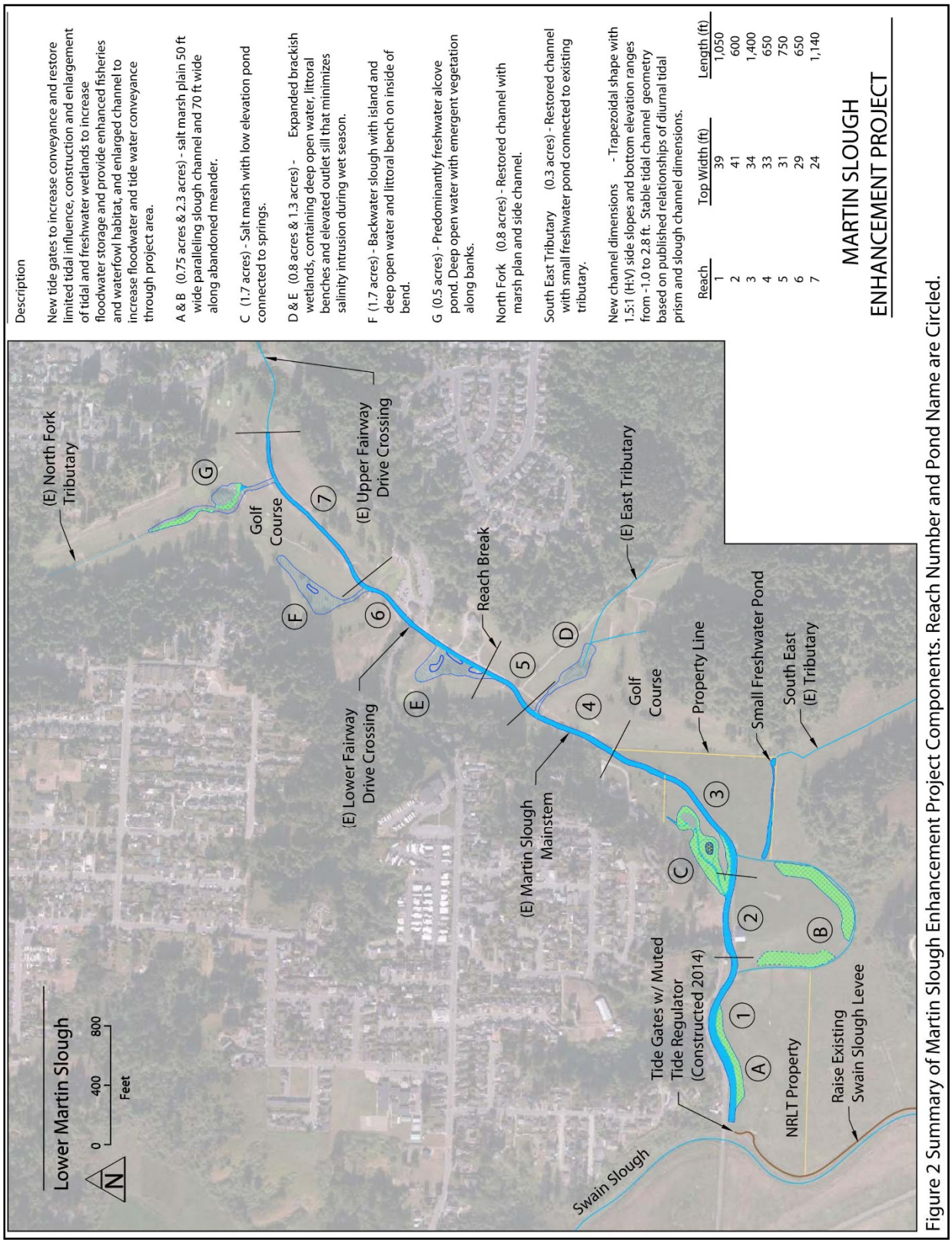

Figure 2 Summary of Martin Slough Enhancement Project Components. Reach Number and Pond Name are Circled.

approximately station M 13+25 to M 14+35 at depths ranging from 20 to 32 feet (as per Sheet C-110, S-501, and S-502). Bridge footings will be installed, bridge beams will be installed, and decking and railing will be installed on the bridge. Phase 4 includes installation of large wood habitat structures, grade control weirs, riparian fencing, and re-vegetation. Phase 4 will include installation of scour protection on the 12-inch gas line that crosses the meander at Station M 8+00 and at Station M 18+75.

Phase 5 implementation will include excavating the Martin Slough channel on City of Eureka property from station 30+50 to 46+00, Pond D and the east fork excavation, and Pond E. Phase 5 also includes the installation of scour protection over a 12-inch gas line crossing on the east fork, installation of large wood habitat structures, installation of 6 new bridges and their associated footings, removal and disposal of 6 old bridges, installation of grade control weirs, and re-vegetation.

Phase 6 will include excavating the Martin Slough channel on City property from station 46+00 to 62+80, excavation of Pond F, installation of 4 new bridges, removal and disposal of 8 old bridges, installation of grade control weirs, installation of large wood habitat structures, hauling and disposing of spoils, placement and grading of spoils to fill depressions in the adjacent floodplain that "pond" water during heavy rain events and present potential fish stranding and mortality threats, and re-vegetation.

Table 1. Cut and Fill Volumes and Disposal Locations

CUT VOLUMES				FILL VOLUMES		
Location	Cut Vol.	Disposal Area	Phase	Location	Fill Vol.	Phase
NRLT:				**NRLT/ Vroman:**		
Marsh Plain A + MS 0+00 to 9+50	4,545	Swain Slough Berm, White Slough, &/ or other permitted site	2	Swain Slough Berm	125	2
Southeast Trib. & Pond	2,150	Around Barn, White Slough, &/ or other permitted site	2	Around barn	520	2
MS 9+80 6" gas line relocate	311	Re-fill trench	2	MS 9+80 6" gas line relocate	311	2
subtotal - Ph. 2 Exc. **City:**	**7,006**			**subtotal - Ph. 2 Fill** **subtotal - Ph. 2 off-haul**	**956** **6,050**	
North Fork & Pond G	3,864	610 in old NF channel; 3,254 to GC 3rd, 4th , 7th fairways	3	North Fork	610	3
				GC 3rd Frwy	2,207	3
				GC 4th Frwy	653	3
				GC 7th Frwy	394	3
subtotal - Ph 3 Exc.	**3,864**			**subtotal - Ph 3 fill**	**3,864**	
NRLT:						
MS 9+50 to 30+50 and meander channel	7,414	239 CY to MS 10+50 to 12+30 Channel; 517 CY to MS 13+80 to 15+80; 1,459 to MS 16+50 to 20+50; 5,199 to White Slough or other permitted location	4	MS 10+50 to 12+30 Channel (NRLT)	239	4
Marsh Plain B	6,319	White Slough or other permitted location	4	MS 13+80 to 15+80 Channel (NRLT)	517	4
				MS 16+50 to 20+50	1,459	4

12" Gas Line Scour Protection (NRLT)	10	Re-fill trench	4	12" Gas Line Scour Protection (NRLT)	10	4
Pond C	12,634	White Slough or other permitted location	4			
subtotal - Ph 4 Exc.	**26,377**			**subtotal - Ph 4 fill**	**2,225**	
				subtotal - Ph 4 off-haul	**24,152**	
Total Excavation Volume for NRLT property	**33,383**			**Total Fill Volume for NRLT property**	**3,181**	
				Total Off-Haul for NRLT Property	**30,202**	
City:				**City:**		
MS 30+50 to 46+00	3,478	3,015 to GC 14th & 17th fairways; 463 to White Slough or other permitted location	5	GC 14th Frwy	2,418	5
East Trib & Pond D	2,378	White Slough or other permitted location	5	GC 17th Frwy	597	5
12" Gas Line Scour Protection (City)	10	Re-fill trench	5	12" Gas Line Scour Protection (NRLT)	10	5
Pond E	5,797	White Slough or other permitted location	5			
subtotal - Ph 5 exc.	**11,663**			**subtotal - Ph 5 fill**	**3,025**	
				subtotal - Ph 5 off-haul	**8,638**	
Pond F	12,634	White Slough or other permitted location	6			
MS 46+00 to 62+80	3,478	White Slough or other permitted location	6			
subtotal - Ph 6 Exc.	**16,112**			**subtotal - Ph 6 fill**	**0**	
				subtotal - Ph 6 off-haul	**16,112**	
Total Excavation Volume for City	**31,639**			**Total Fill Volume for City**	**6,889**	
				Total off-haul for City	**24,750**	
				Total Fill Volume for NRLT & City	**10,070**	
TOTAL EXCAVATION VOLUME NRLT + CITY	**65,022**			**TOTAL OFF-HAUL NRLT & City**	**54,952**	

The following sections summarize project components.

1.6.1 Tide gate Replacement

New tide gates were installed in 2014 to replace the old undersized tide gates where Martin Slough drains into Swain Slough to improve discharge capacity, improve aquatic organism passage, and introduce estuarine conditions into Martin Slough. The tide gate replacement project is described here because it is an integral part of the project and without the new tide gates the rest of the project as described is not feasible. The replacement tide gates were designed to meet multiple objectives:

- Reduce the duration that floodwaters inundate the golf course and pasture.
- Create a muted tide to enter Martin Slough to provide adequate volume of tidal water for sediment and nutrient flushing and enlargement of estuarine habitat.
- Maintain the tidal water below elevation 6 feet (note – all elevations are in NAVD88) to protect adjacent pasture grasses and turf from salt-burn.
- Mimic the natural variability of the tidal cycle within the muted tide range to support a variety of salt marsh and open water habitats.
- Maximize the amount of time the tide gates are open to provide for upstream and downstream movement of aquatic organisms.
- Maximize the amount of time water velocities through the gate openings meet passage criteria for adult and juvenile salmon and steelhead.

A maximum allowable muted tide elevation of 6 feet within Martin Slough was established to avoid brackish waters in the channel affecting the root-zone of the golf course turf, which will have a minimum elevation of 7 feet after several low areas within the golf course are raised. In general, the muted high tide will only reach 6 feet for brief periods during spring (also called king) tides, which generally occur in late fall/ early winter (November- December).

The replacement tide gate structure is similar to the tide gate recommended in the Martin Slough Enhancement Feasibility Study (Winzler & Kelly et al., 2006). The new tide gate has three 6-foot by 6-foot gates that will drain outgoing flows. The three gates were constructed at an elevation of -1.0 feet to allow operation of the muted tide regulator (MTR) mechanism that controls the auxiliary door. The MTR mechanisms are essentially float valves installed on the upstream side of the tide gates, connected to the tide gates with an arm and cam system that closes the gate as the water level rises up to and above the design operation level. The invert of the separate auxiliary door was constructed at an elevation of 1.0 feet. The center gate is top-hinged and the outer two gates are side hinged so that outflow is centered, helping to prevent the potential for undermining of the Pine Hill Road bridge, which is adjacent to the new tide gates. The new tide gate structure was also placed 30 feet further upstream than the old tide gates to create more buffer between the tide gate discharge and the bridge. The auxiliary door is top hinged. The tide gate elevation was selected to balance the benefits of increasing the tidal prism into Martin Slough while at the same time minimizing the amount of potential scour that could occur under the foundation of the adjacent Pine Hill Road Bridge.

On an outgoing tide, all three of the 6-foot by 6-foot doors of the new tide gate open to allow drainage. On an incoming tide, two independently operated doors, one of the 6-foot by 6-foot doors and the 2-foot by 2-foot habitat door, each fitted with its own MTR, close when the water surface elevation within Martin Slough reaches specific elevations, allowing the muted tide within Martin Slough to follow the water surface elevation pattern of the natural tide within the elevation range of the muted tide. When the direction of the tide changes from outgoing to incoming, one of the 6-foot by 6-foot tide gate doors at an invert elevation of -1.0 feet remains open to allow tidal inflow into Martin Slough (MTR Gate). Once the tide reaches an elevation of 4.0 feet in Martin Slough, the MTR mechanism will close the gate. The MTR on the 6-foot by 6-foot door will not be put into operation until the channel and ponds have been excavated to accommodate the design tidal prism. As the channel and pond enhancements are planned to be completed in phases, probably five but possibly more depending on available funding, the two MTR gates will be operated at interim levels according to the amount of tidal prism storage

created in the channel and ponds.

Martin Slough Tide gates, upstream side, showing the two MTR floats at left

After the single 6-foot by 6-foot MTR Gate closes, the auxiliary door will continue to allow a small portion of tidal water to flow into Martin Slough. The auxiliary door is necessary to prolong the duration of upstream fish passage and to create the diversity of tidal elevations necessary to achieve the zonation of salt marsh vegetation that is a project objective. At full build out, once the tide in Martin Slough reaches an elevation of approximately 5.7 feet, an MTR mechanism will close the auxiliary door, preventing saltwater intrusion into Martin Slough above an elevation of 6 feet, to prevent salt burn of the golf course turf and pasture grasses. The interim operation level of the auxiliary door is 5.0 feet, which will allow sufficient tide water to enter Martin Slough to sustain the salt marsh plants that have established along the channel due to the

Martin Slough Tide gates, downstream side, showing the three 6' x 6' gates on the center and left and the 2' x 2' "habitat door" on the right.

leakiness of the old tide gates. With the old tide gates, salt marsh plants (mainly Lyngbye's sedge [*Carex lyngbyei*]) established along the channel margins up to the property line between the City of Eureka/ Golf Course property and the NRLT property, and through the old meander in the pasture except for the area from Station M 9+00 to M 15+00 which receives enough freshwater spring flow to keep that section of the meander fresh (see Sheet C-103).

1.6.2 Pacific Gas & Electric Gas Line Protection, Relocation, and Decommissioning

Phase 2 will include relocation of 130 feet of a 6-inch natural gas line (line L 126A) and de-commissioning of a 4-inch gas line (Line L 126B) (the gas line project). Phases 4 and 5 will also include installation of scour protection over a 12-inch gas line (line L 177) where it crosses the meander on NRLT property and the East Tributary on the Golf Course. The natural gas lines are owned and operated by Pacific Gas & Electric (PG&E).

Scour protection will be installed on the 12-inch gas line in three locations where it crosses the stream channel to prevent the loss of soil from channel scour, which would reduce the depth of soil cover over the gas line. The scour protection will include placement of woven geo-textile fabric and Armorflex™, or equivalent, over the gas line as specified on sheet C-505 of the Martin Slough Enhancement Project design plans.

The gas line relocation project is necessary because the enhancement project will result in excavating soil from the channel and adjacent floodplain, reducing the soil cover over the gas lines to less than PG&E's required minimum depth of coverage. Currently the 6-inch gas line
does not meet PG&E's standard of 5 feet of soil cover over the gas line, which also applies to gas lines under stream channels, meaning the gas line has to be 5 feet or more below the bottom of the channel. The 4-inch gas line currently meets the standard under the channel, but if the marsh plain is extended to

this location, the depth of soil cover would not meet PG&E's standards. The 4-inch gas line is a redundant line and PG&E has proposed to decommission it rather than relocate it. PG&E has approved of the plan to relocate the 6-inch gas line (L 126A) and decommission the 4-inch gas line (L 126B) and has agreed that the scour protection designed for the 12-inch gas line (L 177) will be acceptable and the 12-inch line won't need to be re-located. PG&E is developing the plans and specifications for the gas line relocation and decommissioning and will implement the gas line project. PG&E is paying for the design work and will implement the gas line project. The enhancement project proponents are including the gas line relocation and de-commissioning as part of the enhancement project, CEQA document, and permit applications as it is an essential element for future project phases.

The gas line relocation will involve temporarily shutting off the gas supply and venting the remaining gas in the line into the atmosphere. This is a common practice in conducting gas line maintenance and repairs and is not considered dangerous or harmful to the environment as long as standard safety practices are employed (i.e., no open flame or spark generating equipment is operated in the vicinity of the vent while venting is occurring). After the gas is evacuated from the 6-inch gas line, a pit will be excavated at the zero station on the gas line to expose it sufficiently to have access to all sides of the pipe. Installation of 130 feet of new 6-inch gas line will be implemented either using an open trench or directional drilling. Prior to installation of the new gas line, the old gas line will be removed from under the channel area proposed for excavation by the enhancement project. Where the gas line crosses the channel, coffer dams will be installed upstream and downstream of the crossing and the work area will be dewatered by pumping. Stream flow will be routed around the work area by pumping. Energy dissipation will be employed at the stream bypass outlet to prevent an increase in turbidity downstream of the outlet.

Prior to installing the coffer dams, temporary fish screens will be installed upstream and downstream of the coffer dams. A qualified and licensed fish biologist will capture fish within the work area by seining. Fish will be identified to species and temporarily placed in aerated buckets. The biologist will be present during the de-watering of the work trench to ensure that any fish or amphibians that eluded capture during the seining are captured and relocated during the de-watering. The pump intake will be screened to prevent the intake of aquatic organisms. Once the site is de-watered and all fish and amphibians have been captured, they will be released back into the channel upstream of the de-watered section where they will have access to suitable habitat areas. The intake for the stream bypass will be placed between the upstream fish screen and coffer dam and it will have a screened intake with a mesh size opening no greater that 3/16 inch. The outlet of the stream bypass pipe will be discharged into an energy dissipater to prevent scour of the channel and creation of turbidity in excess of background levels.

If an open trench is used to install the new gas line, shoring will be installed according to OSHA-approved standards as the trench is excavated. The trench will be dug to a sufficient depth to accommodate the new gas line, including the minimum depth of soil cover (5 feet) over the pipe. The design channel depth at this location is -1.0 feet. The top of the new gas line will be at the depth recommended by PG&E engineers to provide allowance for unanticipated-future-channel scour in addition to the minimum depth of soil cover. The maximum elevation for the top of the gas line is anticipated to be -6.0 feet (after relocation).

If directional drilling is used, the station zero pit (on the south side of the channel) will be dug to sufficient size to facilitate the drilling machinery and operators and to sufficient depth to allow installation of the new gas line at a depth of -6.0 feet or greater. Shoring will be installed according to OSHA-approved standards. The gas line will be cut at station zero and at approximately station 130 on the north side of the channel. Sections of old pipe that interfere with the installation of the new gas line or stream flow within the channel upon enhancement project completion will be removed and disposed of at a metal recycling facility. Sections of the old pipe under the pasture, where they will not interfere with the future channel or marsh plain, may be abandoned in place to minimize the disturbance to the pasture. A receiving pit will be excavated on the north side of the channel. Shoring will be installed according to OSHA-approved standards. After the bore hole is created, new 6-inch gas line will be pulled through the bore hole and re-attached to the existing gas line. After the line is pressure tested, the bore holes will be

filled in, the coffer dams will be removed, the fish screens will be removed, and the gas line will be put back in service.

The 4-inch gas line will be decommissioned in place as PG&E has determined that it is a redundant line and its removal will not affect service to its customers. After venting, the gas line will be cut and capped. The gas line under the channel will not be removed. Based on pot-holing conducted by RCAA under the supervision of PG&E, the elevation of the 4-inch gas line was determined to be sufficiently deep under the channel that it will not interfere with stream flow, even after the channel is excavated to -1.0 feet as called for in the project plans.

Phases 4, 5, and 6 of the enhancement project will proceed only after the gas line relocation and decommissioning have been implemented. PG&E, the Coastal Commission, and RCAA have reached an agreement in principle to have PG&E re-locate the 6-inch line and de-commission the 4-inch line to fulfill the wetland enhancement goal of the PG&E Humboldt Bay Generating Station. As part of that agreement, RCAA is including the gas line project in the CEQA document and permit applications for the enhancement project. Phase 3 (Pond G and North Fork Martin Slough enhancement) may proceed prior to the gas line relocation as it involves enhancement of freshwater habitat that will not rely on the muted tide to maintain it.

1.6.3 Tidal Channel

The project area of Martin Slough will be wholly within the limits of tidal influence after project implementation. The upper reaches of the project (North Fork, Pond G, channel upstream of station 60+00) are expected to remain tidally-influenced-freshwater habitat, meaning the water level will fluctuate with tide levels but the water will remain fresh, even at high tide. Though Martin Slough receives freshwater inflows, the hydraulic geometry of the tidal channel of Martin Slough was assumed to be governed by the daily tidal flux rather than less frequent high flow events from upstream. Therefore, the channel cross section and profile design was based primarily on established tidal channel design methodologies.

The contributing tidal prism is defined as the total tidal flux between MHHW and MLLW from channel, pond and overbank storage flowing to a channel reach on an ebb tide. The tidal prism in Martin Slough will be controlled by tidal conditions in Swain Slough, tide gate opening geometry, water surface elevations within Martin Slough, and tidal prism storage within Martin Slough. The iterative process used in solving the regression equations yielded a channel cross section shape and size and a longitudinal profile in equilibrium with the contributing tidal prism.

A design tidal prism of approximately 20 acre-feet was identified to be feasible for the project area. This volume was selected to achieve several project objectives. The design tidal prism is similar to the historical tidal prism determined from measurements of channel widths of the abandoned meander bend on the NRLT property. A tidal prism of this size will result in a stable channel that fits under the existing Lower Fairway Drive bridge crossing and also allow sufficient space for the golf cart path that crosses in that location.

Geomorphically stable tidal channels typically have a U-shape, with nearly vertical banks. Experience with tidal channel restoration projects throughout the West Coast has found that it is most effective to excavate new tidal channels to match the anticipated stable top width and depth, but not attempt to grade them in a U-shape. Rather, the channels are typically built in a trapezoidal shape and allowed to self-adjust, which happens relatively rapidly.

For ease of construction, the Martin Slough tidal channel will be constructed with a trapezoidal shape having side-slopes of 1.5H:1V. Steeper side-slopes can unnecessarily complicate construction. The resulting stable channel and marsh plain geometries will have top widths ranging from 60 feet wide from Station MS 00+00 to MS 11+00 (Sheet C-300, Martin Slough Enhancement Project November 2015), along the lower portions of the Northcoast Regional Land Trust (NRLT) property near the tide gates, to 20 feet

wide at Station MS 62+50 (see Sheets C-107, C-300, C-304), which extends to the confluence with the North Fork of Martin Slough. The constructed channel depths, as measured from the top of bank to bottom of channel, will range between 6.3 feet and 3.9 feet.

The new channel profile has a constantly decreasing slope. It matches the existing channel elevation at the upstream end of the project and slopes downward at an average slope 0.25% (0.0025 ft/ft) until it reaches the confluence with Pond F. Downstream of Pond F the channel slope averages 0.02% (0.0002 ft/ft), ending at the replacement tide gates.

1.6.4 New and Expanded Ponds

The project will include construction of a new tidal marsh complex (Pond C), enlargement of the existing Pond D into an in-channel tidal pond in a tributary flowing into Martin Slough, enlargement of the existing off-channel Pond E, construction of new Pond F, and enlargement of the existing in channel Pond G in the North Fork. A new channel will be constructed to route flow from the North Fork around Pond G, making Pond G an off-channel pond. This design feature is intended to route sediment down the North Fork channel around rather than through Pond G to avoid sedimentation of Pond G.

Tidal marshes and pond sizing is an integral process of the equilibrium tidal channel design. Tidally influenced ponds can be a substantial component of the contributing tidal prism in a receiving channel. Similar to the channel design, pond design was an iterative process between the tidal channel design equations and HEC-RAS model results to identify the optimal pond storage volume and outlet elevations to allow flow exchange and maintain the desired water quality.

Pond Geometry

The ponds were designed to create side channel and off-channel rearing conditions preferred by juvenile coho salmonids. Circulation through the ponds will occur from stream through-flow (Ponds D) and tidal backwater effects (Ponds C, E, F, and G). The off-channel nature of the ponds and outlet designs are intended to minimize entry of sediments and control salinity entering from the main channel into the ponds.

All of the ponds were designed to provide a complex shoreline with a variety of water depths to create a range of wetland vegetation and habitat areas. The proposed pond side slopes range from 3H:1V to 10H:1V, depending on location. The more gentle side slopes are intended to simulate point bar geometry, and the steeper slopes to simulate meander channel banks. The side slopes of the ponds will create a shallow littoral area where emergent vegetation will grow. At and above the water line, zones of wetland vegetation will change to more upland vegetation. Below the permanent pool elevation established by the pond outlets, pond side slopes steepen to 1.5H:1V to create a permanent pool a minimum of 2 to 3-feet deep. Pond bottom elevations were set to the elevation of the adjacent stream channel so that differential draining will not occur.

Pond Outfalls/ Earthen Sills

Ponds E, F, and G will be connected to Martin Slough, or the North Tributary in the case of Pond G, through an elevated pond inlet/outlet channel, referred to as the pond outfall. Martin Slough and the North Fork carry a substantial volume of fine sands and silts and the elevated outfalls will minimize entry of bedload sediment into the ponds, reducing the need for maintenance dredging to maintain pond capacity.

Pond outfall elevations and locations were established to limit winter saltwater intrusion while maximizing the amount of time the pond is hydraulically connected to the channel. Pond outfall elevations were also established to ensure the ponds are flooded twice daily by the tidal cycle. This will allow aquatic organism ingress and egress, and ensure frequent water exchange and flushing between the pond and main channel. Additionally, each pond outfall was set at a different elevation to create a diversity of off-channel conditions and habitats.

The elevations of pond outfalls are intended to minimize entry of bedload sediments from the main channel into the ponds. Some accretion of fine material may occur from smaller grained sediments suspended within the water column during flood events. However, a large volume of the water in the ponds will be flushed twice daily by tidal action, minimizing the amount of time for settlement of smaller particles.

Each of the pond outfalls is 20 feet wide. HEC-RAS modeling indicates peak velocities across the weirs do not exceed 0.5 fps. Therefore, grade controls on the pond outfalls are not proposed, but the outfalls should be composed of relatively resistant material, such as clays.

1.6.5 Tidal Marsh Plains A and B and Tidal Marsh Complex C Design

Approximately 1,970 feet of tidal marsh plain in 3 reaches will be constructed along alternating sides of the tidal channel (Marsh Plain A- 750 ft.) and meander reaches (Marsh Plains B1- 500 ft. and B2- 900 ft.) on the NRLT property. The marsh plains will have a top width of 50 to 75 feet with gentle side slopes of 3H:1V transitioning to existing ground. The width of the marsh plain will gently taper to the existing channel width of approximately 20 feet at the 12 inch gas line crossings in the meander (i.e., the marsh plain will end at the gas line crossing and stream flow will be carried by the channel only). Similarly, to facilitate flow into the new tide gate, the marsh plain width will taper to the channel width of approximately 35 feet immediately upstream of the tide gates.

The design marsh plain will range in elevation from 4.8 to 6 feet, with varying elevations both in cross section and along the channel length. This range in elevations is expected to support a range of salt marsh plant species. Elevations below 4.5 feet in Martin Slough are not expected to support salt marsh vegetation and will be open channel or mudflat. Elevations between 4.5 and 6 are expected to support a range of marsh communities including *Sarcocornia* Dominated Marsh and Mixed Marsh. It is expected that Mixed Marsh will extend a portion of the way up the 3H:1V side slopes, which will be partially inundated by higher tides.

Marsh Plains A and B and Tidal Marsh Complex C are expected to be brackish to saline most of the year and are expected to support tidal marsh vegetation, thus were designed specifically to support salt marsh plant communities. Ponds D through F are expected to experience brackish to freshwater conditions throughout the year and are expected to support more freshwater marsh species. Pond G is expected to remain fresh year-round but it will be tidally-influenced and pond-water elevations are expected to vary with the tides.

1.6.6 Salinity and Expanded Aquatic Habitat

The salinity modeling indicated that salinities fluctuate up and down with the tide and with freshwater inflows. Salinities increase in the downstream direction, with rising tides, and with drops in freshwater inflows. Conversely, salinities fall during freshwater inflow events and when the tide is falling.

During the rainy season, salinities greater than 15 ppt extend upstream in the Martin Slough Mainstem to Pond D. Tidal marsh Complex C (Pond C) will be brackish, but the upstream end of the pond which drains freshwater springs may have salinities less than 4 ppt. Similarly, Pond D is slightly brackish at the downstream end, but becomes fresher upstream in the pond closer to the tributary oufall where salinities are approximatly 5 ppt. Pond E has varying salinities of 0 ppt to approximately 6 ppt, similar to the mainstem at its outfall location. Ponds F and G, located in the upper reaches of the Martin Slough Mainstem, are expected to have salinities less than 1 ppt.

At the end of the dry season when stream baseflows are at their lowest, salinities up to 15 ppt are expected to extend from Swain Slough to the upstream head of Pond E. A similar situation may occur for Pond D. Pond E is located where channel salinites drop to a more brackish level. Pond E has salinities of

approximately 6 ppt, similar to the mainstem at its outfall location. Ponds F and G are expected to maintain salinites less than 5 ppt. These predicted concentrations are depth averaged. Stratification is expected to occur during these low flow periods, with freshwater dominating the top portion of the water colunm and high salinities near the bottom.

The Project will increase the amount of tidal channel and bordering pond habitats in the Project area. This additional aquatic habitat will also improve hydraulic connectivity. The Project will re-establish a muted tidal prism, which will improve adult salmonid migration and spawning runs to upstream tributaries. Table 2 contains the existing and projected aquatic habitat for the expanded pond areas only. The table does not include the expanded Martin Slough channel width and depth which would also provide increased aquatic habitat.

Table 2. Existing and projected aquatic habitat for expanded pond and marsh plain areas in the Martin Slough Project Area.

Expanded Ponds	Existing Habitat (Acres)	Projected Habitat (Acres)
Marsh Plain A	0	0.75
Marsh Plain B	0	2.3
Pond C (brackish)	0	1.7
Pond D (fresh)	0.1	0.8
Pond E (Hole 17) (brackish)	0.2	1.3
Pond F (seasonally brackish)	0	1.7
Pond G (fresh)	0.10	0.5
North Fork (fresh)	0.12	0.8
Southeast tributary (fresh)	0	0.2
SUBTOTAL	**0.52**	**10.05**
Riparian Habitat	**.50**	**9.23**
TOTAL HABITAT AREA	**1.02**	**19.28**

1.6.7 Golf Course Improvements

Currently, the golf course has numerous low areas on the floodplain that do not drain after storm events because the water ponds, increasing the potential for stranding of coho salmon and tidewater goby as floodwaters recede and leave ponds that become isolated from the creek. As part of the project design, the low areas within the golf course that pond will be filled to a minimum elevation of 7 feet so they drain towards the channel, reducing the likelihood of fish stranding and improving drainage.

The old tide gates had limited outflow capacity that increased the amount of time necessary for storm events to drain out of Martin Slough. The new tide gates have a much larger outflow capacity, reducing the amount of time it takes for flood flows to drain from Martin Slough. Channel excavation and replacement of the culvert at station 13+70 (on NRLT property) will improve conveyance of floodwaters and further reduce the duration of flooding. The added channel capacity and the enlarged ponds will also provide floodwater detention, which will reduce the extent of flooding on adjacent pasture and golf course fairways.

1.6.8 Construction Phasing and Earthwork Volumes

Project construction will be phased over multiple construction field seasons. Each season may last up to 120 days. Construction season duration will be determined by funding availability and logistics of minimizing impacts and revenue losses to the golf course. Replacement of the tide gate structure was completed in the first construction season (Phase 1). Excavation of the new slough channel up to approximately Station 8+60, Marsh Plain A, and the southeast tributary on the NRLT property are scheduled for Phase 2, expected to be implemented in 2017. Pond G and the north fork project will be completed in Phase 3. Currently sufficient funding has been secured to complete the main channel up to

approximately Station 8+60, and the southeast tributary on the NRLT property in Phase 2 (2017). Ponds C, D, E, and F would occur in the upstream direction in subsequent construction seasons, projected as Phases 4, 5, and 6 (see Table 1. Cut and Fill Volumes by Project Phase and Location, for construction phasing). In consideration of comments received from the California Department of Fish and Wildlife and the National Marine Fisheries Service regarding the need to maintain habitat for juvenile coho salmon similar to that provided now by Hole 17 pond, i.e., tidally-influenced but primarily freshwater, enhancement of Pond G will occur as soon as funding is available so the new habitat may be observed and fish utilization can be monitored before introducing the full muted tide which will turn Pond E seasonally brackish. Enhancement of Pond G is intended to replace the fresh water habitat currently provided by Pond E. Enhancing Pond G will ensure that the project area will provide an equal or greater amount of freshwater habitat as currently exists when the tide gates are replaced and the muted tide is introduced.

Sediment excavated from the channel and ponds will be used onsite to raise adjoining ground elevations and repair the Swain Slough berm or hauled off-site for beneficial reuse. Table 1 contains the earthwork cuts and fills for the project based on the 100% Design Plans and divided into anticipated construction phases two through six.

Potential off-site reuse areas include spreading on nearby agricultural lands or re-use on another wetlands enhancement project in the Humboldt Bay area. The US Fish & Wildlife Service, Humboldt Bay National Wildlife Refuge (HBNWR), is a potential spoils disposal location. The USFWS has a failing dike around White Slough, which, if it fails, will expose the Highway 101 Hookton Overpass to wave action and erosion. Therefore the HBNWR is seeking fill to use in a salt marsh restoration project to raise the level of the subsided land behind the dike so it will be high salt marsh rather than open water, thus creating a buffer between the open water and wave action and the overpass. Table 1, estimated excavation (cut) and disposal (fill) volumes by project phase, includes the proposed disposal locations.

1.6.9 Construction Techniques and Temporary Disturbance

The primary excavation methods that will likely be utilized include track-mounted excavators, scrapers and bull-dozers. Excavated material will be loaded into either belly- or end-dump trucks and hauled to the reuse areas. The contractor may choose to use track trucks to transport excavated material (spoils) to either an on-site re-use location or to a stockpile location from which larger street-legal trucks will be loaded for transport to its final destination. It will be the responsibility of the contractor to ensure the haul trucks are street legal and that local speed and weight limits are obeyed. The Contractor will also be responsible for developing and submitting for review by the Construction Manager a Traffic Control Plan prior to construction commencement. Hauling the excavated material from the project area to reuse sites will require a fleet of dump trucks operating continuously during the excavation activities. Table 3 shows the range of project construction equipment estimates for any given construction season.

Table 3. Estimates of Equipment Needed for Project Construction

Equipment Type	Estimated Quantity
Excavators	1-5
Scrapers	1-5
Dozers	1-5
Loaders	2-4
Dump Trucks	2-10
Small Tractors	1-3
Compactors	1-3
Graders	1-2
Water Trucks	1-3
Small Crane	1

Temporary construction areas will be needed to stage equipment, store material and transport material. Temporary construction areas will be located within locations already identified as permanent impacted

areas such as excavation areas or areas within close proximity as depicted on the 100% Design Plans. Temporary construction activities outside permanent impact areas will be limited to temporary construction buffers, haul routes, material and equipment staging/stockpiling areas, and temporary egress/ingress areas adjoining City and County Roads and as shown on the 100% Design Plans. Areas identified as temporary construction areas will be restored to pre-construction conditions once construction is complete. Temporary haul roads and other high traffic areas will be de-compacted and restored back to pre-construction soil densities. Restoration of temporary construction disturbance areas will be specified in the final specifications.

1.6.10 Temporary Haul Roads

The construction of temporary haul roads may be required to transport excavated materials from the channel corridor to City, County, and State Roads depending upon the final re-use areas. Haul roads will also provide stable working and staging areas for excavation and loading activities. Haul road construction will depend on subgrade suitability, the size of the transport equipment to be used, the intensity of use, excavation/reuse locations, and identification of sensitive habitats and species. Temporary haul road construction could include proof-rolling native subgrade to provide a non-yielding surface or placement of crushed rock or river-run gravel over woven or non-woven geotextile fabric and geo-grid. Locations of anticipated temporary haul roads will be within the limits of temporary construction disturbance as depicted on the 100% Design Plans.

1.6.11 Construction Erosion and Sediment Control BMPs

Prior to Project construction, a Storm Water Pollution Prevention Plan (SWPPP) will be developed, submitted to, and approved by the North Coast Regional Water Quality Control Board (RWQCB) and implemented during construction. As part of the SWPPP, Best Management Practices (BMPs) for controlling soil erosion and the discharge of construction-related contaminants will be developed and monitored for successful implementation. Individual SWPPPs may be prepared for various construction components or phases (e.g., demolition of existing site structures, grading of one parcel, dredging channels, etc.). BMPs that will be implemented as part of the SWPPP will 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 prevent sediment from entering the waters below.

- Sediment sources will be controlled using fiber rolls, straw, filter fabric, 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. If necessary, shallow-temporary-receiving basins (settling basins) will be excavated to receive and hold construction site water and allow it to percolate into the soil to avoid introduction of silty or turbid water into Martin Slough. Sod will be skimmed off

the settling basin and temporarily stockpiled, as will soil from the basin, until the basin is no longer needed, at which time the soil will be replaced into the basin and the sod will be re-planted. The MTRs will be taken out of operation during excavation to prevent tide water from entering Martin Slough and active work areas. This will reduce the amount of water in the work areas and the volume of water that will need to be evacuated from the construction site and discharged onto fields or into settling basins.

- Appropriate energy dissipation devices will be utilized to reduce or prevent erosion at discharge end of dewatering activity.

- Turbidity monitoring will be conducted in Martin Slough throughout the site stabilization period to ensure that water quality is not being degraded. Turbid water will be contained and prevented from being transported in amounts that are deleterious to fish, or in amounts that could violate state pollution laws. Silt fences or water diversion structures will be used to contain sediment. If sediment is not being contained adequately, as determined by visual observation, the activity will cease until remedial actions to correct the problem are implemented.

- 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 delineated with temporary fencing 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 not be 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 removed from the project area.

- After work is completed, project staff will be on site to ensure that the area is re-contoured as per approved specifications. If necessary, restoration work (including revegetation and soil stabilization) will be performed in conformance with the Revegetation and SWPP plans.

1.6.12 Construction Dewatering and Stream Diversion Sequencing

During excavation within the channel, management of the stream flow from Martin Slough tributaries will be required throughout the construction period. Preventing inflow into the active work zones (both tidal and freshwater) will be required to prevent aquatic and non-aquatic organisms from entering the construction site, to reduce the water to be managed in the active work area, and to reduce moisture content in the excavated soils. The muted tide regulators (MTRs) will be taken out of service during construction activities so no tide-water will enter the Martin Slough channel and ponds. This will reduce

the amount of water the excavation contractor has to deal with when de-watering a work area. Inflow control practices include placement of temporary coffer dams to isolate the active work zone. The coffer dams may be comprised of native material, washed gravel encased with an impermeable geotextile or visqueen liner in combination with ecology blocks, and/ or water bladders. A combination of pumped and gravity diversion pipes will be used to route flow around the active work areas. Fish screens will be installed immediately upstream from the coffer dams to prevent aquatic organisms from being transported into the bypass pipe.

For all construction phases and areas, diversion of freshwater from the upstream coffer dam will be pumped or gravity piped and discharged onto pastures or fairways where it will be allowed to infiltrate into the ground. If needed to prevent construction site water from returning directly to the stream through overland flow, shallow temporary holding basins may be excavated in the pasture or fairways. Ponded storm or groundwater in construction areas will not be dewatered by project contractors directly into adjacent surface waters or to areas where they may flow to surface waters unless authorized by a permit from the North Coast Regional Water Quality Control Board (NCRWQCB). In the absence of a discharge permit, ponded water (or other water removed for construction purposes), will be pumped into adjoining fields to infiltrate if suitable, baker tanks, or other receptacles. If determined to be of suitable quality, some of this water may be used on-site for dust control purposes. The Contractor will be required to submit for review and approval by the Construction Manager a Dewatering and Creek Diversion Plan that shall include the proposed dewatering and diversion techniques and schedule of operations. The following construction phases and associated dewatering and diversions activities are proposed to occur in the order presented below. For all construction within the channel or existing ponds, as water within the construction area is pumped out and the channel or pond is de-watered, a fish biologist will observe and capture any fish as the water level is drawn down to ensure the fish are captured and relocated without harm.

Lower Martin Slough Channel (MS 0+00 to MS 46+00), Including Ponds C and D: Coffer dams will be placed at the upstream and downstream end of the restoration area. Diverted flow will be pumped, gravity piped, or ditched and conveyed downstream of the active work zone. Prior to placement of temporary coffer dams, a qualified biologist will utilize seines to corral fish out of the construction limits and into adjoining waters.

Upper Martin Slough Channel Including Pond E and F: Prior to placement of temporary coffer dams, a qualified biologist will utilize seines to corral fish to areas out of the construction limits and into adjoining waters including the newly constructed Ponds C and D. Fish that cannot be corralled to areas outside of the construction limits will be captured and relocated as the water is drawn down during de-watering.

Pond G: During the instream channel excavation a combination of pumped and/or gravity diversion pipes and or ditches will be used to route flow around the active work areas. Nuisance water (i.e., turbid water seeping into excavated areas from ground water) will be pumped to adjacent fields for infiltration or into settling basins. Clean water (e.g., water from Martin Slough and contributing tributaries) will be diverted using coffer dams that will prevent clean freshwater and clean tidal water from entering the excavation. Coffer dams will be placed in the Martin Slough channel immediately upstream and downstream from work sites, which will typically be 1,000 feet long or less. The coffer dams will preclude freshwater and tidal inflow into the work zone during construction.

Golf Course Improvements: Currently, the golf course has numerous low areas on the floodplain that are slow to drain after storm events because the water does not have a flow path back to the channel. This increases the potential for stranding of coho salmon and tidewater goby as floodwaters recede and

leave shallow pools that are isolated from the creek. As part of the project design, the low areas within the golf course that pond will be filled to a minimum elevation of 7 feet so they drain towards the channel, reducing the likelihood of fish stranding and improving drainage. Additionally, the new tide gates have a much larger outflow capacity, reducing the amount of time it takes for floodwaters to drain from Martin Slough. Eliminating shallow pools where fish can become stranded will also improve drainage.

1.6.13 PG&E Gas Line Relocation and Decommissioning

Phase 2, or a subsequent phase, will include relocation of 130 feet of a 6-inch natural gas line (line L 126A) and de-commissioning of a 4-inch gas line (Line L 126B) (collectively called the gas line project). Phases 4 and 5 will include installation of scour protection (see sheet C-505) over a 12-inch gas line (line L 177) where it crosses the meander on NRLT property (see 100% designs, sheet C-102 and C-103) and the East Tributary on the Golf Course (see 100% designs, sheet C-105). The natural gas lines are owned and operated by Pacific Gas & Electric (PG&E).
Scour protection will be installed on the 12-inch gas line in three locations where it crosses the stream channel to prevent the loss of soil from scour by stream flow or tidal exchange. Scour would reduce the depth of soil cover over the gas line. The scour protection will include placement of woven geo-textile fabric and Armorflex™ or equivalent over the gas line as specified in the design plans.

The gas line project is necessary because the enhancement project would result in excavating soil from the channel and adjacent floodplain and reduce the soil cover over the gas lines to less than PG&E's required minimum depth of coverage. Currently the 6-inch gas line does not meet PG&E's standard of 5 feet of soil cover over the gas line, including under stream channels. The 4-inch gas line meets the standard under the channel but if the marsh plain was extended to this location, the depth of soil cover would not meet PG&E's standards. However it is a redundant line and PG&E has proposed to decommission it rather than relocate it. PG&E has agreed to relocate the 6-inch gas line (L 126A) and decommission the 4-inch gas line (L 126B) and has agreed that the scour protection designed for the 12-inch gas line (L 177) will be acceptable as a substitute for relocating it.

The gas line relocation will occur while the channel is de-watered for channel and marsh plain excavation. Prior to installing the coffer dams, temporary fish screens will be installed upstream and downstream of the coffer dams. A qualified and licensed fish biologist will capture fish within the work area by seining. Fish will be identified to species and temporarily placed in aerated buckets. Coffer dams will be installed upstream and downstream of the crossing and the work area will be dewatered by pumping. Stream flow will be routed around the work area by pumping. Energy dissipation will be employed at the stream bypass outlet to prevent an increase in turbidity downstream of the outlet. The biologist will be present during the de-watering of the work trench to ensure that any fish or amphibians that eluded capture during the seining are captured and relocated during the de-watering. The pump intake will be screened to prevent the intake of aquatic organisms. Once the site is de-watered and all fish and amphibians have been captured, they will be released back into the channel at least ¼ mile upstream of the de-watered section. The intake for the stream bypass will be placed between the upstream fish screen and coffer dam and it will have a screened intake with a mesh size opening no greater that 3/16 inch. The outlet of the stream bypass pipe will be discharged into an energy dissipater to prevent scour of the channel and creation of turbidity that will exceed background levels.

Gas line relocation will involve temporarily shutting off the gas supply and venting the remnant gas in the line into the atmosphere. This is a common practice in conducting gas line maintenance and repairs and is not considered dangerous or harmful to the environment as long as standard safety practices are employed (i.e., no open flame or spark generating equipment is operated in the vicinity of the venting while venting is occurring). After the gas is evacuated from the 6-inch gas line, a pit will be excavated at the zero station on the gas line to expose it sufficiently to have access to all sides of the pipe. Installation of 130 feet of new 6-inch gas line will be implemented either using an open trench or directional drilling. Prior to installation of the new gas line, the old gas line will be removed.

If an open trench is used to install the new gas line, shoring will be installed according to OSHA-approved standards as the trench is excavated. The trench will be dug to a sufficient depth to accommodate the new gas line, including the minimum depth of soil cover (5 feet) over the pipe. The design channel depth at this location is -1.0 feet (note – all elevation references are in NAVD 88). The top of the new gas line will be at the depth recommended by PG&E engineers to provide allowance for unanticipated future channel scour in addition to the minimum depth of soil cover. The maximum elevation for the top of the gas line is anticipated to be -6.0 feet (after relocation).

If directional drilling is used, the station zero pit (on the south side of the channel) will be dug to sufficient size to facilitate the drilling machinery and operators and to sufficient depth to allow installation of the new gas line at a maximum depth of -6.0 feet. Shoring will be installed according to OSHA-approved standards. The gas line will be cut at station zero and at approximately station 130 on the north side of the channel. Sections of old pipe that interfere with the installation of the new gas line or stream flow within the channel upon enhancement project completion will be removed and disposed of at a metal recycling facility. A receiving pit will be excavated on the north side of the channel. Shoring will be installed according to OSHA-approved standards. After the bore hole is created, new 6-inch gas line will be pulled through the bore hole and re-attached to the existing gas line. After the line is pressure tested, the bore holes will be filled in, the coffer dams will be removed, the fish screens will be removed, and the gas line will be put back in service.

The 4-inch gas line will be decommissioned in place as PG&E has determined that it is a redundant line and its removal will not affect service to its customers. After venting, the gas line will be cut and capped. The gas line under the channel will not be removed. Based on pot-holing conducted by RCAA under the supervision of PG&E, the elevation of the 4-inch gas line was determined to be sufficiently deep under the channel that it will not interfere with stream flow, even after the channel is excavated to -1.0 feet as called for in the project plans.

Phases 5 and 6 of the enhancement project will proceed only after the gas line relocation and decommissioning have been implemented. Phase 4 will not be affected by the gas line relocation/ decommissioning project and it will proceed as funds are available. PG&E, the Coastal Commission, and RCAA have reached an agreement in principle to have PG&E re-locate the 6-inch line and de-commission the 4-inch line to allow the upstream portions of the Martin Slough Enhancement Project to proceed and to fulfill the wetland enhancement acreage goal of the PG&E Humboldt Bay Generating Station. As part of that agreement, RCAA is including the gas line project in the CEQA document and permit applications for the enhancement project.

1.6.14 Revegetation

The 100% Design Plans include the planting areas and species densities for the project area. The goal is to create native, forested riparian, wetland, and tidal marsh habitats along the Martin Slough channel and expanded ponds. The excavated reaches of Martin Slough and expanded ponds will be revegetated with low growing brackish and freshwater wetland (sedges and rushes) and riparian forest (Sitka spruce, willow, wax myrtle, and alder). Plant material, to the extent feasible, will be salvaged from the project impact footprint. All areas disturbed during grading and other construction activities will be treated with erosion control seeding with native grasses, forbs and shrubs. A combination of active planting and passive revegetation with invasive plant control will be used. Active planting will include re-seeding of pasture and golf course fairways, planting of trees and shrubs within the riparian zone as identified in the planting plan. Brackish wetlands will be re-vegetated with a combination of active planting and passive revegetation which will include monitoring and invasive plant removal. Exclusion fencing will be constructed around the perimeter of the riparian forest and along the channel through the pasture to protect the plantings. Fencing is not needed on the golf course (City) property as no cattle are allowed there.

Active vegetation maintenance will be regularly performed to ensure that the target riparian forest habitat develops along the riparian corridor areas. Options for limiting undesirable vegetation include

intermittent controlled flash grazing (cattle, goat, or sheep), manual removal, and mechanical removal. Special attention will be given to non-native invasive species such as dense-flowered cordgrass and maintenance activities will be coordinated with regional eradication programs, including both timing and methods for removal of specific species. If grazing is employed, exclusion fencing will be placed to protect channel banks, newly establishing revegetation plantings, and areas of naturally recruiting desirable native plants. Flash grazing may be carefully employed to control weed cover in active planting areas and natural recruitment areas but will be managed to avoid excessive damage to native plantings and recruits.

2.0 REFERENCES

California Department of Fish and Game, Fish Passage Evaluations at Stream Crossings, 2001

National Oceanic Atmospheric Administration, NOAA. Guidelines for Salmonid Passage at Stream Crossings, 2001

Winzler & Kelly, Michael Love & Associates, Coastal Analysis. Martin Slough Enhancement Feasibility Study, 2006

Winzler & Kelly and Mike Love & Associates, Martin Slough Habitat Enhancement Project, 100% Design Submittal, December 2015

Winzler & Kelly and Mike Love & Associates, Martin Slough Habitat Enhancement Project, Basis of Design Report, September 2015

Winzler & Kelly, Martin Slough Wetlands Report. September 2011.

SUMMARY OF POTENTIAL PROJECT IMPACTS: Below is a table that summarizes the impact potential for each category of impacts discussed and analyzed in this Initial Study.

		Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
1.	Aesthetics			X	
2.	Agricultural and Forestry Resources			X	
3.	Air Quality		X		
4.	Biological Resources		X		
5.	Cultural Resources		X		
6.	Geology and Soils		X		
7.	Greenhouse Gas Emissions			X	
8.	Hazards and Hazardous Materials		X		
9.	Hydrology and Water Quality		X		
10.	Land Use and Planning			X	
11.	Mineral Resources				X
12.	Noise		X		
13.	Population and Housing				X

14.	Public Services				X
15.	Recreation				X
16.	Transportation and Traffic		X		
18.	Utilities and Service Systems			X	
19.	Mandatory Findings of Significance				X

RECOMMENDED MITIGATION MEASURES: Below is a list of mitigation measures that are identified in the following checklist and would be recommended as conditions of project approval.

1. Aesthetics

None.

2. Agricultural and Forestry Resources

None.

3. Air Quality

Mitigation Measure AQ-1: Utilize Best Management Practices to Minimize Fugitive Dust Generation and Assure Compliance with North Coast Air Quality Management District Rules for Particulates.

Mitigation Measure AQ-2. Minimize Construction Machinery Emissions.

4. Biological Resources

Mitigation Measure BIO-1. Seasonal limitations on in-channel work.

Mitigation Measure BIO-2. Fish relocation.

Mitigation Measure BIO-3. Protect nesting birds through seasonal limitations on removal of upland vegetation and exclusion zones around active nests.

Mitigation Measure BIO-4. Minimize ground disturbance area.

Mitigation Measure BIO-5: Minimize, avoid, and compensate for impacts to sensitive plants

Mitigation Measure BIO-6. Replanting and expanding populations of Lyngbye's Sedge and Humboldt Bay owl's clover.

5. Cultural Resources

Mitigation Measure CR-1. Project construction Shall Not Adversely Affect the Historic "Lorensen Ranch" Dairy Barn.

Mitigation Measure CR-2. During all construction phases and prior to initiating ground disturbance the applicant shall secure the participation or assistance of an affiliated Tribal Historic Preservation Officer (THPO) in the presentation at field crew meetings of what to watch for.

Mitigation Measure CR-3. During all construction phases and prior to initiating ground disturbance affiliated the applicant will notify all affiliated THPOS to allow for spot checking of digging.

Mitigation Measure CR-4. Specified Procedures Shall Be Followed in the Event of Inadvertent Discovery of Archaeological Material or Human Remains.

6. Geology and Soils

None, but see Mitigation Measures WQ 1-5 below.

7. Greenhouse Gas Emissions

None.

8. Hazards and Hazardous Materials

Mitigation HHM-1: Emergency Spill Cleanup kits and Hazardous Materials Spill Prevention Control and Countermeasure Plan.

9. Hydrology and Water Quality

Mitigation Measure WQ-1: Storm Water Pollution Prevention Plan.

Mitigation Measure WQ-2. Implement contractor training for protection of water quality.

Mitigation Measure WQ-3. Minimize potential pollution caused by inundation.

Mitigation Measure WQ-4. Instream erosion and water quality control measures during channel excavation.

Mitigation Measure WQ-5. Implement Dewatering and Diversions Restrictions

10. Land Use and Planning

None

11. Mineral Resources

None

12. Noise

Mitigation Measure N-1: Restrict noise from earthmoving and hauling of soils

Mitigation Measure N-2: Notify neighbors

13. Population and Housing

None.

14. Public Services

None.

15. Recreation

None.

16 Transportation and Traffic

Mitigation Measure T-1. Traffic Control Plan

17. Tribal Cultural Resources

Same as CR-2, CR-3, and CR-4

18. Utilities and Service Systems

None.

20. Mandatory Findings of Significance

None.

CHECKLIST AND EVALUATION OF ENVIRONMENTAL IMPACTS: An explanation for all checklist responses is included, and all answers take into account the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts. The explanation of each issue identifies (a) the significance criteria or threshold, if any, used to evaluate each question; and (b) the mitigation measure identified, if any, to reduce the impact to less than significance. In the **CHECKLIST** the following definitions are used:

"**Potentially Significant Impact**" means there is substantial evidence that an effect may be significant.

"**Less than Significant with Mitigation Incorporated**" means the incorporation of one or more mitigation measures can reduce the effect from potentially significant to a less than significant level.

"**Less Than Significant Impact"** means that the effect is less than significant and no mitigation is necessary to reduce the impact to a lesser level.

"**No Impact"** means that the effect does not apply to the proposed project, or clearly will not impact nor be impacted by the project.

1. AESTHETICS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?			X	
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			X	
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			X	
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers whether the proposed project may have any significant effects on visual aesthetics because of: (a) the short-term or long-term presence of project-related equipment or structures; (b) project-related changes in the visual character of the project area that may be perceived by residents or visitors as a detraction from the visual character of the project area; (c) permanent changes in physical features that would result in the effective elimination of key elements of the visual character of the project area near a State scenic highway; or (d) the presence of short-term, long-term, or continuous bright light, such as from welding or nighttime construction, that would detract from a project area that is otherwise generally dark at night or that is subject to artificial light.

DISCUSSION:

Impact: Effects on scenic vistas

The project area in the unincorporated areas are not designated under the Humboldt Bay Area Plan as a Coastal Scenic or View area. The project site is visible to travelers on Elk River Road, Fairway Drive, Pine Hill Road and Myers Avenue, all publicly maintained roads. Visibility of the project site for travelers on Fairway Drive is limited to short distances due to undulating topography and existing vegetation. The visibility of the project site to travelers on Elk River Road is greater due to the flat topography and more open vistas. For the project area located in the unincorporated area is greatest for travelers on Pine Hill Road and Myers Avenue. However, much of the work area is adjacent to Martin Slough and is over a 1,000 feet from Elk River Road. Travelers on Pine Hill Road and Meyers due. Pine Hill Road parallels a portion of Martin Slough, while the elevation of the Myers Avenue roadway decreases to being only a few feet higher than Martin Slough where it intersects with Pine Hill Road. For the project area located in the City of Eureka, visibility of the work will be greatest for golf course patrons as some of the work will occur on or adjacent to the fairways; however, access to the fairways where

construction is being performed will be limited for patron safety. A secondary visibility area is at the golf course's developed parking lot that sits at a higher elevation than the surrounding fairways affording a view of the golf course. Even from this elevated vantage point, the project area's visual profile is generally linear because it follows Martin Slough and its tributaries. During the project's construction phases travelers, golf course patrons, and other users, will view a variety of heavy equipment. This heavy equipment will be operating in the riparian and stream zone for up to 28 weeks total over the life of the project, which will be implemented in up to 6 phases, depending on securing adequate funding for full project build out. The construction season for each phase of earthwork, bridge installation, and other improvements will be between June 15 and October 15 each year, with fencing and re-vegetation occurring between October 15 and May 15. During construction there will be channel de-watering equipment (pumps, coffer dams, discharge pipes), erosion control measures (silt fencing, straw wattles, straw bales), equipment staging areas with equipment stored over-night and over weekends and holidays, temporary storage facilities (shipping containers), temporary haul roads, and other project activities visible from public roads and residences that some may consider unsightly. Signage explaining the nature of the project will be posted, which should reduce the negative response of onlookers to construction. The effect will be temporary and the site will be restored after construction is completed with riparian and marsh species planted to revegetate pond perimeters and riparian areas. The aesthetics of post-project condition will be improved by planting native trees in the restored riparian zone. Through the upper portion of the project (the golf course reach), revegetation will occur in pockets to allow the fairways to cross the creek and maintain playability of the golf course. Given that the aesthetic impact will be temporary, the project proposal incorporates revegetation and posting explanatory signage, and that the project site is not a mapped scenic vista, the impacts to scenic vista are less than significant.

Damage to scenic resources: While the project will have short-term construction related adverse effects on scenic resources, such as patches of willow trees along Martin Slough that may be removed during construction, the long term effects of the project on scenic resources will be beneficial due to riparian and wetland plantings, as discussed above.

Degradation of the existing visual character of the site and its surroundings: As discussed above, the project will result in short term degradation of the site's visual character due to construction, but will improve the site's visual character over the long term.

Light and Glare: The project does not involve the addition of any new sources of light or glare that would affect day or nighttime views in the area.

FINDINGS:
The project will have a less than significant impact due to temporary degradation of the existing scenic vista, scenic resources, and visual character during construction. The impact is less than significant because of its temporary nature and the improvement in visual character after project completion due to an increase in riparian and wetland vegetation.

MITIGATION MEASURES:
No mitigation is required.

2. AGRICULTURE & FOREST RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and the forest carbon measurement methodology provided in the Forest Protocols adopted by the California Air Resources Board. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?			X	
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined in Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				X
d) Result in the loss of forest land or conversion of forest land to non-forest use?				X
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would: (a) change the availability or use of agriculturally important land areas designated under one or more of the programs above; (b) cause or promote changes in land use regulation that would adversely affect agricultural activities in lands zoned for those uses, particularly lands designated as Agriculture Exclusive or under Williamson Act contracts; or (c) change the availability or use of agriculturally important land areas for agricultural purposes.

DISCUSSION:

Prime Farmland: Prime farmland was mapped in the project area using the definition in the 1983 Humboldt County General Plan (HCGP) (1983). The HCGP defines prime agricultural land as follows, per California Government Code Section 51201(c):

A. Land which qualifies for rating as Class I or Class II in the Soil Conservation Service land use capability classifications.
B. Land which qualifies for rating 80 through 100 in the Storie Index Rating. (Res. 85-55, 5/7/85)
C. Land that has a livestock carrying capacity of one animal unit per acre.
D. Land planted with fruit or nut bearing trees, vines, bushes or crops which have a non-bearing period of less than five years and which will normally provide a return adequate for economically viable operations during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production.

E. Land capable of producing an unprocessed plant production adequate for economically viable operations.
F. Additional lands adjacent to A, B, or C above which presently or historically have been necessary to provide for economically viable agricultural areas. These lands are included to prevent the establishment of incompatible land uses within an area defined by natural or man-made boundaries.

County soils maps (Humboldt County WebGIS, based on Soils of Western Humboldt County maps, 1965) indicate that 30.4 acres of the project area located on the NRLT Property and the Eureka Municipal Golf Course are considered prime agricultural soil according to criteria A (Figure AG-1). Prime agricultural soils meeting criteria A above consist of Ba3 soils (Bayside silty clay loam, imperfectly drained 0-3%). In addition to the Ba3 soils, the remaining pasture on the NRLT property also qualifies as a prime agricultural soil according to criteria E. Pastures on the NRLT property support approximately one animal per acre for five to six months of the year, which is an adequate period of time and grazing rate for an economically viable feeder calf operation. Pasture on the NRLT property does not produce adequate forage to harvest as hay and serve as pasture. Hay could be produced if the cattle were removed for part of the year.

Impact: Conversion of prime farmland and other agricultural land

The project would convert approximately 6 acres of prime agricultural soils located immediately adjacent to Martin Slough on the NRLT Property from agricultural use to salt marsh, riparian habitat, and open water. In addition, the project would convert approximately 1.3 acres mapped as Ba3 prime agricultural soil on the golf course to brackish wetlands.

With respect to the 1.3 acres of prime agricultural soil on the golf course, this land is part of the golf course that was established in 1957, and has not been used for agricultural production. Further this land is zone and planned for recreation purposes consistent with the established use. Therefore, the Project will not result in a conversion of agricultural land.

While the project would preclude continued grazing on approximately 6.0 acres of the project area, it would nonetheless result in a net increase in agricultural productivity for agricultural lands in the vicinity. Agricultural land in the project area and in the vicinity suffers from prolonged inundation during the winter months. These periods of inundation limit the use of the land for grazing during the winter. Grazing land in the project area and vicinity is frequently unusable due to flooding or saturation from October through May. During times when the pasture is flooded, cattle are sometimes moved off the land, or if the flooding is of short duration (2 or 3 days), cattle are kept on site and feed is provided by the rancher. The area to be converted to marshes and open water is located along Martin Slough and its tributaries, and is therefore the land most prone to flooding and least usable for agriculture.

Project implementation would reduce the frequency and duration of flooding on land adjacent to the project area, thereby increasing its capacity to support livestock. With Project implementation the lands will not be flooded as frequently or for as long of a duration, therefore, the frequency to relocate livestock or provide supplemental feed will be reduced. Hydraulic modeling indicates that a 10-year rainfall event currently results in the project area being strongly inundated for over a week after peak rainfall. After project implementation, inundation from a 10-year rainfall event would be substantially reduced after one day. After two days, all flooded portions of the project area would be drained with the exception of some low-lying areas in the downstream pasture (Figure AG-2- See Figure 16.2 in the Feasibility Study). Given this reduction in the duration of inundation, it is reasonable to expect that the project would not result in a loss in livestock capacity for the project vicinity. In addition, the project is designed to maximize the agricultural use of the 34.3 acres of pasture on the NRLT owned property that will not be converted to other uses. Therefore, although the project would convert prime farmland to other land cover types, it would likely have a neutral or beneficial impact on agricultural productivity of the project vicinity overall.

Impact Significance
Less than significant (self-mitigating due to increases in agricultural productivity associated with reduced frequency and duration of inundation).

Conflicts with Agricultural Zoning or Williamson Act Contracts: This project does not involve a change in land use designation that would conflict with agricultural use or a Williamson Act contract. As discussed above, the parcels owned by the City of Eureka are zoned and planned for public—public recreation uses. None of the subject parcels are subject to a Williamson Act contract. All of the project area lands in the unincorporated area are planned and zoned Agricultural Exclusive (AE) under the certified Local Coastal Program (LCP). Both the certified Humboldt Bay Area Plan (HBAP) and the Coastal Zoning Regulations (CZR), specifically enumerate fish and wildlife management and watershed management as conditionally permitted uses in the Agricultural Exclusive land use designation and zoning district. A conditional use permit has been applied for with the County as part of the project, while the County's Coastal Development Permit has been consolidated and is being processed by the Coastal Commission pursuant to the request for consolidation of the CDP letter dated January 4, 2017. Therefore, there is no impact from conflicts with agricultural zoning or Williamson Act contracts.

Conflicts with zoning for forest land, timberland, or timberland zoned Timberland Production: None of the project area is zoned for forest land, timberland, or timberland production. Therefore, the project does not conflict with these zoning types. There is no impact.

Loss or conversion of forest land: The project area does not contain any forest land, and project implementation will not lead to the loss or conversion of such land. There is no impact.

Other changes in the environment which could lead to loss or conversion of agricultural or forest land: The project will not result in any other changes in the environment which could lead to such losses. The project will reduce the duration of inundation on agricultural lands in the project area and vicinity, thus enhancing agricultural productivity and the viability of continued agricultural operations. There is no impact.

FINDINGS:
The project will have a less than significant impact due to the conversion of six acres of prime farmland currently in agricultural use, and 1.3 acres of prime farmland currently used as a golf course, as well as an additional 1.3 acres that are currently used for grazing but are not prime farmland, to marshes and open water. The impact is less than significant because project implementation will reduce the frequency and duration of inundation of agricultural lands, which return the pasturelands to suitable grazing conditions sooner than under current conditions.

MITIGATION MEASURES:
No mitigation measures are required.

3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?		X		
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		X		

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?		X		
d) Expose sensitive receptors to substantial pollutant concentrations?		X		
e) Create objectionable odors affecting a substantial number of people?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would (a) directly interfere with the attainment of long-term air quality objectives identified by the North Coast Unified Air Quality Management District; (b) contribute pollutants that would violate an existing air quality standard, or contribute to a non-attainment of air quality objectives in the project's air basin; (c) produce pollutants that would contribute as part of a cumulative effect to non-attainment for any priority pollutant; (d) produce pollutant loading near identified sensitive receptors that would cause locally significant air quality impacts; or (e) release odors that would affect a number of receptors.

DISCUSSION:

Project-related air pollutant emissions are anticipated to be almost exclusively short-term construction-related emissions. Some long-term operations-related emissions may occur as a result of channel maintenance if maintenance dredging is required, but these emissions are not expected to have a significant impact. Also, the project will restore a muted tidal prism that will efficiently transport sediment through the system and this will reduce and minimize the need for dredging so the end result will be a reduction in future emissions.

Conflict with or obstruct implementation of the applicable air quality plan: The CEQA Guidelines provide explicit guidance for a circumstance in which a proposed action may result in a contribution to a cumulative effect on a regional basis, in Guidelines Section 15064(i)(3), where there is an ongoing regulatory concern but for which the relevant regulatory body has adopted an appropriate control plan:

"A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g., water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency."

The 1995 PM10 attainment plan adopted by the AQMD provides specific requirements for addressing the particulate non-attainment in the air basin, and the plan was adopted pursuant to a formal public review process. Therefore, compliance with the AQMD's plan would constitute the necessary mitigation (see below) to mitigate the project's effects to less than significant levels. Best Management Practices to minimize fugitive dust generation will be implemented as part of project implementation.

As discussed above, existing levels of particulates in the North Coast Air Basin exceed State ambient air quality standards, and the entire Air Basin is designated non-attainment for PM10. According to the NCUAQMD Particulate Matter Attainment Plan (NCUAQMD 1995), Humboldt County must reduce PM10 emissions by nearly 50 percent (based on Humboldt County's proportionate share of North Coast Air Basin PM10 emissions) from 1991 levels to meet State standards. The following activities associated with all components of the project could generate fugitive dust:

1. Grading, excavation, road building, and other earth moving activities;
2. Travel by construction equipment and employee vehicles, especially on unpaved surfaces; and
3. Exhaust from onsite construction equipment.

A portion of this fugitive dust would have particle sizes small enough to be considered PM10. It is estimated that approximately 65,022 cubic yards (cy) of earth will be excavated as part of the project. 10,070 cy would be reused onsite to repair up to 50% of the existing Swain Slough berm, to fill in channel areas to add sinuosity and habitat to the channel, and to improve drainage on the golf course and on the NRLT agricultural property. Round trip hauling of this onsite use varies but at a maximum would be approximately 0.5 miles, with most of the haul length being less than 0.2 mile. 54,952 cy would be used offsite. Possible uses of the off-hauled sediment would be to restore tidal marsh on subsided lands at the White Slough Unit of the Humboldt Bay National Wildlife Refuge, or application to agricultural land in the Lower Elk River area. Round trip hauling distance for the White Slough Unit would be approximately 10 miles from the downstream end of the project area, and 11 miles from the upstream end. Round trip hauling distance to agricultural sites in the Lower Elk River would be approximately 6 to 10 miles. For the purposes of the air quality analysis, a round trip hauling distance of 10 miles was used for 30,202 cy of earth, and a distance of 11 miles was used for offsite hauling of the remaining 24,750 cy. These numbers were based on the off-haul estimates for the project activities on the NRLT property and on the golf course, respectively. Construction-related project emissions were calculated using the California Emissions Estimator Model (CalEEMod) Version 2013.2.2 (Caleemod.com). Assumptions and CalEEMOD output are in Appendix 1. Construction-related PM10 emissions from the project will occur over the short term. PM10 emissions from the project could contribute to a cumulative effect that would prevent the Air Basin meeting PM10 standards. Short-term PM10 emissions would be reduced to a less-than-significant level by the implementation of Mitigation Measures AQ-1 and AQ-2. Implementation of these mitigation measures would reduce the project's construction-related PM10 emissions from approximately 1.34 tons in the first construction season, and 1.30 tons in the second, to approximately 0.85 tons in the first construction season, and 0.80 tons in the second (Appendix 1). The NCUAQMD's significance threshold for stationary source PM10 emissions is 16 tons/yr. Therefore, the project's PM10 emissions would be less than significant after mitigation.

Violate Air Quality Standards or Substantially Contribute to an Existing Air Quality Violation: As noted above, construction activities associated with the project represent a potential source of fugitive dust which may violate PM10 air quality standards or substantially contribute to nonattainment of the PM10 standard for the County. This impact would be mitigated to a less than significant level by implementation of Mitigation Measures AQ-1 and AQ-2.

In addition, during the two construction seasons, construction machinery would potentially produce approximately 8.1 tons per year of nitrogen dioxide (NOx) and 6.0 tons per year of carbon monoxide (CO), in addition to 0.37 tons per year of PM10 exhaust, and 0.76 tons per year of reactive organic gases (ROG), and 0.01 ton per year of sulfur dioxide (SO2). The NCUAQMD annual thresholds for significance under CEQA for these pollutants are 40 tons per year for NOx, 100 tons per year for CO, and 40 tons per year for ROG. The amount of NOX, CO, and ROG potentially emitted per year due to project implementation is far below the NCUAQMD significance thresholds. Air quality impacts from the project are further reduced by the relatively short duration of construction (approximately 270 days total over 5 phases/5 years). The emissions of these pollutants, which were estimated from the number and distance of truck haul trips and the hours of operation of other heavy construction equipment, would not result in a violation of air quality standards or substantially contribute to an existing air quality violation.

Expose sensitive receptors to substantial pollutant concentrations: Construction activities associated with the project could expose schoolchildren and sensitive residents adjacent to the project area to substantial concentrations of fugitive dust, ozone, and NO_2. This impact would be reduced to a less than significant level by implementation of Mitigation Measures AQ-1 and AQ-2.

Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard: As noted above, activities associated with the project represent a potential source of fugitive dust which may violate PM10 air quality standards or substantially contribute to nonattainment of the PM10 standard for the County. The extent of the impact is reduced by the relatively short duration of construction (approximately 2.75 months per year over five years) and the location of the project in an area of low population density. This impact would be reduced to a less than significant level by implementation of AQ-1 and AQ-2 above.

Expose workers or the public to hazardous toxic emissions or substantial pollutant concentrations. Construction activities associated with the project could expose construction workers and residents adjacent to the project area to substantial concentrations of diesel particulate matter. This impact will be reduced to a less than significant level by implementation of Mitigation Measure AQ-2. The venting of natural gas as part of the gas line relocation and decommissioning project could expose workers to hazardous substances. PG&E staff or contractors trained in working with hazardous substances will employ measures to ensure their personal safety (i.e., no open flame or use of spark producing equipment when gas is being vented) and the safety of the public. The exposure will be temporary and short lived and is not considered significant.

Create objectionable odors affecting a substantial number of people: The gas line relocation and decommissioning components will result in the venting to the atmosphere of natural gas which is treated with an odor for leak detection purposes, which may create an odor that some people consider objectionable. The odor will be of brief duration and it will occur in a sparsely populated area and will therefore not affect a substantial number of people. The impact will be less than significant.

FINDINGS:

The project would result in potentially significant air quality impacts discussed above, but these impacts would be reduced to a less than significant level by the implementation of Mitigation Measures AQ-1 and AQ-2 below.

MITIGATION MEASURES:

Mitigation Measure AQ-1: Utilize Best Management Practices to Minimize Fugitive Dust Generation and Assure Compliance with North Coast Air Quality Management District Rules for Particulates

In order to minimize the generation of fugitive dust, the following best management practices shall be implemented during project construction.

- All active construction areas shall be watered at a rate sufficient to keep soil moist and prevent formation of wind-blown dust.
- All trucks hauling soil, sand, and other loose materials shall be covered, or all trucks shall be required to maintain adequate freeboard to prevent formation of wind-blown dust.
- All unpaved access roads, parking areas, and construction staging areas shall be paved, watered daily, or treated with non-toxic soil stabilizers during construction.
- All paved access roads, parking areas, and construction staging areas shall be cleaned daily with water sweepers during construction.
- If visible soil is carried out onto adjacent streets, the area shall be washed with water or by a water sweeper truck.
- Exposed stockpiles of dirt, sand, and similar material, and inactive constructive areas shall be enclosed, covered, watered daily, or treated with non-toxic soil binders.
- Traffic speeds on unpaved roads shall be limited to the posted speed or 10 miles per hour whichever is more restrictive.
- Sandbags, hay bales, filter fabric, coir rolls, or other erosion control measures shall be installed to prevent silt runoff to public roadways.
- Vegetation in disturbed areas shall be replanted as quickly as possible.

- Outdoor dust-producing activities shall be suspended when high winds (>15 mph) create visible dust plumes in spite of control measures.
- Reasonable precautions shall be taken to prevent the entry of unauthorized vehicles onto the site during non-work hours.

Construction activities associated with the Project shall comply with AQMD Rule 420 (Particulate Matter) and Rule 430 (Fugitive Dust Emissions), or succeeding AQMD rules that carry out the AQMD's management program for particulate matter. Many of the Best Management Practices listed above are also cited in Rule 430.

Mitigation Measure AQ-2. Minimize Construction Machinery Emissions
Contractors shall be required to maintain properly tuned equipment.

4. BIOLOGICAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers whether the proposed project would result in a significant adverse direct or indirect effects to: (a) individuals of any plant or animal species (including fish) listed as rare, threatened, or endangered by the Federal or State government, or effects to the habitat of such species; (b) more than an incidental and minor area of riparian habitat or other sensitive habitat (including wetlands) types identified under Federal, State, or local policies; (c) more than an incidental and minor area of wetland identified under Federal or State criteria; (d) key habitat areas that provide for continuity of movement for resident or migratory fish or wildlife, or (e) other biological resources identified in planning policies adopted by the County of Humboldt.

DISCUSSION:

Existing Conditions

Information in the biological resources discussion is based on the surveys and reports listed in Table BIO-1. The Project area can be broadly classified into six land cover types: aquatic, willow-alder riparian forest/scrub, salt and brackish marsh, freshwater marsh, agricultural grassland (pasture), and golf course. Below are descriptions of the vegetation and wildlife associated with each land cover type.

Aquatic habitat is present in Martin Slough and in the golf course ponds in the upstream portion of the project area. At low tides, a small amount of mudflat habitat is exposed, especially in areas closer to the confluence with Swain Slough, where Martin Slough is wider. At high tides, these mudflat areas convert to shallow open water or aquatic habitat. Small patches of eelgrass may occur seasonally in Swain Slough, but have not been documented in Martin Slough.

Vegetation: Aquatic habitat in the Martin Slough channel is unvegetated.

Wildlife: Survey reports from the California Department of Fish & Wildlife (DFW) show observations of Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead trout (*O. mykiss*), coast cutthroat trout (*O. clarki*), tidewater goby (*Eucyclogobius newberryi*), prickly sculpin (*Cottus asper*), threespine stickleback (*Gasterosteus aculeatus*), coast range sculpin (*Cottus aleuticus*), Pacific staghorn sculpin (*Leptocottus armatus*), starry flounder (*Platichthys stellatus*), rough skinned newt (*Taricha granulose*), and Dungeness crab (*Cancer magister*) in Martin Slough. Northern red-legged frog (*Rana aurora aurora)* has been found in the Martin Slough channel just south of the golf course. In 2008, DFW captured six invasive Sacramento pikeminnow (*Ptychocheilus grandis*) in Martin Slough. DFW and other cooperating agencies conducted a number of pikeminnow eradication sampling events, culminating with a large effort in November 2008 that included draining a pond where five of the six were found. No additional pikeminnow have been captured in Martin Slough since that time.

Willow-alder riparian forest/scrub is present in small clumps along the slough channel and on the shores of the golf course ponds. No patches of riparian forest/scrub large enough to be mapped were located within the Project area in the 2002 survey, although patches were mapped adjacent to the project area along Fairway Drive and downstream on the edges of the golf course. Hooker willow (*Salix hookeriana*), shining willow (*Salix lucida* ssp. *lasiandra*), Sitka willow (*Salix sitchensis*), red alder (*Salix rubra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), cascara (*Rhamnus purshiana*), and California blackberry (*Rubus ursinus*) are common species in this community.

Salt and brackish marsh is present along Swain Slough and the downstream reach of Martin Slough. Common plant species associated with salt marsh in the project area include cordgrass (*Spartina densiflora*), pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata*), arrowgrass (*Triglochin maritima*), jaumea (*Jaumea carnosa*), brassbuttons (*Cotula coronopifolia*), and rushes (*Juncus* spp.). Common plant species associated with brackish marsh in the project area include Lyngbye's sedge (*Carex lyngbyeii*), ditchgrass (*Ruppia maritima*), slough sedge (*Carex obnupta*), and tufted hairgrass (*Deschampsia cespitosa*).

Freshwater marsh is present along Martin Slough.

Vegetation: Common plant species associated with freshwater marsh in the project area include Pacific water parsley (*Oenanthe sarmentosa*), reed canary grass *(Phalaris arundinaceae*), Pacific silver-weed (*Potentilla anserina*), broadfruit bur-reed (*Sparganium eurycarpum*), field horsetail *(Equisetum arvense)*, and small-headed bulrush (*Scirpus microcarpus*).

Wildlife: Seasonal wetlands provide habitat for a variety of wildlife. The composition of species using seasonal wetlands varies considerably depending on the extent of the wetlands and the duration of inundation. Many of the species that use flooded pasture also use freshwater marsh. However, a number of additional species use the vegetation associated with the freshwater marsh that are absent from the flooded pasture. Amphibians such as Pacific treefrogs (*Pseudacris regilla*) use these ponded areas and breed in them if the duration of ponding is sufficient. Various species of garter snakes

(*Thamnophis* spp.) may visit freshwater marsh in the project area. Northern red-legged frogs occur in the project area and are likely to visit these wetlands. Small mammals such as rodents and insectivores inhabit vegetated portions of the freshwater marsh and these species, in turn, provide prey for predatory birds and mammals. Examples of birds found in this habitat that are not likely to use flooded pasture include the green heron (*Butorides virescens*), common yellowthroat (*Geothlypis trichas*), and marsh wren.

Agricultural grassland is located at the downstream end of the project area on the Northcoast Regional Land Trust property, and comprises approximately 39 acres of the project area.
Vegetation: Agricultural grassland in the project area is dominated by species such as annual bluegrass (*Poa annua*) and perennial ryegrass (*Lolium perenne*). Much of the grasslands in the project area are seasonal wetlands, characterized by species such as meadow foxtail (*Alopecurus genticulatus*) and creeping buttercup (*Ranunculus repens*), with a smaller area of upland grassland, characterized by species such as hairy cat's ear (*Hypochaeris radicata*) and sweet vernal grass (*Anthoxanthum odoratum*). Lyngbye's sedge (*Carex lyngbyei*), listed by the California Native Plant Society as a rare plant (List 2.2), is found along the banks of Martin Slough within the NRLT property. This species has no state or Federal listing status. This rhizomatous herb occurs in coastal brackish or freshwater marsh, where it can form dense monotypic stands. The blooming period extends from May to August. The range of this species includes four counties in California, extending north from Marin County into Oregon.

Wildlife: Agricultural pastureland provides habitat for a suite of wildlife species. Mammals that typically use pastureland include the California vole (*Microtus californicus*), Pacific shrew (*Sorex pacificus*), and coast mole (*Scapanus orarius*). Swallows typically forage for aerial insects over pastureland, including species such as tree (*Tachycineta bicolor*), cliff (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*). Other passerine bird species that utilize this habitat in the region include Eurasian collared-dove (*Streptopelia decaocto*), Savannah sparrow, and red-winged and Brewer's blackbirds. Shorebirds that occur in pasturelands in coastal Humboldt County include the long-billed curlew (*Numenius americanus*) and killdeer (*Charadrius vociferous*). Agricultural pasturelands also provide foraging habitat for a number of raptor species including the northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrinus*), red-tailed hawk (*Buteo jamaciensis*), barn owl (*Tyto alba*), and the turkey vulture (*Cathartes aura*). During periods of substantial precipitation, large areas of the pastureland become inundated. During these periods, many species are likely to use these inundated areas, including herons and egrets, waterfowl, and shorebirds. Two known osprey (*Pandion haliaetus*) nests are located near the project site but they have not been affected by recent construction activity for the Martin Slough Sewer Interceptor project and they have successfully nested there for many years in the midst of regular golf course use and maintenance activities. The proposed project will not have an adverse effect on the osprey.

An informal wildlife survey conducted with US Fish & Wildlife staff on March 9, 2012, identified multiple bird species occurring on or adjacent to the Property. These species include: Aleutian cackling goose (*Branta hutchinsii*), black phoebe (*Sayornis nigricans*), song sparrow (*Melospiza melodia*), Steller's jay (*Cyanocitta stelleri*), common snipe (*Gallinago gallinago*), white-crowned sparrow (*Zonotrichia leucophrys*), hairy woodpecker (*Picoides villosus*), northern flicker (*Colaptes auratus*), yellow-rumped warbler (*Setophaga coronate*), marsh wren (*Cistothorus palustris*), Anna's hummingbird (*Calypte anna*), great blue heron/egret (*Ardea Herodias/Ardea alba*, identified only by tracks in the mud). Also observed on the site were a bobcat (*Lynx rufus*) and tracks left by a raccoon (*Procyon lotor*).

Golf course grasslands
The golf course occupies the upstream portion of the project area, comprising 115 acres of the project area.
Vegetation: Dominant vegetation within the fairway of the golf course adjacent to the slough consists of tall fescue (*Festuca arundinacea*), annual bluegrass (*Poa annua*), and perennial ryegrass (*Lolium perenne*). Other plant species found in the golf course include colonial bentgrass (*Agrostis capillaris*),

bird's foot trefoil (*Lotus corniculatus*), velvet grass (*Holcus lanatus*), buttercup (*Ranunculus repens*), and English plantain (*Plantago lanceolata*). [FAC-] were commonly found in both wetland as well as upland areas. Vegetation on drier, upland areas on the golf course is dominated by Kentucky bluegrass (*Poa pratensis*), cow parsnip (*Heracleum lanatum*), white clover (*Trifolium repens*), soft brome (*Bromus hordeaceus*), hairy cat's ear (*Hypochaeris radicata*), orchard grass (*Dactylis glomerata*), and sweet vernal grass (*Anthoxanthum odoratum*).
Wildlife: Wildlife using the golf course are similar to those using agricultural grasslands. However, species using the golf course are characterized as those more tolerant of human disturbance.

Special Status Species
"Special-status" species is a general term that refers to any species or population segment with substantial, legal, policy, or scientifically valid concern for conservation. A "population segment" refers to geographically or genetically distinguished portion of species, subspecies, or variety. Special status species generally include: federally listed or state-listed endangered, threatened, and candidate species; state-listed "rare" species; species identified as "species of concern" in federal endangered species recovery plans; species ranked as "species of special concern" or listed as "fully protected" by the DFW; species ranked as rare, threatened, endangered, or "watch list" in scientifically peer-reviewed nongovernmental conservation organizations (such as the California Native Plant Society's (CNPS) Inventory of Rare, Threatened and Endangered Plants); and species for which substantial evidence ("fair argument") exists to justify conservation significance at a local, regional, or statewide scale, such as evidence of rarity from published scientific surveys, floras, or research. The species lists in Appendix 2 were generated from these sources as well as DFW's California Natural Diversity Database (CNDDB) and Special Animals and Special Plants lists, and lists generated from the USFWS website on October 23, 2012. The project site is located in the Eureka USGS quad map. The CNPS and DFW lists were generated for this quad as well as the surrounding six quads (Arcata North, Arcata South, Tyee City, Cannibal Island, Mcwhinney Creek, and Fields Landing). The CNDDB was consulted for the occurrence of sensitive plants or animals at the project site.

Of 47 special status animal species known to occur in the project vicinity, 15 species have potential habitat in the project area (Table BIO-2). The sensitive animal species which are known to currently inhabit the project area are coastal cutthroat trout (*Oncorhynchus clarki*) (candidate for federal listing), steelhead trout (*O. mykiss*) (federally listed as threatened), Coho salmon (*O. kisutch*) (federally listed as threatened), and tidewater goby (*Eucyclogobius newberryi*) (federally listed as endangered). In addition, an osprey (*Pandion haliaetus*) nest is present and in active use adjacent to the upstream end of the project area, near the proposed Pond F on the main stem and Pond G on the north fork of Martin Slough.

The CNDDB was also consulted for sensitive plant species that could occur at the project site. Of 35 special status plant species known to occur in the project vicinity, 15 species have potential habitat in the project area (Table BIO-3). One of these species, Lyngbye's sedge (*Carex lyngbyeii*), is known to occupy the Swain Slough and Martin Slough channels from Pine Hill Rd to downstream of Fairway Drive and is found along Pond E on the golf course. In addition, Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*) was documented in 2002 adjacent to Swain Slough. The likelihood of other special status plant species occurring in the project area is low, as no others were detected in the project area in 2002. No special status species were recorded during the preparation of the wetland delineation (Winzler & Kelly, 2011).

Direct or indirect adverse effects on rare, threatened or endangered plant or animal species or their habitats
The project is expected to have beneficial long-term effects for special status anadromous fish species and for special status birds and other species utilizing riparian and marsh habitat. The post-project conditions will greatly expand and improve fisheries habitat and fish access to the habitat. Instream habitat will be improved by removal of invasive species, rearing habitat will be expanded by increasing

the channel capacity and excavating channel-connected ponds, and riparian restoration and cattle exclusion fencing will keep cattle out of the restored channel and wetlands and create a riparian forest with native trees and shrubs that will stabilize streambanks, provide shade and instream cover, and a source of insects (both aquatic and terrestrial) which will become forage for the fish. The project will increase the type of habitat that CDFW biologists have observed coho salmon to use and need, i.e., over-wintering high flow refugia.

The Project will increase the amount of tidal channel and bordering pond and riparian habitats and decrease the amount of agricultural grassland and developed lands in the Project area. This will provide additional overwintering and rearing habitat for salmonids and tidewater gobies, improve hydraulic connectivity, and re-establish a muted tidal prism, which would improve adult salmonid migration and spawning runs to upstream tributaries. Table BIO-4 contains the existing and projected salmonid and tidewater goby habitat. The table does not include the expanded Martin Slough channel width and depth which would also provide increased aquatic habitat for salmonids and tidewater goby.

Table BIO-4. Existing and projected salmonid and tidewater goby habitat in the Martin Slough Project area.

Salmonid and Tidewater Goby Habitat	Existing Habitat (Acres)	Projected Habitat (Acres)
Marsh Plain A	0	0.75
Marsh Plain B	0	2.3
Pond C (brackish)	0	1.7
Pond D (fresh)	0.1	0.8
Pond E (Hole 17) (brackish)	0.2	1.3
Pond F (brackish)	0	1.7
Pond G (fresh)	0.10	0.5
North Fork (fresh)	0.12	0.8
South East Tributary	0	0.18
TOTAL	0.52	10.03

However, project construction may result in short-term adverse impacts to these species. Individual species that may experience adverse short term effects are discussed below.

California Coastal Chinook Salmon

Chinook salmon could be injured or killed during the channel construction. However, this impact will be avoided by implementation of Mitigation Measures BIO-1 and 2.

Over the long term, Chinook would benefit from the restoration of in-channel habitat, enhanced riparian buffer, and improved stream flow and habitat complexity. In addition, the restoration of a muted tidal prism will improve fish passage and increase aquatic habitat for Chinook salmon.

Tidewater Goby

Tidewater gobies could be killed or injured during in-channel construction activities as a result of dewatering and channel excavation. This is most likely to occur during the expansion of Pond E at Hole 17 where tidewater gobies were detected. This impact would be avoided by implementation of Mitigation Measures BIO- 1 and 2.

Over the long-term, tidewater goby would benefit from the re-establishment of a muted tidal prism and the construction of additional brackish wetlands and open water habitat suitable for tidewater goby (see Table BIO-4 above).

COHO SALMON

Juvenile coho salmon could be harmed during in-stream channel activities, especially when sections of the channel are dewatered or during channel excavation. This impact would be avoided by implementation of Mitigation Measure BIO-1 and 2. Other life stages of coho salmon are not likely to occur between July 1 and October 15 in Martin Slough, so they would not be directly affected by in-stream channel activities. Increased turbidity and suspended sediments in Martin Slough may occur as a result of channel excavation after the coffer dams installed during construction are removed, or as a result of upland restoration activities such as riparian vegetation replanting. Increased turbidity and suspended sediments could cause mortality, illness, or injury of coho salmon due to re-suspended contaminants, clogging and abrasion of gill filaments, low-oxygen water, and interference with feeding due to poor visibility (LFR Levine-Fricke 2004). Sediment can also smother coho salmon eggs, which would affect future fish stocks (Hobbs 1937). However, the introduction of sediments is expected to be short-term and insignificant, and background levels are already high in Martin Slough. In the long-term, turbidity and suspended sediment is expected to be reduced due to upland restoration activities and establishment of a riparian buffer. The impact from increased turbidity and suspended sediments will be minimized by the implementation of Mitigation Measures WQ-1-5.

Juvenile coho could also be harmed by increased salinity in Pond E, which currently provides excellent freshwater rearing habitat. This impact would not occur until after all phases of the project are completed, at which time the tidegates would be operated to allow the designed tidal prism with maximum tidal elevations of 6 ft. Even under operation of the full build-out design muted tide, Pond E will likely exhibit low salinity due to increased freshwater input from seasonal rains and groundwater inflow during the main time of the year when juvenile coho salmon have been documented using Martin Slough (December to June). During the summer months, some juvenile coho salmon reside in Martin Slough, and it is expected that freshwater habitat in Ponds D, E, and F will be maintained in the upper layers as the water stratifies, as observed during fish sampling and water quality monitoring conducted between 2006 and 2016. Stratification causes a layering effect with the brackish water being heavier and occupying the bottom of the water column and fresh water being lighter and occupying the upper part of the water column. Pond E will provide low-salinity habitat during most of this period, even at full design operation of the MTR. Pond F is further upstream and it will have very low salinity or be primarily fresh water during the rainy season, with increasing salinity during low flow times of year but maintaining some freshwater habitat due to stratification. Pond G is expected to remain fresh throughout the year.

Pond D and the small freshwater pond connected to the Southeast Tributary (proposed for construction in 2017), can provide suitable replacement habitat for Pond E. Fish use and water quality will be monitored in all new and existing ponds (including Pond E) after phases 2-4 are implemented. If fish use and water quality in Pond D and the small freshwater pond are similar to Pond E, Phases 5 and 6 will be concurrently implemented during the following construction season on the City property (anticipated to take place in 2018). Phases 5 and 6 include the remaining channel enhancements on the City property and enhancements to Ponds E and G, as well as the creation of a new pond, Pond F. If water quality and fish use data from Pond D and the small freshwater pond suggest that Pond E is still the most desirable habitat for endangered coho, the remaining restoration actions on the City property will be conducted in two phases to allow Ponds F and G to provide replacement habitat before Pond E is enhanced. This would allow for another full season of monitoring the new features before any impacts occur to Pond E. This approach will avoid any significant impacts to juvenile coho from degradation of freshwater rearing habitat.

Construction activities, as well as some of the future management and maintenance activities could accidentally introduce contaminants (fuel oils, grease) to Martin Slough and downstream of the project area. These substances are known to be toxic to fish and prolonged exposure can cause morphological, behavioral, physiological, and biochemical abnormalities (Sindermann et al. 1982). The risk of this disturbance would be highest during in-stream channel construction activities; the effect

would be deleterious to coho salmon or their prey. However, these effects would be avoided or minimized through implementation of Mitigation Measure HM- 1 (Hazardous Materials Plan, BMPs.)

Over the long term, restoration of the muted tidal prism will increase the availability of transition (salt/freshwater) habitat. This will increase the amount and quality of overwintering and rearing habitat for juvenile coho salmon, which grow larger in estuaries than farther upstream (Wallace and Allen 2009). In addition, excavation of additional ponds and widening of the lower channel will improve fish passage and increase aquatic habitat for coho salmon. The restoration of a riparian buffer will reduce water temperatures and increase protective cover and food sources for coho salmon. Turbidity and suspended sediment is expected to be reduced due to the new buffer zone, which may ultimately improve water quality and habitat for coho salmon.

SPOTTED OWL

Noise from project construction could result in short-term disturbance to spotted owls that occur to the south and southeast of the project area. The following impact analysis follows the methods of USFWS (2006). Because of the presence of a paved roadway with occasionally heavy and fast-moving traffic bisecting the project site, the background noise level is considered moderate. Project construction noise would be in the "high" range (backhoe, trucks, etc.) with the possibility of occasional brief instances of very high levels. At these levels, sound would reach the threshold of take at distances of up to 330 feet during worst-case scenario very high noise events, or 165 feet at more typical high noise levels. Because the nearest documented spotted owl territory is more than 4,000 feet away, there will be no significant effects related to noise.

The same report gives visual disturbance (direct line of sight) distances for spotted owls as 131 feet. Thus no significant visual effects are anticipated. Because construction will be limited to the June 15 to November 30 period and will occur during normal daytime working hours, the potential for construction related impacts will be further reduced.

BREEDING OR NESTING MIGRATORY AND SPECIAL STATUS BIRDS

Grassland and riparian forest and scrub in the project area may support nesting by state bird species of special concern, as well as numerous species protected under the Migratory Bird Treaty Act. Construction could result in short-term disturbance of breeding or nesting migratory and/or special status birds. Short-term disturbance of breeding or nesting migratory and/or special-status birds would be avoided or minimized by implementing Mitigation Measure BIO-5.

NORTHERN RED-LEGGED FROG

The project could adversely impact Northern red-legged frogs (RLFs). Short-term impacts to RLFs could occur through mortality related to construction activity, and long-term impacts could occur due to the loss of freshwater aquatic habitat and wetlands (portions of Martin Slough and the golf course ponds with appropriate salinity levels for larval development, seasonal wetlands, agricultural grasslands with wetlands characteristics, and riparian habitat) that serve as potential breeding, foraging, and dispersal habitat for this species. Seasonal wetlands and agricultural grasslands in the project area are unlikely to provide RLF breeding habitat except in exceptionally wet years, because RLF larval development can only occur in inundated conditions and requires 11-20 weeks. RLF normally uses perennial ponds or streams for breeding. RLF may breed in drainage ditches in the project area, and is likely to use the golf course ponds, Martin Slough, and its tributaries for breeding. Restoration of muted tidal influence in Martin Slough and adjacent wetlands would increase salinities and reduce the value of these areas for RLF breeding. RLF eggs die when exposed to salinities greater than 4.5 parts per thousand (ppt), and larvae die when exposed to salinities greater than 7 ppt (Jennings and Hayes 1998). However, much of Martin Slough and its tributaries would still be suitable RLF breeding habitat. During the rainy season, salinities will be lower than 4 ppt at the upstream end of Tidal marsh Complex C (Pond C) where the tributary enters. Pond E will have salinities of approximately 4 ppt, similar to the mainstem at its outfall location. Ponds F and G, located in the upper reaches of the Martin Slough Mainstem, are

expected to have salinities less than 1 ppt. RLF breeding and larval development occurs from January to June (DFW 2008). Therefore, portions of the channel and pond complex would provide viable RLF breeding habitat after project implementation. In addition, the project would create new breeding, foraging and dispersal habitat for RLF in over 1.2 acres of the expanded Martin Slough channel, ponds, and associated riparian forest and scrub that will remain fresh water.

Short-term impacts to RLF from construction and maintenance activities. Construction activities associated with Alternative 1 could result in the mortality of individual RLFs. This can occur in many ways, but the most likely mechanism is through frogs being crushed by construction equipment in aquatic habitats, or being excavated from burrows or other refugia in upland habitats during ground disturbing activities. Short-term impacts to RLFs would be minimized by the implementation of Mitigation Measure BIO-4.

Special Status Bats

Project implementation would lead to a loss of agricultural grassland areas that provide potential foraging habitat for bats. However, this impact is considered less than significant because agricultural grassland is regionally abundant, and because special status bats have only a moderate probability of occurrence in the project area (See Table BIO-2). Yuma myotis bats can utilize riparian areas and wetlands as foraging habitat, further reducing the impact of the loss of agricultural grasslands on this species.

Lyngbye's sedge

Project implementation will result in removal of Lyngbye's sedge growing adjacent to Martin Slough and Pond 17, although disturbance will be avoided to the extent feasible (Mitigation Measure BIO-5). However, the project will increase brackish marsh habitat for this species, and replanting and restoration efforts (Mitigation Measure BIO-6) are expected to increase the population over the long term.

Humboldt Bay Owl's Clover

Project implementation may result in temporary disturbance to the population of Humboldt Bay owl's clover adjacent to Swain Slough. Over the long term, the project will increase the brackish and salt marsh habitat available for this species. Impacts to owl's clover will be minimized by avoiding disturbance to the extent feasible (Mitigation Measure BIO-5), and, if necessary, by replanting and restoration efforts (Mitigation Measure BIO-6) that are expected to increase the population over the long term.

Special Status Plant Species

The project may result in impacts to other special status plant species in the project area. Botanical surveys will be conducted to confirm that other special status plants are not present in the project area. If special status plants are located, potential impacts will be avoided if possible, and minimized or mitigated if necessary by implementation of Mitigation Measure BIO- 5.

Adverse effects on riparian habitat or other sensitive natural communities

As described above, riparian habitat in the project area is patchy and poorly developed. The project will result in short term impacts to riparian habitat during channel and construction, but will restore 8.8 acres of diverse riparian forest and scrub along Martin Slough, its tributaries and associated ponds. The net effect of the project on riparian habitat will be beneficial. Effects on wetlands are discussed below.

Adverse effect on wetlands

The project will result in net increases in the extent and function of wetlands in the project area. However, it will also involve the conversion of some seasonal wetlands to other types of wetlands and waters (primarily tidal marsh, riparian forest and scrub, and open water; see Table BIO-5). The project will therefore result in impacts to Corps jurisdictional wetlands, and California Coastal Commission ESHA – wetlands. The project will involve removal of sediment deposits from wetlands and stream channels. Some of this sediment may be placed in mesic agricultural grasslands that are wetlands under the jurisdiction of the Corps or Coastal Commission in order to enhance agricultural productivity and eliminate depressions on the floodplain that hold water and become isolated pools as floodwaters recede, creating the potential for stranding of fish that sought refuge from high velocity floodwaters on the floodplain. However, fill in such wetlands will be limited to an amount that will not reduce wetland function or interfere with wetland hydrology. Sediment removed from the project area as part of the project may also be placed in wetlands in the White Slough Unit (WSU) of the Humboldt Bay National Wildlife Refuge (HBNWR) or other approved spoils disposal location. Placement of fill in the WSU will occur in conjunction with the breaching of dikes currently blocking tidal influence in this area, and will restore tidal marshes to the WSU. The land surface in the WSU has subsided since diking, and failure or breaching of dikes without fill placement would convert much of this area to subtidal habitat or mudflat.

Table BIO-5. Current and Projected Land Cover Types in the Project Area.

Land Cover	Current Area (ac)	Projected Area after Project Implementation (ac)
Aquatic	1.6	2.7
Riparian scrub/forest	0.5	9.3
Salt marsh	2.5	5.6
Freshwater/Brackish marsh	0.4	2.4
Agricultural grassland/seasonal wetland	43.0	35.6
Golf course grassland/seasonal wetland	73.0	65.4
Total	121.0	121.0

In the case of the proposed project, conversion of wetlands from one type (fresh wetland) to another (brackish wetland) is not considered to be an adverse impact because it would further the objective of restoring historic tidal marsh and the Martin Slough channel with the capacity to maintain high levels of biological function with minimal maintenance. Project design has minimized filling or excavation of wetlands, and the project is considered self-mitigating in light of the net increase in wetland area and function that it makes possible. Analysis of project impacts to wetlands is informed by state policy regarding coastal wetlands restoration, as enumerated by the California Coastal Commission (CCC) in *Procedural Guidance for Evaluating Wetland Mitigation Projects in California's Coastal Zone* (CCC 1995). In Chapter 8, Paragraph 2, the CCC states that wetland restorations that are not undertaken to satisfy mitigation requirements "should be guided by the desire to achieve functional equivalency with historic conditions or with reference wetlands." Paragraph 3 states that "wetland restoration is defined here as an activity that re-establishes the habitats and functions of a former wetland". This project will restore a greater degree of tidal function and salt marsh habitat. Paragraph 5 states that "there are other important distinctions between restoration projects completed for mitigation and restoration projects completed for other reasons. For example, there is no need to consider the various mitigation attributes. In particular it is not necessary to consider project location and mitigation ratios in designing

a restoration project, since habitat compensation is not an issue."

The 20 acres of riparian, wetland, and waters restored or enhanced through excavation, new and enhanced channel configurations, and the re-introduction of a muted tidal regime will fully compensate for the 15 acres of mesic grasslands and grazed wetlands impacted by the project. The wetland restoration will provide substantial qualitative enhancement of wetland habitats for the project area as a whole. The project will also remove soil material from other existing channels to deepen or enhance drainage and flood capacity, and increase tidal prism. The channels will not "drain" a wetland; they will become an extension of the Elk River/Martin Slough estuary wetland system. The enhanced channels and surrounding areas will be designed and managed to function as wetlands and riparian habitat with high levels of fish and wildlife habitat function. This will result in an increase in wetland habitat and functioning. Impacts to riparian forest and scrub, parts of which are also wetlands, are discussed further above.

Project implementation could result in short-term impacts to wetlands. Construction activities associated with restoration implementation would involve disturbance of wetlands and waters through vegetation clearing activities, grading and installation of restoration features, dewatering activities, and construction and use of access/bypass roads and staging areas for construction equipment, materials, and fill. Vegetation clearing activities may occur in advance of other restoration actions, increasing the duration of the site disturbance.

Operation of heavy machinery in or adjacent to wetlands and waters could result in contamination of these habitats with hazardous materials. Hazardous materials associated with construction equipment would be present onsite for the duration of construction of any of the alternatives. Fuel, lubricants, coolants, and other fluids contained with operational equipment are considered hazardous to water resources if accidentally released to surface or ground waters due to poor equipment maintenance or an unforeseeable incident. If these materials are not managed appropriately, long-lasting impairment of water quality, including soils and groundwater, could result as some construction-related materials are highly mobile, persistent, and bioaccumulative in the environment. Potential impacts to water quality from hazardous materials would be avoided through implementation of Mitigation Measures HHM-1 (See Hazards and Hazardous Materials Section).

Ground disturbing activities in or adjacent to surface water bodies, such as channel excavation, would present an opportunity for sediment to migrate into the water body through accidental releases. Adverse effects could include increased turbidity and water temperature and reducing dissolved oxygen levels, all of which would potentially exceed water quality standards and impair beneficial uses. The sediments could also migrate and deposit to downstream areas, resulting in effects within a larger area. Ground disturbance activities for areas larger than 1 acre require compliance with the General Construction Permit, as described in Water Quality above. Potential impacts to water quality from sediment influx would be avoided through implementation of Mitigation Measures WQ 1-4.

Interfere with fish and wildlife movement

Project implementation will allow the operation of a fish friendly tidegate to optimize the ability of aquatic organisms, particularly salmonids, to move up Martin Slough. The tidegates were installed in an earlier phase of the project, but cannot currently be operated at full design to optimize fish passage, as that would lead to unacceptable channel scour. The 2' x 2' habitat door will be operated at an interim muted tide level to maintain brackish marsh plants (primarily Lyngbye's sedge) that became established along the lower approximately 3,000 feet of Martin Slough in the last several years before the od tide gates were replaced. The old tide gates were corroded and leaked enough salt water that brackish marsh vegetation became established on the channel margins from the tide gates to the property line between the City and NRLT (~ 3,000 feet of main channel and 1,500 feet in the meander). Movement of fish will be constrained during project construction, but the long term effect of the project will be an improvement in fish passage.

Movement of terrestrial wildlife will not be significantly affected by the project. Project implementation will include the installation of riparian fencing to protect riparian vegetation from livestock grazing. Riparian fencing will be wildlife friendly to minimize adverse effects on wildlife movement, while still protecting riparian vegetation from livestock. Wildlife-friendly fencing features will include 1) smooth top and bottom wires, 2) bottom wire will be at least ten inches off the ground, and 3) top wire will be no more than 40 inches high.

Conflict with local policies or ordinances protecting biological resources
None of the project alternatives would conflict with local policies or ordinances protecting biological resources. County regulations protect sensitive habitat such as coastal streams and riparian habitats from disturbance. Disturbance and alteration of these habitats is permitted by the County when it is carried out for fish and wildlife habitat restoration or improvement, or for flood control channel replacement with CDFW consultation (Humboldt Bay Area Plan Sections 3.30 and 30233).

Conflict with Habitat Conservation Plan, Natural Community Conservation Plan, or other approved habitat conservation plan. There are no approved habitat conservation plans in the project area. Therefore, none of the project alternatives would conflict with such a plan.

FINDINGS:
The project would result in potentially significant biological impacts discussed above, but these impacts would be reduced to a less than significant level by the implementation of Mitigation Measures BIO-1-6, HHM-1, and WQ 1-4 below.

MITIGATION MEASURES:

Mitigation Measure BIO-1. Seasonal limitations on in-channel work. In-channel construction and maintenance activities will be limited to the June 15 to October 31 dry season (and November 15 if there is no significant rain event). This will reduce the amount of sediment and contaminants entering Martin Slough as a result of project activities. In addition, few salmonids or other fish species would be expected to be present, as it is outside the main rearing period, which is December to June.

Mitigation Measure BIO-2. Fish relocation. Before any de-watering activities begin in any creeks or channels within the project area, fish screens will be installed at the upstream and downstream ends of the construction reach, and all native aquatic vertebrates and larger invertebrates will be relocated out of the construction area into a flowing channel segment by a qualified fisheries biologist holding appropriate permits. Coffer dams will be installed within the fish screens at the upstream and downstream ends of the construction area and pumps or gravity flow pipes will be used to convey water around the work site. A pump will be used to de-water the construction area. In deeper areas, water levels shall first be lowered to manageable levels using a screened pump to ensure no impacts to fish and other special status aquatic species. A qualified fisheries biologist or aquatic ecologist will then perform appropriate seining, dip netting, electrofishing, or other trapping procedures to a point at which the biologist is assured that all individuals within the construction area have been caught. These individuals will be kept in buckets equipped with battery operated aerators to ensure survival, and will be relocated to an appropriate flowing channel segment or other appropriate habitat as identified by NMFS, CDFW, and USFWS as soon as feasible to minimize the holding time for the fish. If fish mortalities occur, individuals will be collected and frozen for delivery to NMFS (for salmonids) or USFWS (for tidewater goby). Construction activities shall be prohibited from unnecessarily disturbing aquatic habitat. Introduced species, particularly Sacramento pikeminnow, shall be documented and euthanized if captured. Coffer dams will not be removed or tidegates opened until most sediment has settled, which will minimize water quality degradation from suspended sediment and turbidity in the estuary.

Mitigation Measure BIO-3. Protect nesting birds through seasonal limitations on removal of vegetation and exclusion zones around active nests. Removal of vegetation during initial project construction or vegetation maintenance will be conducted between August 15 - March 1, outside the nesting season for western yellow-billed cuckoos and other nesting birds. Vegetation removal may occur with hand methods in winter months (December 1-Februrary 28) to avoid instream and wetland impacts during non-nesting winter months. Nesting surveys will be conducted by a qualified biologist and will occur no more than one week prior to the initiation of site preparation. If surveys identify active nests belonging to western yellow-billed cuckoos, a 300-foot exclusion zone will be established around each nest in which no construction activities will occur until nesting is completed.

Construction activities will occur during the breeding and nesting season (March 1-August 15) only following pre-construction site-specific surveys by a qualified biologist. Nesting surveys shall be conducted no more than one week prior to the initiation of site preparation. If surveys identify active nests belonging to common migratory bird species, a 100-foot exclusion zone shall be established around each nest to minimize disturbance-related impacts on nesting birds. If surveys identify active nests belonging to special status birds, a no-activity zone shall be established around the nest. A no-activity zone for Raptors shall be established at 180-feet. The radius of the no-activity zone and the duration of the exclusion shall be determined in consultation with CDFW.

Mitigation Measure BIO-4. Minimize ground disturbance area. Grading limits will be clearly defined and identified on the construction plans. Project work areas currently vegetated with native plants will be protected unless they are in areas slated for excavation, fill, access roads or other essential items of work that involve ground disturbance. All native vegetation to be protected should be marked in the field to clearly demarcate all work areas from protected areas during construction. The contractor must demarcate these areas and these locations will be inspected/approved by the site inspector prior to any ground disturbance or vegetation removal in the project area.

Mitigation Measure BIO-5: Minimize, avoid, and compensate for impacts to sensitive plants
Mitigation for special status plant species is addressed collectively for all species, with modifications noted for individual species.

Significant impacts to special-status plant species present or likely to be present onsite shall be minimized, avoided, and contingently compensated by complying with the following:
Pre-construction surveys: Potential habitat for special-status plant species shall be surveyed in appropriate seasons for optimal species-specific detection prior to project excavation/dredging, fill, drainage, or flooding activities associated with project construction. Survey methods shall comply with CNPS/CDFW rare plant survey protocols, and shall be performed by qualified field botanists. Surveys shall be modified to include detection of juvenile (pre-flowering) colonies of perennial species when necessary. Any populations of special status plant species that are detected shall be mapped. Populations shall be flagged if avoidance is feasible and population is located adjacent to construction areas. The locations of any special status plant populations to be avoided shall be clearly identified in the contract documents (plans and specifications).
If special-status plant populations are detected where construction would have unavoidable impacts, a compensatory mitigation plan shall be prepared and implemented in coordination with USFWS or CDFW. Such plans may include salvage, propagation, on-site reintroduction in restored habitats, and monitoring.

If USFWS or CDFW require propagation or transplantation, scientifically sound genetic management guidelines and protocols for rare plants shall be applied to propagation and transplant plans, possibly including the following:

- maintain some reserve clonal stock of perennial special-status plant populations during the monitoring period to offset the risk of failure in establishing populations in the wild,
- set aside surplus reserve seed of annual special-status plants from impacted populations,

- conduct long-term monitoring to determine the fate of managed special-status plant populations.

No special-status plant species shall be introduced to the site beyond their known historic geographic range unless such introduction is recommended in a final recovery plan or conservation plan prepared and adopted by the USFWS or the CDFW, in formal consultation with the USFWS.

Mitigation Measure BIO-6. Replanting and expanding populations of Lyngbye's Sedge and Humboldt Bay owl's clover.

The impact will be reduced to less than significant by removing and storing plants at the start of channel excavation, and re-planting the sedge after excavation of ponds, tidal benches, and slough channels is complete. Root masses will be divided to generate propagules, which will be used to expand the area of Lyngbye's sedge over the existing condition.

Before construction begins, any Humboldt Bay owl's clover within the construction area will similarly be dug up, stored in nursery containers, watered regularly to ensure survival, and re-planted on the restored landscape. A plant salvage storage area will be identified at the project site for the safe storage and care of salvaged plants. This technique has been successfully used by RCAA at mitigation and enhancement sites around Humboldt Bay (PG&E Mitigation Project 2009-10, RCAA under contract to CH2MHill; Martin Slough Tide Gate Replacement 2014, and Wood Creek Enhancement Project 2009)

Mitigation Measure HHM-1. See Hazards and Hazardous Materials Section below.

Mitigation Measures WQ-1, 2, 3, and 4. See Hydrology and Water Quality Section below.

5. CULTURAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?		X		
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?		X		
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d) Disturb any human remains, including those interred outside of formal cemeteries?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would cause (a) physical changes in known or designated historical resources, or in their physical surroundings, in a manner that would impair their significance; (b) physical changes in archaeological sites that represent important or unique archaeological or historical information; (c) unique paleontological resource site or unique geologic feature; or (d) disturbance of human burial locations.

DISCUSSION:

Information for the cultural resources analysis below was taken partly from a cultural resources study of the Martin Slough Interceptor Project area commission by the City of Eureka (Roscoe and Van Kirk, 2002). Additional information was gleaned from the County of Humboldt's archeologic review (Roscoe & Associates, 2013) conducted for the Swain Slough Bridge on Pine Hill Road replacement project. The bridge replacement project area overlaps the lower 400 feet of the Martin Slough Enhancement Project area. The project area for the Martin Slough Interceptor includes all of the Martin Slough Enhancement Project Area except for the lower 800 feet of the channel; so there is approximately 400 feet of the project area that has not been recently subjected to archeologic review. The City, as part of their cultural resources assessment, consulted the Native American Heritage

Tradition who conducted a Sacred Lands File search, and they responded that no known archeologic sites exist in the project area. They recommended contacting local tribal historic preservation officers (THPOs). RCAA staff contacted local THPOs from the Wiyot Tribe, Rohnerville Rancheria, Blue Lake Rancheria, and Yurok Tribe.

The cultural resources study consisted of literature research; examining site records and project files at the North Coastal Information Center of the California Historical Resources Information System; an intensive, on-foot field survey of all areas of potential impact; interviews with local residents and Native American representatives; and evaluations of the significance of identified cultural properties. Results of this investigation are generally discussed below; owing to the confidentiality of this information, the report itself is not included in the EIR, but may be available for review by qualified persons at City Hall, 531 K St, in Eureka.

"Cultural resources" in a CEQA setting includes historical, archaeological, and paleontological1 materials located within the appropriate contexts. In a general sense, the cultural resources setting for the project includes two phases: a prehistoric phase beginning at least 3,000 years ago, and an historic phase that began in the middle of the nineteenth century during EuroAmerican settlement of the region.

The prehistoric phase includes the use of the Humboldt Bay region, during approximately the last 2,000 years by a people collectively known as the Wiyot, a Native American group that lived in the region generally bounded by the McKinleyville terrace on the north and the Eel River delta on the south. Wiyot activity locations tended to be associated with or concentrated near the edges of tidewater and freshwater wetlands, including the historical shoreline of Humboldt Bay and near the mouths of large streams and the Mad and Eel Rivers.

Historical resources in the region are generally EuroAmerican artifacts that date from the mid-19th century until approximately 50 years ago. The Humboldt Bay area retains a relatively good representation of settlement-period buildings, still located in the relative context in which they were built. The Elk River area was among the earliest EuroAmerican settlement areas in the region. Two of the early settlers living in the area in the 1850s and 1860s were John C. Martin and Albert Swain, whose names continue to be associated with the two sloughs in the project area. Part of the early history of the area was a household that included a family named "Myer." In 1894, their land was subdivided into the Myers Tract in the vicinity of Herrick Road and what is now Pine Hill Road west of Meyers Ave, including a 50 acre bottomland ranch. This ranch was acquired in 1907 by the Lorensen Family, Danish immigrants who operated a dairy farm on the property for two generations.

No significant prehistoric cultural resources were identified by the project-specific cultural resources investigation within the project's potential areas of direct impact. None of the known and recorded archaeological properties within the regional context would be affected by construction of the project. As part of this project, Jamie Roscoe & Associates have completed a Cultural Resources Investigation, and again the representatives of tribes affiliated with the project area were consulted. According to Janet Eidsness and Dr. Tom Torma, THPOs, the study performed by Jamie Roscoe & Associates was satisfactory, and they concur with the Mr. Roscoe's negative findings for potential resources. They have stated that the project will not result in impacts to tribal cultural resource impacts. Although unlikely give the identification effort, the proposed project activities do have the potential to inadvertently uncover subsurface archaeological material. In the event that materials or remains are unearthed, the following pages offer recommendations that would ensure potential project impacts on the inadvertently discovered historical resources are eliminated or reduced to less than significant levels. The following mitigation measures are incorporated into all project phases:

1 No significant paleontological resources are known from the Humboldt Bay region, although the Pliocene-to-Pleistocene-aged Wildcat Formation contains abundant fossiliferous material that is not unique to this region. Paleontological resources have not been identified as a CEQA concern in the Humboldt Bay area and will not be discussed further in this document.

1) THPO participation or assistance in presentation at field crew meetings of what to watch for;
2) The application will notify the THPOs prior to initiation of work phases to allow an opportunity to spot check digging activities.
3) Inclusion of inadvertent archeological discovery protocol that will at a minimum require for the immediate stop of work, notification of THPOs, retention of a qualified archeologists with local knowledge, implementation of best practices for assessing the significance of the find. Additionally the protocol will include establishing an exclusion zone, treatment of remains, that inadvertent discoveries shall be considered confidential, and contacting the County Corner. In other words, if buried archaeological or historical resources are encountered during construction activities, the contractor on-site shall call all work in the immediate area to halt temporarily, and a qualified archaeologist is to be contacted to evaluate the materials. Prehistoric materials may include obsidian or chert flakes, tools, locally darkened midden soils, groundstone artifacts, dietary bone, and human burials. If human burial is found during construction, state law requires that the County Coroner be contacted immediately. If the remains are found to be those of a Native American, the California Native American Heritage Commission will then be contacted by the Coroner to determine appropriate treatment of the remains.

One property possessing potential historical cultural resource values was identified as being potentially affected by the proposed project: the Lorensen Ranch. The property was researched and documented in accordance with state requirements and professional standards. It was determined that the Lorensen Ranch meets the eligibility criteria for the California Register of Historical Resources. This property is located at the east end of Pine Hill Road at the intersection of Meyers Avenue and Pine Hill Road. As documented in records prepared for the California Department of Parks and Recreation as part of the Martin Slough Interceptor EIR investigation, this historical property consists of several intact structures: the original ranch house, a dairy barn, and a small garage-workshop. In addition, the site contains a remnant partial floor and pier-and-post foundation of an additional outbuilding, located in the draw on the south side of the terrace east of the house, opposite the existing barn. The Lorensen House and dairy barn were constructed in the first decade of the 20th century; the garage-workshop dates to the 1930s. The Lorensen House is situated on a hillside, overlooking the lower reaches of Martin Slough and Elk River. The setting and viewshed from the ranch has changed somewhat over time, although several remaining, intact elements of the setting continue to reflect the ranch's history. The house and the ranch are presently in separate ownership on two assessor's parcels.

Collectively, these ranch structures- the house, barn, the garage-workshop, and the remnant partial structure- have been determined to be eligible for the California Register as representative of early 20th century dairy ranching in the Humboldt Bay area. The determination is based on the structure's retained historical integrity of design, workmanship, materials, and setting.

Changes in the significance of historical resources. Activities that would damage or degrade the Lorensen Ranch historic property (including permanent, adverse changes in context or setting), therefore, would constitute adverse, significant effects. The project will not involve any disturbance in the area of the Lorensen Ranch house or garage-workshop, but some disturbance will take place in the vicinity of the barn. Implementation of Mitigation Measure CR-1 would reduce potential impacts to this property to a less than significant level.

Changes in the significance of archaeological resources. Inadvertent damage to currently unknown archaeological sites or materials encountered during construction, while not considered highly probable, could result in significant adverse effects to these resources. In prehistoric times, much of the project area would likely have been dense redwood forest and wetlands, ecological areas not considered to be particularly sensitive for archaeological resources (Roscoe and Van Kirk 2002). In addition, any archaeological sites that may have existed in the project area almost certainly have been affected by historical land uses, golf course and road construction, and seasonal water

fluctuations. Nevertheless, there is a slight chance that archaeological materials could be encountered. Potential impacts to archaeological sites or materials will be reduced to a less than significant level by implementation of Mitigation Measures CR-2.

Paleontological resources and Geological Features. The project area does not contain any significant paleontological resources or unique geological features. There will be no impact.

Disturbance of human remains. It is very unlikely that human remains will be disturbed due to project construction, because the project area consisted primarily of wetlands before development for agriculture. Nevertheless, there is a slight chance that human remains could be encountered. Potential impacts to human remains will be reduced to a less than significant level by implementation of Mitigation Measure CR-2.

FINDINGS:

The project could result in potentially significant historic and archeological resource impacts discussed above, but these impacts will be reduced to a less than significant level by the implementation of Mitigation Measures CR-1 and CR-2 below.

MITIGATION MEASURES:

Mitigation Measure CR-1. Project construction Shall Not Adversely Affect the Historic "Lorensen Ranch" Dairy Barn. Project construction activities in the vicinity of the Lorensen Ranch Dairy Barn, located adjacent to Martin Slough (APN#301-211-07) shall be conducted in such a manner as to avoid adverse effects on the existing dairy barn. If ground-disturbance is proposed in this location, the contractor shall submit a proposed construction plan for project-related work in this area, demonstrating to the satisfaction of the County Planning and Building Department that the specific construction technique proposed by the contractor shall fully protect the barn from damage related to project construction. This measure shall be made a condition of approval for any required project permit, and shall be incorporated into design documents prepared by the Redwood Community Action Agency for the Project. The County Planning and Building Department shall be empowered to direct the contractor to temporarily suspend construction activities if culturally significant resources are detected and judged to be at risk, pending the development of necessary alterations to the construction process.

Mitigation Measures CR-2, CR-3, and CR-4. Project Construction Shall Not Adversely Affect Archeological Resources or Any Human Remains in the Event of Inadvertent Discovery of Archaeological Material or Human Remains.

The applicant will implement the following measures to reduce potential impacts to archaeological resources or human remains.

CR-2 During all construction phases and prior to initiating ground disturbance the applicant shall secure the participation or assistance of an affiliated Tribal Historic Preservation Officer (THPO) in the presentation at field crew meetings of what to watch for.

CR-3 During all construction phases and prior to initiating ground disturbance, the applicant will notify all affiliated THPOs prior to initiation of work to allow an opportunity to spot check digging activities.

CR-4 During all construction phases and for the life of the project, the applicant adhere to and implement the inadvertent archeological discovery protocol that at a minimum requires for the immediate stop of work, notification of THPOs, retention of a qualified archeologists with local knowledge, implementation of best practices for assessing the significance of the find. Additionally the protocol will include establishing an exclusion zone, treatment of remains, that inadvertent discoveries shall be considered confidential, and contacting the County Corner. In other words, if buried archaeological or historical resources are encountered during construction activities, the contractor on-site shall call all work in the immediate area to halt temporarily, and a qualified archaeologist is to be contacted to evaluate the materials. Prehistoric materials may include obsidian or chert flakes, tools, locally darkened midden soils, groundstone artifacts, dietary bone, and human burials. If human burial is found during

construction, state law requires that the County Coroner be contacted immediately. If the remains are found to be those of a Native American, the California Native American Heritage Commission will then be contacted by the Coroner to determine appropriate treatment of the remains.

This measure shall be made a condition of approval for any required project permit, and shall be incorporated into design documents prepared by the Redwood Community Action Agency for the Project. The County Planning and Building Department shall be empowered to direct the contractor to temporarily suspend construction activities if culturally significant resources are detected and judged to be at risk, pending the development of necessary alterations to the construction process.

6. GEOLOGY AND SOILS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?			X	
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?		X		
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			X	
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers project-related effects that could involve or result from: (a) damage to project elements as a direct result of fault movement along a fault identified in the Alquist-Priolo study or other known fault; (b) damage to project elements as a direct or indirect effect of seismically derived ground movement; (c) damage to project elements because of landslides that are not seismically related; (d) project-derived erosion by water or wind of more than a minimal volume of earth materials; (e) project-derived or project-caused secondary instability of earth materials that could subsequently fail, damaging project elements or other sites or structures; (f) location of project elements on expansive soils that are identified by professional geologists, which could result in damage to project elements or other sites or structures.

DISCUSSION:

Exposure of people or structures to potential adverse effects from earthquake fault rupture, strong seismic ground shaking, seismic related ground shaking, including liquefaction, or landslides.

The project will not create additional exposure to people from strong seismic ground shaking, including liquefaction. The project area is diked former tidelands that could become unstable during saturated soil conditions and a ground-shaking event. The proposed bridges and the tide gate will be designed

and built to withstand strong seismic shaking. Based on the geotechnical report a Site Class E has been designated for the project and the appropriate Seismic Design Criteria have been determined. However, the project will not result in an increase in the number of people in the project area. The pasture area at the downstream end of the project will remain private and the public will not be exposed to any hazards as a result of the project there. The golf course is a public facility that is currently used by the public. The exposure and potential hazard to the public will not be increased by the project and the improved drainage the project will create will reduce duration of soil saturation so the potential hazard from soil liquefaction during ground shaking will be reduced.

Existing culverts and bridges within the project area will be replaced with longer spans to accommodate a wider channel and those structures will be in the zone that could be saturated and could liquefy during a seismic event. Two of the bridges are on private property and up to 8 new bridges will be installed on the golf course to replace the existing bridges. For bridges less than 30ft in length shallow, reinforced concrete abutments and ramp fills that will allow for some settlement will be installed. A stabilization mat to distribute the load of the bridge footing will be used on bridges 30 feet and longer and will compensate for expected settling and the possibility of liquefaction. Geotechnical studies have been conducted by SHN Consulting Engineers and Geologists (Eureka). The recommendations that have been made for the bridge footings were incorporated in the project designs by GHD professional engineers, based on the geotechnical report.

Substantial soil erosion or loss of topsoil. Ground disturbance associated with project construction could result in temporary erosion and loss of topsoil. Temporary erosion could also occur due to export of cut soil (spoils) and placement of that soil in an offsite location. Using the recommendations from the geotechnical report, temporary cut slopes in the soil that are higher than four feet, or where groundwater seepage is present, will be limited to a 1.5H:1V cuts to prevent erosion. Approximately 65,000 cy of soil may be exported during project construction. Temporary roads may be constructed using a mat system of interlocking composite road mats placed on a bed of reinforced gravel to reinforce the ground under temporary haul roads. Alternatively, low ground pressure track trucks may be used to transport spoils from the excavation location to a temporary stockpile site from which larger (20 cubic yard capacity) haul trucks will be loaded. The temporary stockpile will be close to an existing street access point so the distance over the pasture traveled by road-legal haul trucks will be minimized. The temporary road from the stockpile site to the existing public road (Pine Hill Road) will be reinforced as described in the construction plans. These roads will be carefully laid out to maintain a functioning access system and to minimize soil disturbance. Soil will be hauled to an approved spoils disposal location. It is likely that most of this soil (~55,000 cy- see Table 1. Cut & Fill Volumes by Project phase & Location, p. 11 of this document) will be placed in the White Slough Unit of the Humboldt Bay National Wildlife Refuge to restore subsided diked former tidelands to elevations that will allow for salt marsh restoration. Repairing the Swain Slough berm, filling the old channel in areas where the slough channel will be realigned to create sinuosity, and filling low spots to create positive drainage and eliminate shallow depressions that present fish stranding opportunities will use approximately 10,000 cy of excavated soil. All soil areas disturbed during construction, including areas such as the White Slough Unit where excess soil would be placed, will be treated with adequate erosion control BMPs and revegetated to further ensure long-term stabilization pursuant to the Stormwater Pollution Prevention Plan that will be prepared in compliance with Mitigation WQ-1. Additional mitigations that will address protecting water quality from project actions are provided in the Hydrology and Water Quality section and include Mitigations WQ-2-5. Apart from the repaired levee, the low profile configuration and methods of fill placement (including compaction) would not expose placed soil to significant levels of disturbance. Long term erosion will be reduced by project implementation due to reduced flooding and restoration of riparian vegetation and wetlands. Therefore, this impact will be less than significant.

Location on unstable soil. The project area is diked former tidelands that could become unstable during saturated soil conditions and a ground shaking event. As discussed above, the project would not result in exposure of increased numbers of people to unstable soil conditions and new structures

have been engineered to minimize the risk from liquefaction. As discussed above, the project will reduce the risk of liquefaction by improving drainage.
Location on expansive soil. The project is not located on an expansive soil. There will be no impact.
Location on soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. The project will not result in the need for wastewater disposal or construction of a wastewater disposal system. There will be no impact.

FINDINGS: The project will result in potentially significant impacts to Geology and Soils discussed above, but these impacts will be reduced to a less than significant level by the implementation of Mitigation Measures WQ-1-5 (See Water Quality Section below.)

MITIGATION:
Mitigation Measures WQ-1-5. See Hydrology and Water Quality Section below.

7. **GREEN HOUSE GAS EMISSIONS**. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?			X	

THRESHOLDS OF SIGNIFICANCE: This initial study considers to what degree the project would contribute to greenhouse gas emissions and global warming. In addition, the project's vulnerability to sea level rise is discussed.

DISCUSSION:
Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment

Short-term construction related GHG emissions were calculated for the project using the California Emissions Estimator Model (CalEEMod) Version 2013.2.2 (Caleemod.com). Construction equipment types and numbers specified in the CalEEMod modeling effort are based on the applicant's guidance and the consultant's experience. Construction emissions estimated for the proposed project were modeled over the course of two 120-day construction seasons. Long-term maintenance of the project will result in some GHG emissions, but these are not expected to be significant. As addressed herein, the primary GHG contributions from the project are short term and temporary, resulting from construction.

The project would contribute to GHG primarily through the use of diesel-powered construction equipment. There will be no net long-term emissions (permanent sources) of GHG from the project. The combustion of diesel fuel in off-road construction equipment and on-road vehicles (trucks, etc.) will emit greenhouse gases consisting mainly of carbon dioxide (CO_2), along with small amounts of methane (CH_4) and nitrous oxide (N_2O).
The emissions-based carbon footprint for the construction of the project was estimated using:

- estimated construction equipment needed, their fuel consumption, and total hours of operation;
- estimated number of days for construction;
- estimated volumes of imported fill and on-site grading and cut-and-fill.

Using this methodology, the estimate for construction-related emissions for the project is 1,614.7 tons of CO_2-equivalent. Methods used for this estimate can be found in Appendix 1. The 7.98 acres of salt and brackish marsh and the 9.7 acres of riparian scrub restored by the project will sequester carbon at an overall higher rate than the pasture present currently. Given the estimated rates of carbon sequestration in tidal marshes (0.5-3.2 tons/ac/yr) (Crooks 2009) and riparian areas (~0.4 tons/ac/yr) (Brown et al. 2004), marshes and riparian scrub restored by project implementation would take between 55 and 205 years to sequester project emissions. Nevertheless, carbon sequestration in habitats restored by the project will slightly reduce the impacts from the project due to construction-related greenhouse gas emissions. Because the construction-related emissions will be temporary, that the project does not include the development that result in long-term mobile or stationary sources of emissions, the long-term impact of project GHG emissions is considered less than significant and no mitigation is required.

Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases

For the purposes of this analysis, the proposed project was evaluated against Humboldt County Draft Climate Action Plan (2012) which sets a goal of reducing long term annual GHG emissions of the unincorporated County by 31,658 tons. This reduction would meet the goal of Assembly Bill 32 of reducing GHG emissions to 1990 levels by 2025. The County Plan seeks to achieve this reduction primarily by reducing vehicle miles traveled through more compact, higher density urban development. As discussed above, Project implementation is expected to result in a short term increase in GHG emissions during construction, with a small long term net increase in carbon storage. Short-term construction related emissions for Project implementation will not interfere with the County's plan to achieve reductions in GHG emissions by reducing vehicle miles traveled through more compact land use patterns as it does not entail residential or commercial development that may increase the number of vehicle trips. Therefore, the Project will not conflict with any plans, policies or regulations aimed at reducing GHG emissions. Short-term GHG emissions will be minimized by implementing Because the construction-related emissions will be temporary, that the project does not include the development that result in long-term mobile or stationary sources of emissions, the long-term impact of project GHG emissions is considered less than significant and no mitigation is required.

Vulnerability to sea level rise

Like all coastal wetlands, the project area, including restored wetlands and riparian habitat, will be threatened by sea level rise with eventual conversion to mudflats and subtidal habitat. However, the maintenance of berms along Swain Slough and the tidegates installed in 2014 will allow for regulation of tidal influence to maintain habitat in the project area until these structures are overtopped, significantly prolonging the lifespan of project area habitats.

FINDINGS:
Less than significant impact.

MITIGATION MEASURES:
No mitigation is required.

8. **HAZARDS AND HAZARDOUS MATERIALS**. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				X
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d) Be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized area or where residences are intermixed with wildlands?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would involve: (a) potential storage or use, on a regular basis, of chemicals that could be hazardous if released into the environment; (b) operating conditions that would be likely to result in the generation and release of hazardous materials; (c) use of hazardous materials, because of construction-related activities or operations, within a quarter-mile of an existing or proposed school; (d) project-related increase in use intensity by people within the boundaries of, or within two miles of, the Airport Planning Areas; (e) project-derived physical changes that would interfere with emergency responses or evacuations; (f) potential major damage because of wildfire.

DISCUSSION:

A Phase I Environmental Site Assessment of the NRLT property was conducted in 2011. This study did not identify any conditions indicating the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. This report indicates that ground disturbance on this property is unlikely to result in the release of hazardous materials.

Mosquitoes are a health hazard in the project area; they are both pests and vectors of disease-causing microorganisms, such as West Nile Virus (WNV), to humans and animals. Several species have the potential to breed and to reproduce as a result of the construction and operation of project components (e.g., ponds and wetlands).

In Humboldt County, *Culex tarsalis* mosquitoes transmit WNV, but are not the most abundant mosquito species found around the county. The virus responsible for WNV entered California from the eastern U.S. in 2003 and was first reported in Humboldt County in 2004. WNV is found locally in corvids (crows and ravens) and raptors such as hawks and owls. To date, no human cases of WNV have been reported in Humboldt County. In 2003 the county began implementing the Humboldt County West Nile Virus Monitoring and Response Plan, which was most recently updated in 2007. This program involved public education, media outreach, breeding source abatement, disease surveillance, and identification of mosquito species. Currently the County is not an abatement district, but is set up to become one if voted on by the County Supervisors.

The California Department of Public Health released Best Management Practices (BMPs) for mosquito control on California State properties. The USFWS's Draft Mosquito Abatement Policy and Humboldt County's Mosquito Abatement Policy have similar methods and approach this issue in similar ways. The key to maintaining seasonal and estuarine wetlands with a minimum of mosquito production is to avoid conditions where pockets of water become isolated. If wetlands are connected to larger water bodies then most mosquito larvae are consumed by predators. Mosquitoes are a natural component of wetland ecosystems, and both adult and larval forms are a food source for birds, mammals, fish, and other invertebrates.

Marsh habitat features that are inherently likely to constrain mosquito production are associated with strong daily tidal fluctuation and currents, exposure to surface turbulence (wind waves, currents) of open water surfaces, and exposure to fish predators that are widespread in tidal sloughs.
Generally, deep (over 2 ft) open water areas are likely to be unproductive of mosquitoes. Low intertidal marshes (marshes with bed elevations near Mean Low Water) with full tidal range are also unlikely to produce mosquitoes. Marsh types or options that have variably higher risk of mosquito production would include: (a) interior areas of mid-intertidal or high intertidal marsh, remote from tidal channels; (b) zones of wrack (tidal debris) accumulation within the marsh plain or marsh edge, particularly at downwind end (corners) marshes or near topographic high areas; (c) channel reaches that develop obstructed circulation (e.g., blockage by debris jams); (d) marsh areas that are exposed to flood deposits of sediment leaving variable topography, drainage, and debris; (e) any constructed seasonal wetlands or isolated ponds.

In the proposed Martin Slough wetlands, some mosquito production could occur along gently sloped margins of tidal marsh (essential to restoration of native species diversity in restored tidal marsh). Generally, tidal circulation and predation will limit mosquito production, because restored marshes will be connected to tidal channels and the project will improve passage for fish that prey on mosquitos. The project will reduce flooding duration and improve drainage of ponded water on floodplains in much of the project area, thereby reducing mosquito production in these areas. Health impacts from increased mosquito production are less than significant.

Routine transport, use, or disposal of hazardous materials. The project will not involve the long-term routine transport, use, or disposal of hazardous materials. Short-term use of fuels and hydraulic fluids are discussed below. There would be no impact.

Upset and accident conditions involving the release of hazardous materials into the environment. During project construction, heavy equipment will operate within the stream corridor and while the equipment is operating, there is the possibility that a hydraulic or fuel line could leak, creating a hazard to the environment. Prior to delivering heavy equipment, it will be steam cleaned to remove oil and grease from the exterior of the equipment. All fittings and hoses will be inspected to assure that they are tight fitting, in good condition, and have no leaks. To mitigate for the possibility of a leak contaminating the stream or ground outside of the stream, a Hazardous Materials Spill Prevention Control and Countermeasure Plan (HMSPCCP) will be prepared (See Mitigation HHM-1).

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared (see Mitigation Measure WQ-1) and a Notice of Intent will be filed with the North Coast Regional Water Quality Control Board prior to initiation of project implementation. A copy of the SWPPP will be provided to the contractor selected to implement the project and a certified SWPPP inspector will be appointed to ensure compliance with the SWPPP by the contractor. Regular inspections will be made by the SWPPP inspector to ensure compliance with the SWPPP. Non-compliance with SWPPP measures will result in suspension of operations until the non-compliance issue is resolved to the satisfaction of the SWPPP inspector. In addition, weekly safety meetings will be held with equipment operators and construction laborers to review procedures for working safely and to review procedures for what to do in case of an accidental spill of fuel, oil, or hydraulic fluid. The spill prevention plan requires that all fueling and servicing of the equipment be conducted away from streamside management areas. An oil spill response kit will be kept with the equipment at all times. This kit will be the equivalent of the CDF standard materials kit sold by RSSE Corp. of Redding. The kit is capable of containing a spill of 130 gallons. In addition, a minimum of 2 buckets with tight fitting lids and a capacity of 5 gallons each will be kept in the proximity of the equipment when it is operating to catch any leaks that may develop. To prevent the spread of fuel, oil, or hydraulic fluid in case a leak develops while the excavator boom is over the water, a floating absorbent boom designed for containing oil spills will be kept on hand and in case of a spill will be deployed across the stream channel no more than 100 feet downstream of the excavator location. Operators will be instructed to move their equipment away from streams or wetland areas, set their buckets on the ground, and turn off the engines any time a leak is detected to minimize the release of oil, fuel , or hydraulic fluid. Operators will be instructed to capture leaks into buckets and deploy the emergency spill kit as needed if there is an accidental spill.

Hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. The closest schools to the project area are the Pine Hill Elementary School, located approximately 0.4 miles away, and the Play and Learn Preschool, located at 4865 Hidden Meadows Lane, approximately 0.2 miles from the project area. The project will not result in hazardous emissions or the handling of hazardous or acutely hazardous materials. No significant effects from potential spills or leaks of hydraulic fluid or fuel on the school are anticipated, and the likelihood of such spills or leaks will be reduced by the implementation of Mitigation HHM-1. The impact would be less than significant.

Located on a site which is included on a list of hazardous materials sites. The Phase I ESA for the NRLT Property indicated that the project area is not located on a site which is included on a list of hazardous materials sites. There will be no impact.

Airport- or airstrip-related safety hazard. The site is not within an airport land use plan or within two miles of a public airport or public use airport or in the vicinity of an airstrip. There will be no impact.

Interference with an adopted emergency response plan or emergency evacuation plan. The project is located within a tsunami evacuation area, immediately adjacent to a tsunami safe area. The project will not interfere with emergency response or evacuation, as no significant increase in public use of the area is expected, nor will any changes that could affect traffic flow for tsunami evacuation occur. The project involves the repair of the Swain Slough levee, which will decrease the risk from tsunamis compared to existing conditions. There will be no impact.

Exposure to wildland fires. The project involves wetland and slough restoration, which will not increase exposure to wildland fires. There will be no impact.

FINDINGS:

Less than significant impacts with mitigation.

MITIGATION MEASURES:

Mitigation Measure HHM-1: Emergency Spill Cleanup kits and Hazardous Materials Spill Prevention Control and Countermeasure Plan. Contractors and equipment operators on site during treatment activities will be required to have emergency spill cleanup kits immediately accessible. If fuel storage containers are utilized exceeding a single tank capacity of 660 gallons or cumulative storage greater than 1,320 gallons, a Hazardous Materials Spill Prevention Control and Countermeasure Plan (HMSPCCP) will be required and approved by the NCRWQCD. The HMSPCCP regulations are not applicable for chemicals other than petroleum products; therefore, the contractor shall prepare a spill prevention and response plan for the specific chemicals utilized during treatment activities. This mitigation is intended to be carried-out in conjunction with Mitigation WQ-1.

9. HYDROLOGY AND WATER QUALITY. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?		X		
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?			X	
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?		X		
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?			X	
i) Expose people or structures to a significant risk or loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j) Result in inundation by seiche, tsunami, or mudflow?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would involve: (a) improvements that would violate standards set for water quality and for discharge of waste water; (b) use of, or interference with ground water such that the amount of flow of groundwater is adversely impacted; (c) drainage improvements that would alter or cause an increase in amount or flow of drainage, or that would affect the free-flow of a stream or river or cause an increase in silt runoff as to cause adverse impact; (d) added runoff from the site that would exceed the capacity of drainage facilities; (e) the creation of polluted runoff or other general adverse water quality impacts; (f) the placement of housing or other structures within the 100-year flood plain, or other area subject

to flooding; (g) development in such a manner or location that it would be adversely affected by seiche, tsunami, or mudflow.

DISCUSSION:

Violation of water quality standards or waste discharge requirements: The project will not result in any long-term violations of water quality standards or waste discharge requirements. The long term effect of the project will be to improve water quality, through the restoration of wetlands and the riparian corridor. Restored wetlands and riparian vegetation will filter sediment and nutrients from runoff and floodwaters, improving water quality in the long term. Cattle exclusion fencing will be installed to keep cattle out of wetlands and the slough channel. This will improve water quality over current conditions, which allow cattle free access to the channel and wetlands.

Impact: Short term violation of water quality standards. The project has the potential to violate water quality standards and waste discharge requirements in the short term due to erosion during construction. Water Quality certification from the North Coast Regional Water Quality Control Board (NCRWQCB) will be obtained prior to project construction. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and a Notice of Intent will be filed with the NCRWQCB. Best management practices will be employed to prevent negative impacts to water quality. During- and post-construction turbidity monitoring will be conducted to ensure turbidity is not increased. During- and post- construction erosion control measures will be identified in the SWPPP and implemented to protect water quality. This impact will be reduced to a less than significant level by implementation of Mitigation Measures WQ-1-5.

The Swain Slough berm will be repaired (filling low spots) with soil excavated to expand slough channels and create ponds. The improvement will include spot patching where the top of the existing levee is lower than the average levee top elevation of 9 feet. Soil will be compacted to engineered compaction standards and tested to ensure compliance. Appropriate re-vegetation (grasses, forbs, small shrubs) will be included to stabilize the slopes of the levee.

The majority of the project area is within the former tidally influenced slough channels connected to Humboldt Bay and it is possible that a tsunami wave could travel up Elk River to Swain Slough and possibly into Martin Slough. The berm improvement will minimize the risk to the project area and will decrease the risk compared to existing conditions.

Groundwater supplies and recharge. The project will not deplete groundwater supplies or reduce groundwater recharge. Restored wetlands and ponds will increase groundwater recharge.

Alteration of drainage and flow patterns that increases erosion. Drainage patterns will be altered by increasing channel width and excavating ponds but this will not increase erosion. The introduction of a muted tide cycle may cause some bank scour but the channels will be designed to accommodate the expected tidal prism and stream flow based on hydraulic modeling. Riparian and brackish marsh revegetation will stabilize banks and slow runoff post-construction. Up to 10 cubic yards of rock armor may be placed at the Fairway Drive Bridge and along Pine Hill Road to prevent streambank erosion that could affect the roadways. The impact would be less than significant.

Alteration of drainage and flow patterns that increases flooding. Drainage patterns will be altered by increasing channel width and excavating ponds. These actions will reduce the duration and frequency of flooding by increasing conveyance capacity and providing increased flood storage. The reduction in flooding frequency and duration is expected to be sustainable over the long term because the increased tidal prism will provide sediment transport capacity in Martin Slough, reducing the likelihood that the channel will aggrade over time. There will be no impact.

Create or contribute runoff. Over the long term, wetland and riparian restoration and the creation of ponds will decrease runoff and improve water quality. In the short term, construction activities could result in polluted runoff. This potential impact will be reduced to a less than significant level by implementation of Mitigation Measure WQ-1-3.

Water quality degradation. As discussed above, under "Violation of water quality standards or waste discharge requirements," the project will result in long term improvements to water quality, but could have short term adverse effects on water quality during construction. The potential short term impact of the project on water quality will be mitigated to a less than significant level by implementation of Mitigation Measures WQ-1-3.

Housing within a 100-year flood hazard area. The project does not involve the placement of housing. There will be no impact.

Structures within a 100-year flood hazard area which would impede or redirect flood flows. The project does involve the placement of new, wider bridges across Martin Slough. However, the new bridges will be longer than old bridges and the new channel will be wider than the old channel. The overall effect of the project will be to reduce flooding by improving drainage, floodwater storage, and floodwater conveyance capacity. The impact will be less than significant.

Exposure of people or structures to flooding. The project will not increase the number of people in the project area. As discussed above, the project will involve placement of new or replacement bridges across Martin Slough, but the overall effect of the project will be to reduce flooding risk.

Inundation by seiche, tsunami, or mudflow. The project is located within a tsunami inundation area. However, the project will reduce the risk of damage from a tsunami by repairing the Swain Slough levee, and will not increase the number of people at risk from a tsunami due to their use of the project area. There will be no impact.

FINDINGS:

Less than significant impacts with mitigation.

MITIGATION MEASURES:

Mitigation Measure WQ-1: Storm Water Pollution Prevention Plan.

Prior to Project construction, a Storm Water Pollution Prevention Plan (SWPPP) will be developed by a certified SWPPP developer and approved by the North Coast RWQCB and implemented during construction. As part of the SWPPP, Best Management Practices (BMPs) for controlling soil erosion and the discharge of construction-related contaminants will be developed and monitored for successful implementation. Individual SWPPPs may be prepared for various construction components or phases (e.g., demolition of existing site structures, grading of one parcel, dredging channels, etc.). BMPs that will be implemented as part of the SWPPP will 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, silt fences, 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, silt fences, 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. If necessary, a sump pond will be excavated to receive sediment laden water to prevent it from discharging into the stream channel. The muted tide regulators will be taken out of service during construction so that there will be no incoming tide water. This will prevent the entrainment of sediment by the tidal prism.

- Appropriate energy dissipation devices will be utilized to reduce or prevent erosion at discharge end of dewatering activity.

- Turbidity and pH monitoring will be conducted in Martin Slough throughout the site stabilization period to ensure that water quality is not being degraded. Turbid water will be contained and prevented from being transported in amounts that are deleterious to fish, or in amounts that could violate state pollution laws. Silt fences or water diversion structures will be used to contain sediment. If sediment is not being contained adequately, as determined by visual observation, the activity will cease until corrective measures are taken to remedy the situation.

- 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.

- Contractors will be required to provide portable toilets for their crews. Portable toilets will be located away from the stream channel and ponds.

- 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 SWPP plans.

Mitigation Measure WQ-2. Implement contractor training for protection of water quality. All contractors that would be performing demolition, construction, grading, or other work that could cause increased water pollution conditions at the site (e.g., dispersal of soils) will receive training regarding the environmental sensitivity of the site and need to minimize impacts. Contractors also will be trained in implementation of stormwater BMPs for protection of water quality.

Mitigation Measure WQ-3. Minimize potential pollution caused by inundation.

Sites will not be inundated (connected to tidal water or upstream freshwater sources) until surface soil conditions have been stabilized, all construction debris removed, and all surface soils have been removed from the site.

Mitigation Measure WQ-4. Instream erosion and water quality control measures during channel excavation. In instances where excavation and/or dredging occurs in an effort to widen/deepen the existing channel, in-stream erosion and turbidity control measures will be implemented. These measures include installation and maintenance of in-stream turbidity curtains and silt-fences along channel banks as specified in project designs, specifications, and erosion control plans; and use of coffer dams and stream bypass pumping around active construction areas.

Mitigation Measure WQ-5. Implement Dewatering and Diversions Restrictions

Ponded storm or groundwater in construction areas will not be dewatered by project contractors directly into adjacent surface waters or to areas where they may flow to surface waters unless authorized by a permit from the North Coast RWQCB. In the absence of a discharge permit, ponded water (or other water removed for construction purposes), will be pumped into sediment basins, baker tanks, or other receptacles, characterized by water quality analysis, and remediated (e.g., filtered) and/or disposed of appropriately based on results of analysis. If determined to be of suitable quality, some of this water may be used on-site for dust control purposes. The Contractor will be required to submit for review and approval by the Construction Manager Dewatering and Creek Diversion Plan that shall include the proposed dewatering and diversion techniques and schedule of operations.

10. LAND USE AND PLANNING. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community or conflict with existing land uses?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			X	
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would (a) divide an established community or conflict with existing land uses within the project's vicinity, such as agriculture resources; (b) conflict with the Eureka General/Coastal Plans designation, policies, and zoning ordinances regarding commercial, public, and quasi-public facilities; (c) conflict with applicable environmental plans and protection measures enforced by regulatory agencies that have jurisdiction over the project, such as habitat conservation plans or a natural community conservation plan.

DISCUSSION:

The downstream portion of the project area is located in unincorporated Humboldt County and is zoned Agricultural Exclusive (20 acre minimum). The upstream portion, located on the Eureka Golf Course, is located within the City of Eureka and is zoned Public Recreation. In addition, a portion of the project area is within the Coastal Zone. The coastal zone within the project area is divided between the jurisdiction of the California Coastal Commission, Humboldt County, and the City of Eureka. The Coastal Commission's jurisdiction in the project area is over the riparian corridors of Swain Slough and Martin Slough.

City of Eureka Land Use Policy

Land use planning for the portion of the project area that is within the City of Eureka is governed by the City's General Plan, which includes three components: the General Plan Policy Document (as amended, 2008), the General Plan Background Report (1994), and the 1997 Environmental Impact Report. The city's General Plan, in its current form, addresses the requirements of both the state General Plan Law and the California Coastal Act, combining the goals, policies, and programs of both directives into a single document. The Background Report indicates that, at lower elevations, the Martin Slough drainage is within the 100-year flood hazard area and recognizes that, because it receives storm water runoff from the southern Eureka terrace, the Martin Slough drainage is prone to flooding. This flooding is also related to tidal influences in the Elk River and the partial hydraulic damming at the outlet of Swain Slough. The Background Report designates the Martin Slough stream channel system and associated riparian areas as wetlands, and also identifies farmed wetlands at the downstream end of the project area. City planning policies support protection of environmentally sensitive areas, open space, agricultural lands, and other natural resources. Among the habitat areas within the Coastal Zone recognized by the City as sensitive are habitats associated with Martin Slough and Swain Slough, as well as grazed or farmed wetlands (i.e. diked former tidelands) (Policy 6.A.6). The City's zoning regulations specify the following permitted land uses relevant to the project for areas zoned "Public" or "Public Recreation": "13) public recreation facilities, including parks, playgrounds, zoos, and golf courses;...19) uses which are accessory and incidental to a permitted use." (City of Eureka Municipal Code § 10-5.29181).

County of Humboldt Land Use Policy

Land use planning for the unincorporated portion of the project area is governed by the County General Plan. The Humboldt County General Plan consists of a Framework Plan (Volume 1) (completed in 1994, but various sections date from the 1960s to the 1990s), which covers Countywide issues, and a number of other community plans (collectively Volume II), which deal in greater detail with land use issues within particular planning areas. One of these community plans is the Eureka Community Plan (1995). In addition, the County General Plan incorporates the six Local Coastal Plan (LCP) elements. In the project area, the Humboldt Bay Area Plan (HBAP) is the applicable LCP element. Humboldt County is in the process of updating its General Plan and LCPs.

Major policies in the County Framework Plan limit development in and protect sensitive habitats (Section 3431) and flood zones (Section 3291.1 and 3291.3). Sensitive habitats designated by the Framework Plan include streams and streamside areas, natural marshes, and wet meadows with persistent standing water or riparian vegetation. Standards in the Framework Plan require erosion control measures for construction within streamside areas, as well as disposal of any excess material from such construction outside of the streamside area. The Framework Plan permits development

within stream channels and streamside management areas for fishery, wildlife, and aquaculture enhancement and restoration projects. The Plan also permits development within streamside management areas for "road and bridge replacement or construction, when it can be demonstrated that it would not degrade fish and wildlife resources or water quality, and that vegetative clearing is kept to a minimum."

The HBAP LCP contains several policies relevant to the project. Agricultural lands in the HBAP are subject to policies (including those derived from policies in the California Coastal Act) that generally restrict uses that would impair the "economic viability" of agricultural operations, and requires a conditional use permit for any use of parcels zoned for agricultural that is not directly connected to agricultural production. The HBAP lists certain land uses that are compatible with agriculture, including management for fish and wildlife habitat (pg. 3-34). The HBAP limits diking, filling, or dredging of open coastal waters, wetlands, and estuaries to specific purposes, including restoration (pp. 3-38 and 39), and states that such activities must maintain or enhance the functional capacity of the wetlands or estuary.

Conflict with existing land uses. The project will not conflict with land uses in the golf course. Project implementation in this area would reduce the frequency and duration of flooding which currently interferes with use of the course. While habitat restoration is not an explicitly stated permitted use of areas zoned for public recreation, the project may be considered a flood control measure in the context of the golf course, and therefore an accessory use which is permitted under existing zoning. The project will not conflict with agricultural use of the portion of the project area zoned Agricultural Exclusive. While the project will entail conversion of approximately 7.3 acres of the area currently used for agricultural production to wetlands, riparian woodland, and slough channel, the 35.7 acres remaining in agricultural production is expected to be more productive due to decreased flooding. This tradeoff is discussed in greater detail in the "Agricultural Resources" section. Because of the increased productivity of the remaining agricultural lands and the small size of the area being converted from agricultural use, the conflict with agricultural use is less than significant.

Conflict with the Eureka or Humboldt County General/Coastal Plans designation, policies, and zoning ordinances. As discussed above, the project will not conflict with zoning ordinances in the golf course, because the project will result in improved flood control and can therefore be considered an accessory use. As noted above, the project constitutes a permitted conditional use of the portion of the project area zoned Agricultural Exclusive. A conditional use permit will therefore be required. A conditional use permit is also required under the provisions of the HBAP, which requires such a permit for any use of agricultural land in the coastal zone that is not directly connected with agricultural production and that could impair the economic viability of agriculture. The project will enhance the economic viability of agriculture in the vicinity by reducing the duration and frequency of flooding, although it will convert 8.68 acres from agricultural use to fish and wildlife habitat. Up to 3.73 acres of the 8.68 acres of riparian habitat may be seasonally grazed (during the summer, after plants have hardened) to control the growth of grass and competing vegetation. The permanent loss of agricultural land is 4.95 acres, which will be offset by the reduction of flooding on the pasture which is expected to increase available pasture grazing days from 5 to 20 days per year.

All appropriate regulatory approvals will be obtained prior to implementing construction activities. Approvals include the County of Humboldt (Conditional Use Permit and Coastal Development Permit for the project area within County jurisdiction), the Humboldt Bay Harbor and Recreation District, the California Department of Fish and Game (stream bed alteration agreement, CEQA referral, and Endangered Species Act consultation), the California Coastal Commission (Coastal Development Permit) the Army Corps of Engineers (Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act; including referrals to the National Marine Fisheries Service and US Fish and Wildlife Service), and the North Coast Regional Water Quality Control Board (Section 404 of the Clean Water Act).

Given that the project is a conditionally permitted use that will reduce flooding impacts to public recreation and agriculture, conflicts with zoning and regulations are less than significant.

Conflict with applicable environmental plans and protection measures enforced by regulatory agencies that have jurisdiction over the project, such as habitat conservation plans or a natural community conservation plan. There is no Habitat Conservation Plan or Natural Community Conservation Plan in place for the project area. The project will further the goals of multiple plans to protect and restore natural resources in the Region. For example, the project is consistent with the goals of the Coho Recovery strategy (CDFW 2004) and the Humboldt Bay Salmon and Steelhead Conservation Plan (HBWAC 2005). The project aims to improve fish passage, expand critical estuary habitat for coho salmon and other salmonids, and restore the riparian zone that is an important aspect of fish habitat. The application for the Army Corps permit will require a consultation with the US Fish and Wildlife Service and the National Marine Fisheries Service to review the project and assure that it is consistent with their policies to protect and restore habitat. There is no impact.

FINDINGS:
The project's Land Use and Planning impacts are less than significant. No mitigation is necessary.

MITIGATION MEASURES:
None.

11. MINERAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would interfere with the extraction of commodity materials or otherwise cause any short-term or long-term decrease in the availability of mineral resources that would otherwise be available for construction or other consumptive uses.

DISCUSSION:
No mineral resources are known in the project area.

FINDINGS:
No impact.

MITIGATION MEASURES:
None.

12. NOISE. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		

b)	Expose persons to or generate excessive ground borne vibration or ground borne noise levels?		X		
c)	Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d)	Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		X		
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f)	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers whether the proposed project would produce: (a) sound-pressure levels contrary to the City of Eureka noise standards; (b) long-term ground vibrations and low-frequency sound that would interfere with normal activities and which is not currently present in the project area; (c) a substantial increase in ambient short-term or long-term sound-pressure levels; (d) changes in noise levels that are related to operations, not construction-related, which will be perceived as increased ambient or background noise in the project area.

DISCUSSION:

Noise is generally defined as unwanted or annoying sound that is typically associated with human activity and which interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. Hearing loss requires that noise levels exceed thresholds generally not found in ambient environments. Hearing loss danger is generally associated with occupational exposures. The combination of high noise levels and chronic, persistent exposure pose the greatest risk. The response to environmental noise is mainly psychological. Some physiological effects from loss of sleep, irritation, or similar annoyance can be observed in people exposed to elevated environmental noise. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise, and its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual hearing the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually expressed as the logarithmic ratio of the square of the ambient sound pressure level compared to the pressure from the faintest sound detectable by a young person with good auditory acuity. The units of this ratio are called decibels (dB). Most of the sounds humans hear in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The intensities of each frequency add to generate the sound we hear. The method commonly used to quantify environmental sounds consists of determining all of the frequencies of a sound according to a weighting system that reflects that human hearing is less sensitive at low and extremely high frequencies than at the mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A weighted sound level (or dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve. Any further reference to decibels expressed at "dB" should be understood to be A weighted unless otherwise noted.

Although the A weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a combination of noise from distant sources that create a relatively steady background noise in which no particular source is identifiable. A single descriptor called the L_{eq} (equivalent sound level) is most commonly used for environmental noise. L_{eq} is the energy-mean sound level during a measured time interval. It is the 'equivalent' constant sound level that would have to be produced by a steady state source to equal the fluctuating level measured.

The project will take place within the jurisdictions of the City of Eureka and the County of Humboldt. Each jurisdiction has a set of noise standards against which the project can be assessed.

City of Eureka General Plan Noise Policies

The City's adopted 1997 Policy Document includes a standard (Policy 7.G.2 and Table 7-1, reproduced below) for non-transportation sources that daytime (7:00 AM to 10:00 PM) equivalent sound pressure levels (L_{eq}) sound levels shall not exceed 50 dB at the property line of adjacent parcels, with a maximum peak intensity not exceeding 70 dB; comparable nighttime standards are L_{eq} no greater than 45 dB and maximum not exceeding 65 dB. These policies apply for sensitive uses, including schools.

The non-transportation noise policies in the General Plan explicitly do not apply to residential land uses:

> "7.G.3 The City shall not subject existing dwellings and new single-family dwellings to the standards presented in Table 7-1. As a consequence, such dwellings may be constructed in areas where noise levels exceed those standards and it shall not be the responsibility of the City to ensure that such dwellings meet those standards or the noise standards imposed by the lending agencies such as HUD, FHA, and Cal Vet. If homes are located and constructed in accordance with the policies of this section, it is expected that the resulting exterior and interior noise levels will conform to the HUD/FHA/Cal Vet noise standards."

Nonetheless, non-transportation noise sources must comply with the identified policy, and this environmental document adopts the guidelines in the General Plan's Table 7-1 as a standard for identifying noise performance for the elements of this project within the City: an environmentally significant effect occurs whenever an hourly L_{eq} exceeding 50 dBA occurs at the property line and/or peak intensities for short durations exceeding 70 dBA occur.

Table NOI-1. Eureka General Plan Noise Level Performance Standards

New Projects Affected By or Including Non-transportation Sources		
Noise Level Descriptor	**Daytime (7 AM to 10 PM)**	**Nighttime (10 PM to 7 AM)**
Hourly L_{eq}, dB	50	45
Maximum level, dB	70	65
Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g. caretaker dwellings).		

County of Humboldt General Plan Noise Policies

The County Framework Plan Section 3240 addresses noise in residential areas with a standard that "the maximum acceptable exterior noise level for residences is 60 dB." The same policy section, however, includes a table indicating that L_{dn} sound level up to 65 dB are "normally acceptable" in residential areas. L_{dn} is the average sound level in decibels, excluding frequencies beyond the range of the human ear, during a 24-hour period with a 10dB weighting applied to nighttime sound levels. The Framework Plan indicates that L_{dn} of up to 75 dB are normally acceptable in a livestock farming area, and up to 70 L_{dn} in a golf course.

Existing Noise Levels

Existing noise sources in the project area are associated with livestock and with traffic on area roads and on Highway 101, located approximately 3,000 ft west of Swain Slough, and use of lawn mowers on the golf course. A 2002 noise survey measured noise from Highway 101 at 60 dBA Community Noise Equivalent Level (CNEL) at a distance of 270 feet from the Harris Street exit in Eureka. The CNEL is "a measure that describes average noise exposure over a period of time" (County of Humboldt 2008a).

Sensitive Receptors

Land uses that are generally sensitive to noise are residential areas, schools, convalescent and acute care hospitals, some parks and recreational areas, and churches and other religious facilities. Sensitive receptors identified near the proposed project area are schools, an assisted living facility, residences, and the golf course. Two schools are located in close proximity to the project: Pine Hill Elementary School at 5230 Vance St, approximately 0.4 miles from the project, and Play and Learn Preschool at 4865 Hidden Meadows Lane, approximately 0.2 miles from the project. An assisted living facility, Ginger's Loving Care Home at 4399 Ridgecrest Drive, is approximately 0.2 miles from the project area. The golf course is within the project area. However, for the most part, the receivers of the sound generated by the project will be residential land uses. Five houses are located on Pine Hill Rd, approximately 50 feet from the project area, and another house is located approximately 100 ft from the project area at the south end of Noe Ave. Two houses on a private lane off Gatliff Ave. are within 100 feet of the project as are two houses off Herrick Ave. The Ridgewood, Bayview, and Lundbar Hills neighborhoods include many residences located within 0.5 miles of the project area.

Methodology for Impact Analysis

Noise concerns identified with the project are evaluated in the context of project implementation impacts (short term noise impacts). Long-term project maintenance and management activities are expected to be minor and less than significant. Construction activities, especially heavy equipment use, would create short-term noise increases near the project area. For purposes of this discussion, short-term impacts assume a three-field-season construction period, with each season extending approximately 120 days.

Average daytime construction noise levels were estimated based primarily on predictive calculations developed by the City of Boston to regulate construction noise during that City's "Big Dig" construction project (Massachusetts Turnpike Authority 2000 in Thalheimer 2000) and methodology developed by the Federal Transit Administration (FTA) (FTA 2006) (as presented in Hamilton Wetland Restoration Project Dredged Material Aquatic Transfer Facility Draft Supplemental Environmental Impact Statement/Environmental Report. October, 2008.) This included evaluation of the types of construction equipment operating and associated noise emission levels, distance from receiver to construction equipment, effects of topography and ground-to-noise propagation, and period of operation of equipment. Noise levels were evaluated in A-weighted decibels (dBA), a composite frequency-weighting scheme that approximates the way the human ear responds to sound levels.

Noise-Generating Activities

The construction activities associated with the project that may intermittently generate elevated noise levels at nearby noise-sensitive locations are listed in summary fashion below.

Phase 1 Tide Gate Replacement (completed in 2014, therefore not a part of this project)

Phase 2 Martin Slough Channel Excavation [0+00 to 9+50], Southeast tributary and Marsh Plain A

- Prepare staging areas
- Deliver equipment to equipment staging areas
- Install erosion and sediment control measures

- Clear and grub (remove existing vegetation)
- Construct temporary haul routes
- Excavate channels, ponds, and wetlands
- Repair existing berm along Swain Slough
- Haul excess sediment off -site
- Install large wood habitat structures and grade control weirs
- Relocate 130' of 6" gas line; decommission 4" gas line
- Install cattle exclusion fencing
- Revegetate and stabilize disturbed areas

Phase 3 Pond G, North Fork Martin Slough Channel Excavation

- Preparation of staging areas
- Delivery of equipment to equipment staging areas
- Installation of erosion and sediment control measures
- Construct temporary haul routes
- Clear and grub (remove existing vegetation)
- Channel, ponds, and wetland excavation
- Install one new bridge, remove one old bridge
- Install large wood habitat structures and grade control weirs
- Haul excavated material to beneficial reuse locations
- Vegetate and stabilize disturbed areas

Phase 4 - Martin Slough Channel Excavation [10+50 to 30+50), Marsh Plain B & Meander Excavation, Pond C

- Prepare staging areas
- Deliver equipment to equipment staging areas
- Install erosion and sediment control measures
- Construct temporary haul routes
- Clear and grub (remove existing vegetation)

- Excavate channels, ponds, and wetlands
- Replace 2 culverts
- Install large wood habitat structures and grade control weirs
- Install scour protection over the 12" gas line at 2 locations
- Haul excavated material to beneficial reuse locations
- Install cattle exclusion fencing
- Vegetate and stabilize disturbed areas

Phase 5 – Martin Slough Channel excavation [stations 30+50 to 46+50], East Tributary, Pond D, Pond E, gas line protection (East Tributary)

- Prepare staging areas
- Deliver equipment to equipment staging areas
- Install erosion and sediment control measures
- Construct temporary haul routes
- Clear and grub (remove existing vegetation)
- Excavate channels and ponds
- Install large wood habitat structures and grade control weirs
- Install 5 bridges, including bridge abutments and railings
- Install scour line protection over the 12" gas line where it crosses the East tributary
- Haul excavated material to beneficial reuse locations
- Vegetate and stabilize disturbed areas

Phase 6 Pond F, Martin Slough Channel [stations 46+50 to 62+80
Preparation of staging areas

- Deliver equipment to equipment staging areas
- Install erosion and sediment control measures
- Construct temporary haul routes
- Clear and grub (remove existing vegetation)
- Excavate channels and ponds
- Install 3 bridges, including bridge abutments and railings

- Install large wood habitat structures and grade control weirs
- Haul excavated material to beneficial reuse locations
- Vegetate and stabilize disturbed areas

Under the proposed action, each construction phase is expected to occur over a 120-day period in successive years and may be from 30 to 120 days duration. For Phase 2, five houses are located within 100 feet of the proposed channel excavation, and additional residences are approximately 400 ft. from excavation areas. For Phase 3, three houses are located within 100 feet of the proposed channel excavation, less than 50 houses are located within 400 feet of proposed excavation areas, and additional residences are within 1,000 ft. of excavation areas. Phase 3 is located on the golf course. In addition, the assisted care living facility is approximately 1,000 ft. from the proposed location of Pond G, which is located on the golf course. Excavation and other construction noise would occur for several weeks in the immediate vicinity of any particular residence, and would be limited to normal daytime work hours (7 am to 7 pm). For Phases 4 and 5, 6 houses are located within 100 feet of proposed excavation areas, less than 50 houses are located within 400 feet of proposed excavation areas, and additional residences are within 1,000 ft. of excavation areas. For Phase 6 there are 9 houses within 400 feet of excavation areas and additional residences within 1,000 ft. of excavation areas.

The primary excavation methods that will likely be utilized include track-mounted excavators, scrapers, and bull-dozers. Excavated material will be loaded into either belly- or end-dump trucks and hauled to the reuse areas. Hauling the excavated material from the project area to reuse sites will require a fleet of dump trucks operating continuously during the excavation activities. Table NOI-1 shows the range of project construction equipment estimates for any given construction season and the noise level they are expected to generate at specific distances.

As the table illustrates, noise is attenuated with distance. In addition, outdoor noise is attenuated by passing through the exterior envelope of any structure. The expected minimum attenuation for structures meeting current Building Code requirements is at least 15-20 dBA when windows are open, and 25-30 dBA when all windows are closed.

Table NOI-2. Estimates of Noise Generated by Equipment Needed for Project Construction

Equipment Type	Estimated Quantity	**Typical Noise Level (dBA) at Specified Distance from Source**		
		50 ft	**100 ft**	**200 ft**
Excavators	1-5	86	80	74
Scrapers	1-5	84	78	72
Dozers	1-5	82	76	70
Loaders	2-4	80	74	68
Heavy Trucks	2-10	Accelerating: 87 Decelerating: 80	74 68	68 75
Small Tractors	1-3	84	78	72
Compactors	1-3	86	80	74
Graders	1-2	79	73	66
Water Trucks	1-3	Spraying: 89	83	76
Small Crane	1	85	79	73
Pump (Dewatering)	1	81	75	69

Sources: Massachusetts Turnpike Authority, 2000 in Thalheimer, 2000; Geier & Geier Consulting, 1997; ICF Jones & Stokes measurements for a similar dredging operation (Environmental Science Associates,

2003); ICF Jones & Stokes; calculations based on Hoover and Keith, 2000; Federal Highway Authority Construction Noise Handbook 2006.

Multiple sources of sound can be estimated as follows: if one source of noise is joined by another identical source (that is, a doubling of sound energy), the total increase is 3 dBA. For example, if the noise from a single source is 50 dBA, and it is joined by a 2nd identical source, the noise from the 2 sources will be 53 dBA. It the two are joined by a 3rd identical source, the total increase will be 5 dBA, such that the three sources would produce a noise level of 55 dBA.

A conservative assumption for operation of equipment is simultaneous and continuous operation of four pieces of equipment (excavator, loader, dewatering pump, and truck) over at least an 8-hour period for a combined source noise level at a single location. The combined sound level of these four pieces of equipment associated with construction is approximately 92 dBA, equivalent sound level (Leq) measured at 50 feet from the source and 80 dBA at 200 feet from the source.

Construction Truck Traffic Noise

Truck Trip Generation
The proposed project could generate up to 54,952 cubic yards of fill that will need to be off-hauled, requiring a total of 5,495 10-cubic-yard haul truck trips, or half that number if 20-cubic-yard trucks are used. The trip from the excavation site to the reuse site and the trip from the reuse site back to the excavation site are counted as two separate trips. The table below illustrates how excavation and required truck trips would be divided between phases.

Table NOI-3. Truck Trips Required for Sediment Off-Hauling

Phase	**Sediment to Off Haul**	**Total truck trips** 20 cy trucks/10 cy trucks*	**Daily truck trips**** 20 cy trucks/10 cy trucks
Phase 2	6,050 cy	303 trips-605 trips	16-31 trips
Phase 3	0	0	0
Phase 4	24,152 cy	1,208 – 2,415 trips	31-62 trips
Phase 5	8,638 cy	432- 864 trips	31-62 trips
Phase 6	16,112 cy	806- 1,611 trips	31-62 trips

*Range of truck trips depends on whether 10 cy or 20 cy dump trucks are used.
**Assuming 300 cy/ day and 21 haul days for Phase 2; 640 cy/ day and 38 haul days for Phase 4; 640 cy/ day and 14 haul days for Phase 5; 640 cy/ day and 26 haul days for Phase 6

The site to which excess sediment will be taken has not been finalized, but it is likely that sediment will either be taken to the White Slough Unit of the Humboldt Bay National Wildlife Refuge for use in tidal marsh restoration (raising the elevation of subsided diked former tidelands) or to upland agricultural fields in the Elk River watershed. In the former case, sediment will be hauled a short distance on Pine Hill Road and Elk River Road or Herrick Ave, and then south on Highway 101 to the White Slough Unit. In the latter case, sediment will be hauled a short distance on Pine Hill Rd or Herrick Ave and then south and east on Elk River Road. Haul truck trips in Phases 2 and 4, will largely avoid residential areas but will traverse agricultural areas, and Phases 5 and 6 would require trucks to travel through residential areas.

The County and City roads will also be used by fueling, equipment maintenance, equipment transport, and construction management/inspection vehicles throughout the construction period. The combined number of daily trips of these vehicles is anticipated to be less than 10 percent of the daily haul truck trips. The use of larger-capacity belly- and end-dump trucks will reduce the number of truck trip estimates presented above.

At the maximum hour of truck activity the estimated noise level for the hour will be 64.5 dBA, Leq at a distance of 50 feet from the roadway. This noise level would be a noticeable increase, but it will only occur during the period of construction and it will not affect typical indoor activities. However, individual truck noise will be substantially higher (See Table NOI-2 above).

Sound-pressure levels contrary to the City of Eureka or County of Humboldt noise standards. Even though the construction period for each project phase will be short-term, the instantaneous sound pressure levels generated by construction equipment are likely to exceed the City and County noise standards. In some areas, as discussed above, construction work will take place within 100 ft of residences. Mitigation measures have been identified that will reduce the significance of this impact. However, given the proximity of residential areas, it is uncertain the noise standards can always be met. At times, noise levels may exceed 70 dBA, or L_{eq} levels may exceed 50 dBA, even with mitigation measures implemented. However, implementation of Mitigation Measures N-1 and N-2 below will reduce the frequency and duration of project-related noise standard violations, reducing this impact to a less-than-significant level.

Long-term ground vibrations and low-frequency sound that would interfere with normal activities and which is not currently present in the project area. The project will not result in long-term increases in ground vibrations or low-frequency sound. There will be no impact.

Substantial increase in ambient short-term or long-term sound-pressure levels. As discussed above, the project will result in short-term substantial increases in ambient sound-pressure levels. However, implementation of Mitigation Measures N-1 and N-2 below will reduce the frequency and duration of project-related noise standard violations, reducing this impact to a less-than-significant level.

Changes in noise levels that are related to operations, not construction-related. While the project may require some level of maintenance for the channel and ponds, maintenance activities are not expected to be frequent or of long duration. The impact will be less than significant.

FINDINGS:
The project will have noise impacts, but they will be less than significant with mitigation.

MITIGATION MEASURES:

Mitigation Measure N-1: Restrict noise from earthmoving and hauling of soils

a) Hours of construction for outdoor activities exceeding 50 dBA shall be limited to Monday through Friday 7:00 a.m. to 7:00 p.m. and weekends and holidays from 9:00 a.m. to 6:00 p.m. Movement and hauling of material, and associated activities such as re-fueling or maintenance, shall be limited to normal working hours for the area, as specified above. More restrictive operation hours may be specified in the construction documents and may be property-specific.

b) All equipment shall operate with factory-equipped mufflers, and staging areas shall be located as far from residential uses as is practical. These conditions shall be incorporated into project contract specifications.

c) To the degree feasible, haul trucks shall use haul routes distant from sensitive receptors. The contractor shall determine the feasibility of developing haul roads along the channel. Haul road construction shall be designed to minimize impacts; haul road designs shall include, but not be limited to the placement of geotextile fabric and geogrid under the haul road for facilitated re-excavation and removal of bedload materials following project completion.

d) A haul-truck route plan shall be developed. Hauling shall minimize passing any substantial collection of noise-sensitive land uses (i.e. occupied houses, schools, hospitals), and shall be limited to less than 140 loads or one way trips (70 round trips) per day on any given road.

e) Larger capacity belly and end-dump trucks as well as double-trailers shall be used whenever feasible.

f) Construction personnel shall conduct all work activities in a manner that minimizes noise generation. A variety of contractor actions are available that will reduce construction noise, including: i) turning off engines on all construction equipment not in active use, ii) shielding noisy equipment with less noisy equipment, and iii) avoiding high RPM engine operation whenever possible.

Mitigation Measure N-2: Notify neighbors
When activity involving heavy construction equipment is scheduled to occur within 250 ft of occupied structures, construction personnel shall provide written notification to the residents in the potentially affected properties prior to using the heavy construction equipment. The written notification shall be provided to each potentially affected property at least 72 hours prior to the start of the activity, and shall indicate the approximate duration of time (dates and hours) during which the noise-generating activity is expected to occur.

13. POPULATION AND HOUSING. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (e.g., by proposing new homes and/or businesses) or indirectly (e.g., through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would result in, or contributes to, population growth, displacement of housing units, demolition or removal of existing housing units, or any project-related displacement of people from occupied housing.

DISCUSSION:
The project involves the restoration and enhancement of the Martin Slough channel and associated wetlands, ponds, and riparian corridor. It will not affect population growth in the area or displace housing or residents. There will be no impact.

FINDINGS:
No impact.

MITIGATION MEASURES:
None.

14. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Fire protection?				X
b) Police protection?				X
c) Schools?				X
d) Parks?				X

e) Other public facilities?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would result in any changes in existing fire or police protection service levels, or a perceived need for such changes, as well as any substantial changes in the need for, or use of, schools, parks, or other public facilities.

DISCUSSION:
The project will not result in any new demands for fire or police protection or perceived need for such changes, nor will it result in any increased needs for, or use of, schools.

Implementation on the golf course property will be conducted over a minimum of two years so that half of the golf course will remain open at all times during implementation activities. The reduction in recreational opportunities at the golf course will be of a short-term and temporary nature. In the long run, recreational opportunities at the golf course will be increased by providing improved floodwater storage and conveyance, which will decrease the duration of nuisance flooding at the golf course and reduce the maintenance costs caused by flooding.

The project is designed to reduce flooding in and adjacent to the project area. It may therefore result in an increase in the use of the golf course. However, this increase will not result in an increased need for parks or recreational facilities, as it will occur during periods when the golf course is currently unavailable. The project is not expected to result in a net increase in golf course maintenance needs because the project will reduce flood-related maintenance. There will be no impact.

FINDINGS:
No impact.

MITIGATION MEASURES:
None.

15. RECREATION. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree any aspect of the proposed project would be related to demand for recreational facilities or increase use of existing recreational areas such that those areas are physically degraded, including secondary effects such as degradation through over-use of environmentally sensitive areas.

DISCUSSION:
This project is intended to protect and enhance fish and wildlife habitat along Martin Slough and to reduce the duration of flooding through the pasture at the downstream end of the project and through the golf course at the upstream end of the project. The project will be implemented in phases as funding is acquired for implementation. Implementation on the golf course property will be conducted over a minimum of two, and likely three, years so that half of the golf course will remain open at all times during implementation activities. The reduction in recreational opportunities at the

golf course will be of a short-term and temporary nature and in the long run recreational opportunities at the golf course will be increased by providing improved floodwater storage and conveyance, which will decrease the duration of nuisance flooding at the golf course and reduce the maintenance costs caused by flooding. Recreational opportunities for sport fishermen will be increased by enhancing fisheries habitat and increasing the fish production from Martin Slough.

FINDINGS:
No impact.

MITIGATION MEASURES:
None.

16. TRANSPORTATION/TRAFFIC. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?		X		
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?			X	
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?			X	
d) Substantially increase hazards due to design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			X	
e) Result in inadequate emergency access?			X	
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree, if any, the proposed project would be associated with (a) changes in traffic, circulation, or other changes that might be perceived as adverse, including traffic effects resulting from temporary construction-related changes; (b) any project-related changes in levels-of-service on County or State highways; (c) project-associated travel restrictions that would prevent emergency vehicles from reaching the locations where they were needed.

DISCUSSION:

This section describes roads, public transportation, and pedestrian and bicycle facilities of the project site and project vicinity, and assesses the potential impacts on roads, public transportation, and bicycle and pedestrian facilities from the Project. Transportation issues addressed include project-related traffic, potential for accidents or safety concerns on public roads, and potential increase in demand for public transit services and pedestrian and bicycle facilities.

Roads
The existing roadway system in the Project area includes one county road (Pine Hill Road) and one city road (Fairway Drive). There are no signalized intersections. Both roads are two lane roads without sidewalks. Pine Hill Road has no shoulders, while Fairway Drive includes striped bicycle lanes.

The roads adjacent to the Project area are City and County Roads including Meyers Ave, Elk River Road, Herrick Avenue, and a number of smaller residential roads, including Noe Ave, Gatliff Ave, Pinecrest Court, and Lundblade Drive. Herrick Avenue is a commercial two lane road with sidewalks and Class III bicycle lanes. Elk River Road is a wide two lane road with striped shoulders. Residential roads in the project vicinity are of variable width and many have sidewalks. State Route 101 is located in close proximity to the project area. SR 101 is a four lane, divided highway with shoulders in the project vicinity, and is a designated portion of the Pacific Coast Bicycle Route.

Public Transportation
There is no public transit in the Project area. However, Eureka Transit Service provides bus service from Herrick Avenue, adjacent to the Project Area, to downtown Eureka. Redwood Transit Service provides bus service from Scotia to Trinidad along the State Route 101 corridor, with the closest stop to the Project area being in Humboldt Hill, about two miles southwest of the Project area. The Project site is not located directly along the existing RTS bus route.

Pedestrian and Bicycle Facilities
As noted above, there are no sidewalks on roads in the Project Area, although there are Class II bicycle lanes on Fairway Drive. The golf course includes trails for use by golfers on foot or in motorized carts. Pedestrian use of Pine Hill Road and Fairway Drive is low, although pedestrian use of nearby residential and commercial streets occurs at a moderate level. The Project Area is accessible using bike lanes and bike routes along Herrick Avenue and Fairway Drive.

Project Trip Generation

The proposed project could generate up to 54,952 cubic yards of fill that will need to be off-hauled, requiring a total of 5,495 10-cubic-yard haul truck trips, or half that number if 20-cubic-yard trucks are used. The trip from the excavation site to the reuse site and the trip from the reuse site back to the excavation site are counted as two separate trips. The table below illustrates how excavation and required truck trips would be divided between phases. Only a small amount of vegetation removal will take place, and transport of this material is not expected to contribute significantly to project trip generation.

Table TRA-1. Projected Truck Trips by Project Phase.

Phase	Sediment to Off Haul	Total truck trips 20 cy trucks/10 cy trucks*	Daily truck trips** 20 cy trucks/10 cy trucks
Phase 2	6,050 cy	303-605	16-31 trips
Phase 3	0	0	0 updated phase 2+3 only
Phase 4	24,152 cy	1,208 – 2,415 trips	31-62 trips
Phase 5	8,638 cy	432- 864 trips	31-62 trips
Phase 6	16,112 cy	806- 1,611 trips	31-62 trips

*Range of truck trips depends on whether 10 cy or 20 cy dump trucks are used.
** Assuming 300 cy/ day and 6 haul days for Phase 2; 640 cy/ day and 38 haul days for Phase 4; 640 cy/ day and 25 haul days for Phase IV; 640 cy/ day and 26 haul days for Phase V

The site to which excess sediment would be taken has not been finalized, but it is likely that sediment will either be taken to the White Slough Unit of the Humboldt Bay National Wildlife Refuge for use in tidal marsh

restoration (raising the elevation of subsided diked former tidelands) or to upland agricultural fields in the Elk River watershed. In the former case, sediment would be hauled a short distance on Pine Hill Road and Elk River Road or Herrick Ave, and then south on Highway 101 to the White Slough Unit. In the latter case, sediment would be hauled a short distance on Pine Hill Rd or Herrick Ave and then south and east on Elk River Road. An existing driveway from the golf course will be used as one point of ingress/ egress to Fairway Drive. An existing driveway accessing Pine Hill Road may also be used to move soil from the 40-acre pasture and/ or the downstream portion of the golf course (downstream of the Fairway Drive Bridge). Haul truck trips in Phases 2 and 4 will largely avoid residential areas but will traverse agricultural areas, and Phases 5 and 6 will require trucks to travel through residential areas. Figure TRA-1 depicts the existing County roads that could potentially be utilized as haul routes.

The County and City roads also will be used by fueling, equipment maintenance, equipment transport, and construction management/inspection vehicles throughout the construction period. The combined number of daily trips of these vehicles is anticipated to be less than 10 percent of the daily haul truck trips. The use of larger-capacity belly- and end-dump trucks would reduce the number of truck trip estimates presented above.

The County and City roads depicted on Figure TRA-1 as potential haul routes are currently variously used to support residential, commercial, and agricultural traffic. Elk River Road is frequently used by log trucks, agricultural equipment including tractors, and manure spreaders, as well as milk and feed trucks with weights similar to the expected proposed haul trucks. Herrick Avenue is frequently used by commercial trucks with similar weights. Under existing conditions, these roads are not anticipated to require improvements prior to construction to support the increased frequency of haul truck traffic. Minor repairs or overlays could be preferable after completion of the project due to the temporary increase in construction traffic. Maintenance activities on County Roads are typically at the discretion and responsibility of the County. The County maintains control of the roadways in general and through their encroachment permit process for temporary uses such as construction projects. Pine Hill Road is occasionally used by heavyweight vehicles. The County of Humboldt is planning to replace the Swain Slough bridge and raise the approaches to the bridge and make other improvements such as repaving. Pine Hill Road and the Swain Slough Bridge will be capable of handling the anticipated loads.

Maximum haul route distances were determined for Phases 2-6. These routes connect the most remote excavation location to the most remote reuse location, and thereby provide a maximum haul route distance. The maximum haul route distance for Phase 6 could include transporting excavated material from the upstream end of the Project to the White Slough Unit of the HBNWR. This maximum distance (including the return trip) will be approximately 12 miles and will be located along Fairway Drive, Herrick Ave, Highway 101, and possibly portions of Tompkins Hill Road.

The maximum haul route distance for Phase 5 could include transporting excavated material from Ponds D and E to the White Slough Unit. This maximum distance (including the return trip) will be approximately 11 miles and will include travel along the Martin Slough channel, Pine Hill Road, Elk River Road, Herrick Ave, Highway 101, and possibly portions of Tompkins Hill Road.

The maximum haul route distance for Phase 6 could include transporting excavated material from the upstream extent of the Project Area to the White Slough Unit. This maximum distance (including the return trip) will be approximately 12 miles and located along Fairway Drive, Herrick Ave, Highway 101, and Tompkins Hill Road.

While not all of the excavated material will actually be hauled the maximum distances presented above, it is expected that the majority of the material will be taken to the White Slough Unit, resulting in a haul distance of between 10-12 miles.

Adverse changes in traffic and circulation. During Project construction, the number of construction-related vehicles in the area will increase substantially. This traffic increase will be noticeable because it

includes a large number of large construction vehicles, but it will be temporary (i.e., during the project construction phase). Depending on the timing and distribution of project traffic, the project could potentially significantly affect on-street and intersection operations.
Construction crews will use Elk River Road, Pine Hill Road, Herrick Avenue, and Fairway Drive for main access to the Project area. Traffic on roads adjacent to the Project is light and occurs intermittently throughout the day. Traffic on Herrick Avenue is greater than on any of the other access roads. Construction crews will generate a few tens of vehicle trips per day, which will not significantly affect operations of these roadways. Haul truck trips on County and City roads could result in temporary significant impacts to traffic and circulation. This impact will be reduced to a less than significant level by implementation of Mitigation Measure T-1.

Average Annual Daily Traffic (AADT) on Highway 101 at Herrick Avenue was estimated by Caltrans at 30,000 trips in 2009. South of Herrick Avenue, traffic counts on Highway 101 are substantially lower, with an AADT of 21,500 at Fields Landing and 23,000 at King Salmon.[2] A temporary increase in traffic on Highway 101 from an additional 16-62 daily truck trips during the construction period will represent a less than 1% increase in AADT, which will not be a significant impact.

Project-related changes in levels-of-service on County or State highways. The project will result in increased truck trips on Highway 101. As discussed above, the increase will represent less than 1% of AADT, and will not be expected to result in a decline in levels of service. The impact will be less than significant.

Project-associated travel restrictions that would prevent emergency vehicles from reaching the locations where they were needed. The project will not result in any travel restrictions that would prevent emergency vehicles from reaching locations where they were needed. There will be no impact.

FINDINGS:
Less than significant with mitigation.

MITIGATION MEASURES:

Mitigation Measure T-1. Traffic Control Plan
As part of the final construction documents, the contractor shall be required to submit a Traffic Control Plan corresponding to a Work Sequencing Schedule for review and approval by the construction manager prior to commencement of work. The Traffic Control Plan shall provide a narrative supported with figures depicting the haul routes anticipated to be utilized throughout the construction period and shall be developed in accordance to the California Manual on Uniform Traffic Control Devices (MUTCD) and applicable County of Humboldt and City of Eureka encroachment permit conditions. The Traffic Control Plan shall detail the desired haul routes, public notification, required signage/flagging, potential lane/road closers (if applicable), detour routes (if applicable), provisions for providing temporary pedestrian access (if applicable) and provisions for maintaining access to all parcels.

17. TRIBAL CULTURAL RESOURCES. Would the project:	Potentially Significant	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources, or in the local register of historical resources as defined in Public Resources Code §5020.1(k)?		X		
b) Cause a substantial adverse change in the significance of a tribal cultural resource determined by the lead agency to be		X		

2 Data obtained on 3/20/2013 from: http://traffic-counts.dot.ca.gov/2009all/Route101i.htm

significant pursuant to criteria set forth in subdivision (c) of Public Resources Code §5024.1?				

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would cause (a) change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources, or in the local register of historical resources as defined in Public Resources; or (b) a tribal cultural resource determined by the lead agency to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code §5024.1.

DISCUSSION:

A Cultural Resources Investigation has been completed by Jamie Roscoe & Associates, as has consultation with the representatives of tribes affiliated with the project area. According to Janet Eidsness and Dr. Tom Torma, THPOs, the study performed by Jamie Roscoe & Associates was satisfactory, and they concur with the Mr. Roscoe's negative findings for potential resources. They have stated that the project will not result in impacts to tribal cultural resource impacts. Although unlikely give the identification effort, the proposed project activities do have the potential to inadvertently uncover subsurface archaeological material. In the event that materials or remains are unearthed, the following pages offer recommendations that would ensure potential project impacts on the inadvertently discovered historical resources are eliminated or reduced to less than significant levels. The following mitigation measures are incorporated into all project phases:

1) THPO participation or assistance in presentation at field crew meetings of what to watch for;
2) The application will notify the THPOs prior to initiation of work phases to allow an opportunity to spot check digging activities.
3) Inclusion of inadvertent archeological discovery protocol that will at a minimum require for immediately stopping work, notification of THPOs, retention of a qualified archeologists with local knowledge, implementation of best practices for assessing the significance of the find should an archaeological resource be inadvertently discovered during ground-disturbing activities. Additionally, establishing an exclusion zone, treatment of remains, that inadvertent discoveries shall be considered confidential, and contacting the County Corner. In other words, if buried archaeological or historical resources are encountered during construction activities, the contractor on-site shall call all work in the immediate area to halt temporarily, and a qualified archaeologist is to be contacted to evaluate the materials. Prehistoric materials may include obsidian or chert flakes, tools, locally darkened midden soils, groundstone artifacts, dietary bone, and human burials. If human burial is found during construction, state law requires that the County Coroner be contacted immediately. If the remains are found to be those of a Native American, the California Native American Heritage Commission will then be contacted by the Coroner to determine appropriate treatment of the remains.

With the proposed mitigation measures, the proposed project will not cause a substantial adverse change in the significance of a tribal cultural resource.

FINDINGS:

a) Cause a substantial adverse change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources, or in the local register of historical resources as defined in Public Resources Code §5020.1(k): Less than significant impact with mitigation incorporated.
b) Cause a substantial adverse change in the significance of a tribal cultural resource determined by the lead agency to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code §5024.1: Less than significant impact with mitigation incorporated.

Mitigation:
Same as Mitigation Measures CR-2, CR-3, and CR-4.

18. UTILITIES AND SERVICE SYSTEMS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
d) Have insufficient water supplies available to serve the project from existing entitlements and resources (i.e., new or expanded entitlements are needed)?			X	
e) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Violate any federal, state, and local statutes and regulations related to solid waste?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would be related to: (a) a substantial demand for water supplies affecting existing entitlements and resources; (b) increase in runoff intensity that exacerbates drainage conditions and changes; and (c) insufficient provision for solid waste disposal.

DISCUSSION:

Demand for water supplies. The project will result in increased tidal influence in Martin Slough. The existing irrigation water supply for the golf course is upstream of the limit of brackish tidal water. Additionally, the golf course is planning to install a new well to supply irrigation water which will not be affected by the increased salinity. There will be no impact.

Increase in runoff intensity. The project will reduce runoff intensity by restoring wetlands and riparian vegetation. There will be no adverse impact.

Insufficient provision for solid waste disposal. The project will generate approximately 65,000 cubic yards of excavated sediment that will need to be off-hauled. This sediment will be beneficially reused. It is most likely that the sediment will be used to restore tidal marshes in the White Slough Unit of the HBNWR by raising the elevation of subsided-diked-former tidelands. Sediment may also be used as an agricultural soil amendment, most likely for farmland in the Elk River Valley. It is unlikely that any sediment will need to be disposed of in a landfill. There will be no impact.

Other impacts. As detailed in the project description, the project will require the relocation of a six-inch gas line that crosses the project area and the decommissioning of a four-inch gas line. Relocating the six-inch gas line will not result in an interruption of service to homes in the area as the section of line to be replaced can be isolated from the system and other gas lines can supply natural gas to the homes and businesses served by the 6-inch line. PG&E has determined that the four-inch line is redundant and un-necessary and has approved decommissioning of the line. This will be a less than significant impact.

FINDINGS:

Less than significant impacts. No mitigation is required.

MITIGATION MEASURES:
None.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE.	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		X		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects).			X	
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?		X		

DISCUSSION:
Degradation of the environment. The project will result in long-term enhancement of habitat for native plants, fish and wildlife due to the restoration of wetlands, riparian habitat, and instream habitat, as well as the enhancement of fish passage. The project could have short term impacts on fish and wildlife habitat and on cultural resources, but these impacts will be reduced to a less than significant level by implementation of mitigation measures, including Mitigation Measures BIO-1-6, CR-1-2, HHM-1, and WQ 1-5.

Cumulative impacts. The project will not induce development or population growth. It could facilitate additional habitat restoration projects (e.g. at the White Slough Unit of the HBNWR). However, such projects are expected to be beneficial, with only short-term impacts that would be less than significant. There will be no significant cumulative impact.

Adverse environmental effects on human beings. The project will result in long-term reduction of flooding in the project area, which will benefit agricultural production in the pasture and recreation on the golf course. Adverse environmental effects on human beings will be short term, and will be reduced to a less than significant level by implementation of Mitigation Measures AQ-1 and 2, HHM-1, WQ 1-5, N-1 and 2, and T-1.

FINDINGS:
Less than significant with mitigation.

EARLIER ANALYSES

1) ***Earlier Analyses Used***. The following document(s), available at the Community Development Department, have adequately analyzed one or more effects of the project. Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been

adequately analyzed in an earlier EIR or negative declaration (CEQA Guidelines Section 15063 (c)(3)(D)).

a. **Final Environmental Impact Report for the Martin Slough Interceptor Project, City of Eureka, 2004**
b. **Historic Property Survey Report, James Roscoe & Associates, 2012. Prepared for the County of Humboldt for the Pine Hill Road at Swain Slough Bridge Replacement Project**

2) ***Impacts Adequately Addressed***. The following effects from the above checklist were within the scope of and adequately analyzed in the document(s) listed above, pursuant to applicable legal standards.

a. ***Archeological Resources***

3) ***Mitigation Measures***. The following mitigation measures from the document(s) listed above have been incorporated into the checklist.

1. Aesthetics

None.

2. Agricultural and Forestry Resources

None.

3. Air Quality

Mitigation Measure AQ-1: Utilize Best Management Practices to Minimize Fugitive Dust Generation and Assure Compliance with North Coast Air Quality Management District Rules for Particulates.
Mitigation Measure AQ-2. Minimize Construction Machinery Emissions.

5. Biological Resources

Mitigation Measure BIO-1. Seasonal limitations on in-channel work.

Mitigation Measure BIO-2. Fish relocation.
Mitigation Measure BIO-3. Protect nesting birds through seasonal limitations on removal of upland vegetation and exclusion zones around active nests.
Mitigation Measure BIO-4. Minimize ground disturbance area.

Mitigation Measure BIO-5: Minimize, avoid, and compensate for impacts to sensitive plants

Mitigation Measure BIO-6. Replanting and expanding populations of Lyngbye's Sedge and Humboldt Bay owl's clover.

5. Cultural Resources

Mitigation Measure CR-1. Project construction Shall Not Adversely Affect the Historic "Lorensen Ranch" Dairy Barn.

Mitigation Measure CR-2. During all construction phases and prior to initiating ground disturbance the applicant shall secure the participation or assistance of an affiliated Tribal Historic Preservation Officer (THPO) in the presentation at field crew meetings of what to watch for.

Mitigation Measure CR-3. During all construction phases and prior to initiating ground disturbance affiliated the applicant will notify all affiliated THPOS to allow for spot checking of digging.

Mitigation Measure CR-4. Specified Procedures Shall Be Followed in the Event of Inadvertent Discovery of Archaeological Material or Human Remains.

6. Geology and Soils

None, but see Mitigation Measures WQ 1-5 below.

7. Greenhouse Gas Emissions

None.

8. Hazards and Hazardous Materials

Mitigation HHM-1: Emergency Spill Cleanup kits and Hazardous Materials Spill Prevention Control and Countermeasure Plan.

9. Hydrology and Water Quality

Mitigation Measure WQ-1: Storm Water Pollution Prevention Plan.

Mitigation Measure WQ-2. Implement contractor training for protection of water quality.

Mitigation Measure WQ-3. Minimize potential pollution caused by inundation.

Mitigation Measure WQ-4. Instream erosion and water quality control measures during channel excavation.

Mitigation Measure WQ-5. Implement Dewatering and Diversions Restrictions

10. Land Use and Planning

None

11. Mineral Resources

None

12. Noise

Mitigation Measure N-1: Restrict noise from earthmoving and hauling of soils

Mitigation Measure N-2: Notify neighbors

13. Population and Housing

None.

14. Public Services

None.

15. Recreation

None.

16. Transportation and Traffic

Mitigation Measure T-1. Traffic Control Plan

17. Tribal Cultural Resources

Same as CR-2, CR-3, and CR-4

18. Utilities and Service Systems

None.

19. Mandatory Findings of Significance

None.

SOURCE/REFERENCE LIST: The following documents were used in the preparation of this Initial Study.

1) Eureka Municipal Code
2) County of Humboldt – County Code
3) Adopted City of Eureka General Plan and Certified Local Coastal Plan, as applicable
4) Project File(s) for the project for which this Initial Study was prepared.
5) *Mapping Humboldt County's Tsunami Hazard*. Lori Dengler and Jay Patton, Geology Department, Humboldt State University. *Humboldt Earthquake Education Center, Hu*mboldt State University.
6) Crooks, S. 2009. Carbon Sequestration in Tidal Wetlands: White Paper. Report by PWA to the Resources Legacy Fund, PWA Reference 1944.
7) Brown, S., T. Pearson, A. Dushku, J. Kadyzewski and Y. Qi. 2004. Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California. CEC 500-04-069F. Prepared for the California Energy Commission by Winrock International.
8) GHD and Michael Love & Associates, 2015. Martin Slough Enhancement Project Basis of Design Report.
9) GHD and Michael Love & Associates, December 2015, 100% Designs.
10) SHN, 2013. Geologic Setting Martin Slough Enhancement Project
11) SHN, 2013. Geotechnical Investigations Martin Slough Enhancement Project
12) Winzler & Kelly, 2011. Wetlands Delineation Martin Slough Enhancement Project
13) Winzler & Kelly, 2012. Biological Assessment Martin Slough Enhancement Project
14) City of Eureka, 2004. Final Environmental Impact Report - Martin Slough Interceptor Project

    Historic Survey Report, Roscoe & Associates, prepared for the County of Humboldt for the Swain Slough Bridge Replacement Project

Final MMRP

Martin Slough Enhancement Project Monitoring Plan

Prepared by:
Natural Resources Services
Division of RCAA
904 G Street
Eureka, CA 95501

August 2013

Revised March 2017

TABLE OF CONTENTS

INTRODUCTION

The Martin Slough Enhancement Project (Project), is located in and along Martin Slough on private property recently acquired by the North Coast Regional Land Trust (NRLT) and public property owned by the City of Eureka (the City), leased and managed by CourseCo Inc. of Petaluma CA as the Eureka Municipal Golf Course. The NRLT property was owned by Mr. Gene Senestraro until December 2011 and he was the owner during the development of a feasibility study prepared for the project as well as through the development of the 30% design plans. Mr. Senestraro, the City, CourseCo, and the Redwood Community Action Agency (RCAA) have worked cooperatively since 2001 to develop an enhancement plan for Martin Slough. In 2006, the Martin Slough Enhancement Feasibility Study was produced by consulting engineers Winzler & Kelly and sub-consultants Michael Love & Associates and Coastal Analysis under contract to RCAA with funding from the State Coastal Conservancy, the Department of Water Resources, and the City. The Feasibility Study looked at 3 options as well as a no project alternative and led to the selection of a preferred option by the project team, a technical advisory committee (TAC) comprised of representatives from regulatory agencies and local jurisdictions, and the City of Eureka.

The Project site is diked-former-tideland that provides critical habitat for two endangered species (coho salmon [*Oncorhynchus kisutch*] and tidewater goy [*Eucyclogobius* newberryi]). The habitat has been degraded by past management practices that included draining the former tidal wetland by excavating straight-line channels, removing the riparian vegetation, and installing dikes and tide gates at the confluence of Martin Slough and Swain Slough. The exclusion of the tide resulted in losing the sediment transport benefits and natural fluvial geomorphic process that maintained the tidal wetlands and the channel capacity. The loss in channel capacity was offset by mechanical dredging to remove the accumulated sediment. With the endangered species listing of coho and tidewater goby, the cost of obtaining permits to conduct maintenance dredging became prohibitive for the landowners and resulted in the loss of channel capacity and an increase in the duration of flooding on their properties. The landowners sought assistance from RCAA in seeking grant funding to explore the feasibility of developing a project design that would assist them with their flood management problems, understanding that the project would also have to include enhancement of habitat for fish and wildlife to be attractive to funders. The landowners' cooperation led to the development of the feasibility study and to securing additional grant funding to design and implement the project.

The preferred alternative includes replacing the existing tide gates, introducing a muted tidal prism, excavating ponds to provide fish and wildlife habitat as well as flood water detention, excavating the channel to increase flow capacity and provide brackish marsh habitat along the channel margins, and restoring riparian and wetland vegetation within the constraints imposed by the land management objectives of a cattle raising operation and a public golf course.

The Martin Slough Enhancement Project Monitoring Plan (Monitoring Plan or Plan) sets forth simple, cost effective methods for evaluating the degree to which the Martin Slough project progressively meets its intended physical, hydrologic, and biological goals during the initial five years of the project. While this Monitoring Plan incorporates ongoing *pre-construction* monitoring activities and summarizes the *construction monitoring* that will occur during the project's build phase, the primary focus of this Monitoring Plan is *post-construction* monitoring. This monitoring plan outlines a methodology for "time-zero" monitoring initiating at the as-built project condition out to project Year 5. The Monitoring Plan includes both quantitative and qualitative measures to evaluate both structural and functional components of the project.

The essential purpose of monitoring activities is to raise a warning flag if the project's enhancement design components or the current course of management actions are not working so that corrective actions and adaptive management may be applied while cost-effective and time sensitive solutions are still available. Conversely, good monitoring can also demonstrate that the current design and management approaches are working and provide evidence for the continuation of current management. In addition, implementation of the Monitoring Plan will demonstrate ongoing permit compliance and, it is anticipated, a trajectory of incremental project success as the project meets various annual performance criteria described in the plan which cumulatively lead to attaining final success criteria. Finally, the results of thorough project evaluation through implementation of this Plan will help this project to provide information about sound design or fatal flaws, effective or ineffective management techniques to other projects, land managers, restoration designers, and practitioners conducting similar estuarine restoration efforts in and around Humboldt Bay.

This Monitoring Plan complements pre-implementation monitoring, including physical, hydrologic, and biotic baseline evaluations that established initial conditions and defined background variability. Please note that the project's Pollution Prevention and Monitoring Plan (PPMP) will separately detail stormwater pollution prevention practices and water quality monitoring methods that will be conducted on the project primarily during and immediately following construction activities.

PLAN ORGANIZATION

This Monitoring Plan is for fish utilization only and is an excerpt from the Martin Slough Monitoring Plan, developed to meet the minimum monitoring requirements of the NOAA Restoration Center. The Plan is divided into six sections as follows:

Introduction – Summarizes the Monitoring Plan's purpose, organization, and responsible parties.

Project Summary – Lists the goals and objectives defined for this project and summarizes the project design

Monitoring Goals – Describes the goals of monitoring, lists the functions to be

monitored, sets forth the performance and success criteria, and elucidates the link between various monitoring efforts.

Monitoring Components – Details the sampling techniques, data analysis methods and schedule for each characteristic, function, or parameter to be monitored.

Reporting – Delineates the monitoring report format, schedule, and responsible parties.

Contingencies and Remedial Actions – Discusses provisions to ensure that enhancement sites that do not meet the goals or performance standards identified in the approved final monitoring plan will be remediated and/or adaptively managed

Guidance Documents

In addition to the Project's aforementioned project planning documents, the secondary monitoring guidance documents utilized in developing this monitoring plan include:

- Science-Based Restoration Monitoring of Coastal Habitats, Volume One: A Framework for Monitoring Plans under the Estuaries and Clean Waters Act of 2000; NOAA and National Ocean Service, October 2003

- NOAA Restoration Center Minimum Scientific Monitoring Requirements, NOAA, November 2003

- Measuring and Monitoring Plant Populations, BLM Technical Reference1730-01, May 2005

PROJECT SUMMARY

SITE DESCRIPTION

The Martin Slough Enhancement Project (Project) is located within 120 acres straddling two ownerships. The downstream 40 acres is owned by the North Coast Regional Land Trust and leased for raising yearling dairy cattle. The upstream 80 acres is owned by the City of Eureka and contains the Eureka Municipal Golf Course, leased and managed by CourseCo Inc. of Petaluma CA. The Project site is bound by a dike along the east bank of Swain Slough on its western boundary and Fairway Drive on its eastern boundary. The City boundary is the property boundary between the Senestraro Property and the Golf Course (Figure 1).

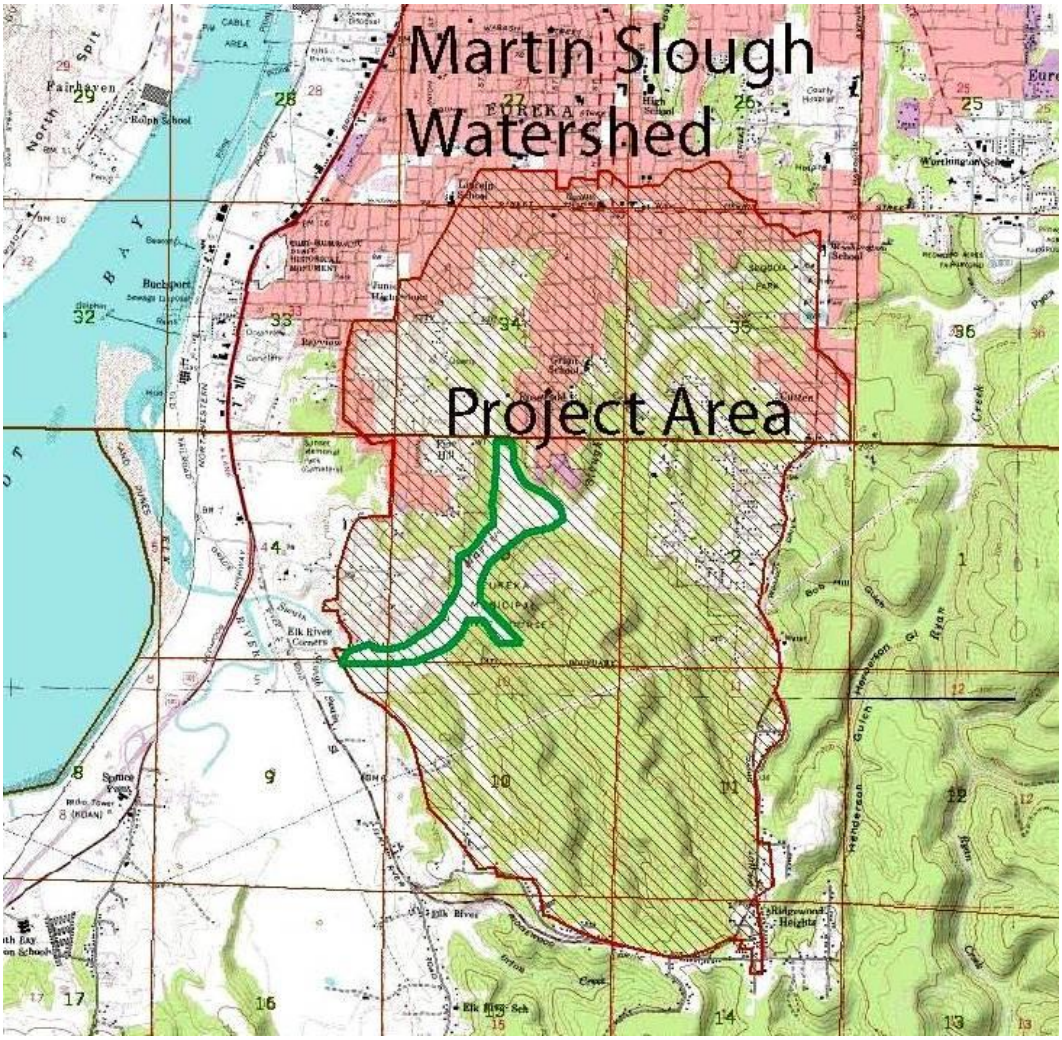

Figure 1. Location of the Martin Slough Enhancement Project, Humboldt County, CA.

The Martin Slough watershed is approximately 5.5 square miles and empties into Swain Slough through three tide gates on the Senestraro property. The tide gates allow the creek to drain, but prevent all but a small volume of leakage water from Swain Slough from entering Martin Slough. The inverts of two culverts are perched at an average elevation of 1.0 ft. NAVD88, approximately 2.0 ft. above the adjacent Swain Slough thalweg, with the invert of the third culvert at approximately 2.75 ft. Most sediment delivered from the Martin Slough watershed is likely trapped in the channel upstream of the tide-gated culverts.
The lower 40 acres of the Project site is currently wet meadow pasture created around 1900 by constructing dikes and installing tide gates to convert former tidelands to grazing lands. Mapping conducted in 1870 by the US Coast and Geodetic Survey did not include Martin Slough, but based on elevations of the channel and adjacent fields, the upper extremes of the project area likely transitioned to lower salinities characteristic of tidally influenced freshwater marshes. Tidal influence extended to approximately 7,000 feet upstream of the tide gates. The upper extend of the project is approximately 7,200 feet from the tide gates.

A thin band of vegetation along Fairway Drive at the upstream project boundary where the land hasn't been cleared for the golf course or for grazing has the highest plant species diversity found across the site. The pasture is mostly monotypic grassland dominated by Velvet Grass (*Holcus lanatus*), Creeping Wildrye (*Leymus triticoides*), Creeping Bentgrass (*Agrostis stolonifera*), and Perennial Ryegrass (*Lolium perenne*) and the golf course is dominated by Bermuda grass (*Cynodon* spp.).

The dominant land use is grazing on the lower 40 acres and public recreation on the upper 80 acres.

GOALS and OBJECTIVES

The primary goal of the project is to restore and enhance estuarine function, improve fish access, and increase habitat diversity and native plant establishment to approximately 7,000 linear feet of channel and 15.5 acres of brackish marsh. In addition 2.5 acres of freshwater marsh and 262 feet of channel will be enhanced for freshwater tidal habitat. Another project goal is preserving working agricultural lands and the public recreational use of the golf course. A plan view of the enhancement plan is provided in Figure 2.

Specific project goals for each of these components include:

Goals: Estuarine Function

- restore tidal hydrology and enhance tidal and brackish marsh habitat to ~ 15.5 acres of former tidelands
- provide areas at an elevation and with access to the estuary that will accommodate a salt marsh plain

- provide areas at an elevation and with access to the estuary that will accommodate a salt marsh pond

Objectives: Estuarine Function

- replace the old tide gates with new tide gates fitted with a muted tide regulator to allow a muted tide
- excavate the channel margins to create the salt marsh plain
- expand existing ponds and create two new ponds at appropriate elevations and within reach of the tidal prism to create salt marsh

Goals: Habitat Diversity

- increase tidal and brackish marsh habitat diversity
- increase the extent of brackish marsh

Objectives: Habitat Diversity

- excavate a backwater channel
- construct inset floodplain benches within the main slough channel
- excavate portions of the pasture and golf course to increase the brackish marsh habitat from 0.2 acres to ~ 15.5 acres total with varying elevations to support the habitat diversity goals

Goals: Fish Access

- restore access, slough channel functions, and associated aquatic habitat in Martin Slough for native salmonid species, and for numerous other fish and wildlife species;
- expand habitat for listed fish species – salmonids (*Oncorhynchus kisutch*, *O. mykiss*, and *O. clarki clarki*) and tidewater goby (*Eucyclogobius newberryi*) – in portions of lower Martin Slough;
- increase the extent of rearing habitat for all fish species that utilize estuarine habitat

Objectives: Fish Access

- replace the existing tide gates with new tide gates designed to increase the amount of time fish can pass through the tide gates
- excavate off-channel ponds, expand existing ponds, and add large woody debris
- excavate the channel to provide marsh plains and estuarine habitat

Goals: Native Plan Revegetation/Recruitment

- facilitate re-conversion of non-native grasslands back to tidal and brackish marsh vegetation;
- restore native riparian vegetation;
- minimize surface erosion in areas disturbed by construction activities;
- minimize exotic invasive plant species on the marsh plain, including pasture grasses;

Objectives: Native Plan Revegetation/Recruitment

- through both active and passive revegetation convert 15.5 acres, including 8 acres of non-prime seasonal agricultural wetlands, to brackish and salt marsh plants;
- revegetate the off-channel pond perimeter and a portion of the riparian corridor with 1,000 plugs of small fruited bulrush (*Scirpus microcarpus*) and 1,000 willow (*Salix* spp.) sprigs
- applying temporary seeding with sterile erosion control grasses and forbs species

- use passive tidal inundation, in addition to manual removal of invasive dense-flowered cord grass (*Spartina densiflora*) that may colonize the restoration area after tidal prism re-introduction

Goals: Working Lands

- retain agricultural production;
- manage the property to facilitate marsh and riparian enhancement and fisheries restoration;

Objectives: Working Lands

- maintain cattle grazing on a 30-acre portion of the seasonal wetlands;
- keep cattle out of tidal marsh and channel restoration area via a cattle exclusion fence designed to permit small wildlife and amphibians to pass under and deer to jump over

Design

The project design will be detailed in the project's engineering construction plans and is summarized below and presented in Figure 2, as excerpted from the project's draft plans

The Martin Slough Enhancement Project is being proposed in order to restore tidal hydrology, expand brackish marsh habitat, and remove the primary barrier to fish migration into Martin Slough – the tide gates – in order to enhance salmonid and tidewater goby access. The project will replace the 3 existing 42-inch diameter culverts at the mouth of Martin Slough with three 6-ft. by 6ft. box culverts fitted with two side hinge and one top-hinge doors. One of the side hinge doors will include a habitat door and a muted tide regulator (MTR) that will allow brackish water to flow into Martin Slough up to a design elevation, allowing the re-establishment of a muted tidal prism. To expand aquatic habitat across the project area, approximately 7,000 linear ft. of channels will be expanded 14 acres of new brackish pond. Freshwater pond habitat will be expanded from the existing 0.5 acre to 2.5 acres (Figure 2). Some of the excavated spoils will be used to reinforce the levee between Martin Slough and Swain Slough, some will be spread on the pasture and golf course fairways, and the remainder will be hauled to a yet-to-be-determined spoils location.

Sections of Martin Slough will be dewatered during construction and fish will be relocated. Two existing culverts in the pasture will be replaced by bridges and the 24 bridges on the golf course will be consolidated into 10 bridges.

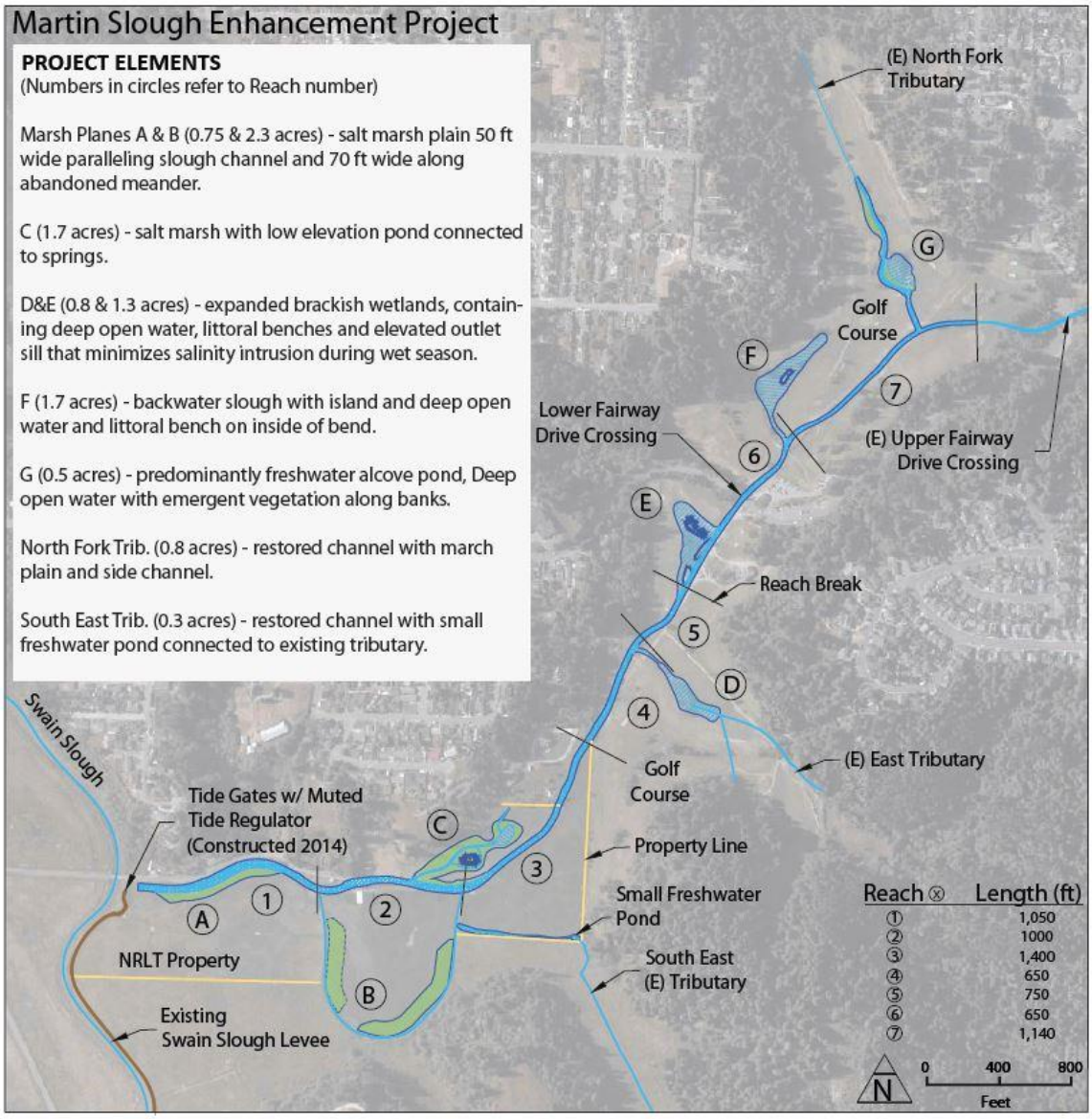

Figure 2. Proposed actions for the Martin Slough Enhancement Project.

Brackish and salt marsh areas will be revegetated with native marsh plant species following a revegetation design developed by the project botanist, and other disturbed areas will be seeded with pasture grass. Access and traffic on the site will be kept to a minimum, and the ground surface will be scarified as needed once the project is completed, to reverse any unwanted compaction.

Impacts

The Martin Slough Enhancement project is voluntary with the sole intent of habitat enhancement for its own intrinsic and biological value and reducing nuisance flooding to allow greater economic realization of the existing land uses. It does not fulfill an off-site mitigation obligation for a project elsewhere. The act of constructing functional wetlands and enhancing instream habitat does, however, generate some temporary and permanent impacts that are mitigated on site.

Temporary impacts will be mitigated at a 1:1 ratio (mitigation to impacts) by restoring the temporary impacts to pre-disturbance conditions. Permanent impacts will be mitigated on-site by creating new tidal salt marsh and brackish marsh habitat, as well as restoring and enhancing existing freshwater marsh habitat at a ratio that far exceeds projects impacts. Hence, the simple fact of constructing the project will result in a large net gain in estuarine functions and values, marsh habitat, and aquatic habitat accessible by fish.

The project's Biological Assessment and other environmental documents (under preparation) describe in detail the direct, indirect, and cumulative adverse impacts that are likely to occur to listed species, species of concern, and protected habitats that are present in the project area as a result of project actions. The mitigation measures that will be taken to avoid, reduce, and minimize those impacts will also be described in detail in the Biological Assessment, PPMP, and agency-specific permit conditions. It is important to note, however, that the pre-construction monitoring activities and assessments undertaken in the development of the project design and construction/post-construction monitoring activities described in this Monitoring Plan fulfill part of the mitigation for project impacts and will ensure that the project meets its short and long-term mitigation obligations.

Time Frame

For a detailed description of the project phasing related to the timeframe see the Martin Slough Biological Assessment

Phase 1 (NRLT): Funded, constructed in 2014
Phase 2-4 (NRLT and lower City): Funded, construction expected summer/fall 2017
Phases 5 and 6 (City): Not currently funded, funding sources identified and grant proposals are forthcoming in 2017 , anticipated implementation will occur in 2018 and possibly 2019

Responsible Parties

The RCAA, in cooperation with the North Coast Regional Land Trust and the City of Eureka, is responsible for project implementation, including the design, construction, and monitoring phases, unless otherwise noted in this plan, e.g., ongoing fish monitoring by the California Department of Fish and Wildlife (CDFW).

The primary contact for this project is:

Elijah Portugal,
Projects Coordinator Natural Resources Services,
Redwood Community Action Agency,
904 G Street, Eureka CA 9550
(707) 269-2058 email: elijah@nrsrcaa.org

MONITORING GOALS

General Approach

This plan identifies the simplest and most cost-effective methods to be applied to fisheries use that when measured, using simple qualitative and quantitative tools, will yield the most information. In developing this fish monitoring plan, we also considered how to minimize the impact of monitoring activities on the habitat and plant and animal species themselves. Non-destructive or low-impact sampling methods were chosen.

We intentionally limited the geographic scope of monitoring to the immediate project site and subject properties, to ensure that all monitoring activities could be implemented without additional access permissions or complications. The project was designed with awareness that it is located in the Elk River watershed set within the larger Humboldt Bay basin and that there are watershed-scale and basin-scale inputs that may impact the success of estuary enhancement within the project site. This monitoring plan does not attempt to monitor the larger ecosystem but to monitor parameters, such as fish use within the site, that are directly and indirectly affected by the larger Elk River and Humboldt Bay ecosystems.

Internal to the project site, we similarly chose *critical areas* and *key areas* to monitor. Critical areas include aquatic habitats in the Martin Slough channel, tributary slough channels, and in- and off-channel ponds where endangered and listed fish species occur.

Monitoring Phases

Like many projects, monitoring for this project occurs in three general phases, including 1) pre-construction or pre-implementation monitoring, 2) construction monitoring, and 3) post-construction monitoring. These three phases of monitoring are linked and act in concert as described below.

Pre-construction monitoring conducted for this project included baseline fish utilization evaluations that established initial site conditions and define background variability. In the case of fish, pre-construction sampling occurred from the summer of 2006 through and will end in the late spring of 2017 (CDFW). In conjunction with the fish sampling, water quality samples were also taken and will be repeated pre- and post-construction. Early pre-construction monitoring has already fulfilled its principal goal of informing the design, implementation, and scheduling of the project. Moreover, pre-construction monitoring identified on-site and off-site reference conditions against which project success will be measured. The methods and results of pre-construction monitoring are detailed in individual reports and are incorporated into the approach and monitoring methods outlined in this plan.

Construction monitoring will be implemented during the construction phase to ensure that construction-related impacts, particularly to listed aquatic species, are avoided or minimized.

This plan will include only those construction monitoring activities that specifically fulfill project permit requirements or are germane to long-term monitoring. This plan will not discuss in detail those monitoring activities which do not define baseline conditions against which project performance and success criteria will be weighed.
Post-construction monitoring will be conducted according to this Monitoring Plan. This monitoring plan outlines a methodology for "time-zero" monitoring initiating at the as-built project condition out to project Year 5. The Monitoring Plan includes both quantitative and qualitative measures to evaluate the both structural and functional components of the project against the project's annual performance and final success criteria. Post-construction monitoring, particularly quantitative evaluations, will be performed in a visible and measurable manner that could be duplicated with some certainty. It will include collection and analysis of data utilizing widely accepted methods in a statistically valid manner where applicable. Similarly, qualitative measuring techniques will be utilized in a manner that reduces observer variability. Data will be made available to interested parties and reviewing agencies in a timely manner, as per the monitoring plan, to allow for course corrections and adaptive management.

The essential purpose of the construction and post-construction monitoring activities is to raise a warning flag if the project's tidal marsh enhancement design components or the current course of management actions are not working so that corrective actions and management may be applied while cost-effective and time sensitive solutions are still available. It is hoped that accurate monitoring can also demonstrate that the current design and management approaches are working and provide confidence in a trajectory of incremental project success as the project meets various annual performance criterion which cumulatively lead to attaining final success criteria.

Parameters

Five general post-construction parameters, including topography, hydrology, water quality, vegetation, and fisheries use will be monitored under this plan. Short-term construction monitoring is a category under this Plan but is not considered a stand-alone parameter for determining final project success. Topography, hydrology, water quality, vegetation, and fisheries use, however, are parameters directly linked to individual long-term goals established for the project and will provide a multi-parameter basis for evaluating the final success of the project. These five parameters were selected to ensure that overlapping structural and functional components assessing both physical and biological characteristics of the site will be measured to evaluate project success.

NOAA Restoration Center's *Minimum Scientific Monitoring Requirements* guidance document posits that at least three parameters must be measured including two *structural* parameters and one *functional* parameter. For the purpose of this plan, topography, hydrology, and water quality are classified as structural (physical or chemical) parameters, while vegetation and fisheries use are functional (biological) parameters. Clearly, there can be overlap between structural and functional, physical and biological parameters. Water fluctuation levels, for example, can both be a structural or functional

parameter. Vegetation can simultaneously be a structural/physical and a functional/biological parameter. Similarly, water quality is a physical/chemical component but also helps to evaluate estuarine function.

In most cases, this plan presents methods to measure multiple structural components within a single parameter. Topography, for example, will measure the length, width, and depth of new slough channels, the extent of sediment aggradation/degradation, the area of new ponds, and so on. Vegetation monitoring will measure multiple structural and functional components, including seedling survival, stem density, percent cover, natural recruitment of native plants, and invasive weed intrusion. Water quality will measure salinity, dissolved oxygen, and temperature: parameters critical to fish utilization of the site.

Qualitative and Quantitative Monitoring

In addition to monitoring structural and functional parameters, the monitoring implemented under this Plan will employ both *qualitative* (observational data) and *quantitative* (numerical data) measures to evaluate project performance and success.

Qualitative monitoring will implement presence/absence observations, estimates of population size, notes on population condition, mapping the boundary of the population, and site conditions assessment using photo-points, and field observations. Qualitative monitoring will be made more effective by observers articulating their qualitative assessments in as quantitative manner as possible. Observers will be prompted to do so by using field data sheets requiring that they make quantitative estimates of areas, plant size classes, relative cover values, depth of sediment deposition, level of high tide wrack lines relative to fixed features, and so forth.

Quantitative monitoring will involve the collection and analysis of numerical physical, chemical, and biological data along permanent fixed transects, channel cross-sections, and selected points. Additional numerical data will be collected at the site level (tidal stage data), macro-plot level (vegetation), and reach level (fish) rather than at fixed points. The location of the sampling unit within these larger sites will be selected at random in some cases and, at other times, will be permanent locations determined by access issues or safety concerns.
The specific monitoring methods, data analysis, and schedule are discussed in the Monitoring Components section of this document.

Reference Sites

One of the tenets of restoration is that it attempts to return an ecosystem to its historic trajectory. The identification of a site or combination of sites that remain unaltered from historic conditions is usually a key tool in developing a restoration project design. Appropriately selected reference sites allow for the evaluation of progress toward restoration endpoints and the accurate assessment of project performance. Two types of reference sites can be used: natural and disturbed.

Since the majority of Humboldt Bay's historic tidal wetlands have been diked and partially filled to create usable agricultural land, it is unlikely that most estuarine restoration sites around Humboldt Bay will recover to their historic pristine (pre-European settlement) state (structure, function, and representative species). Given the high level of disturbance around the Bay, the historic trajectory of a severely impacted ecosystem, like the Martin Slough system, is difficult to determine with complete accuracy. Certain ecosystem functions and values, however, can be restored resulting in substantial site enhancement beneficial to targeted species. Hence, this project is aptly titled the Martin *Enhancement* Project rather than the martin Slough *Restoration* Project. This distinction is not just semantics when it came to identifying reference sites upon which project goals and monitoring were developed.

As a result, two reference sites were selected and combined for this project: one reflecting the current disturbed conditions and the other reflecting as close to natural conditions as possible. The first reference site is the current disturbed project site itself. This disturbed Martin Slough site provides the baseline conditions against which the project will be compared and an indication of the rate of natural recovery had the project not been constructed. The second reference site is located in Fay Slough in an area subject to the tidal prism with representative brackish marsh species (see Figure 3). This site, while subject to a lesser degree of disturbance, provides insight into how the habitat functioned in Martin Slough prior to installation of the dikes, tide gate, and subsequent degradation.

Figure 3. Brackish marsh at the terminal end of Fay Slough at the confluence with Cochran Creek, used as a model of vegetation species composition and distribution for the Martin Slough Enhancement Project.

Using both the natural and disturbed sites as reference formed the basis to judge the progress the enhanced habitat makes in approaching the structural and functional status of a comparable adjacent ecosystem.

Coastal Development Permit Monitoring Parameters

In order to comply with the special conditions of the CDP permit, this Plan provides a program for monitoring the 15.5 acres of brackish marsh and 2.5 acres of juvenile salmonid rearing habitat sites. This Monitoring Plan includes, at the minimum, the following required provisions and components:

1) Performance standards that will assure achievement of the restoration goals and objectives;
2) Submittal of an "as-built" plan demonstrating the project has been constructed according to the approved plans and assessing the biological/ecological status of the "as-built" restoration/enhancements that will be monitored;
3) Assurances that the restoration and enhancement sites will be remediated within one year of a determination by the permittee or the responsible agency that monitoring results indicate that the sites do not meet the goals, objectives, and performance standards herein;
4) Implementation of the monitoring program for five (5) years;
5) Submission of annual reports by December 31 of each year.

This Monitoring Plan will exceed these minimum CDP requirements, as well as NOAA Restoration Center's minimum scientific requirements with the inclusion of the following in the Plan:

1) Several years of pre-construction monitoring to establish a wider understanding of variation in baseline hydrologic and biotic conditions;
2) Construction compliance monitoring as set forth in the Martin Slough Enhancement Project Compliance and Performance Monitoring Plan, and the project's Stormwater Pollution Prevention Plan.
3) Five parameter monitoring, including three structural parameters (topography, hydrology, and water quality) and two functional parameters (vegetation and fish) which exceeds the NOAA requirement for monitoring two structural parameters and monitoring a single functional parameter;
4) Inclusion of a sixth parameter, sediment, and a maximum sediment deposition goal, including measurement and observation of sediment aggradation and degradation within the site;
5) Comparison of the passive and active revegetation strategies to evaluate differences in establishment, cover values, species richness, and cost effectiveness
6) Qualitative monitoring of the compatibility between land uses, including agricultural use (grazing and native plant nursery), conservation, public access and education;

7) And, lastly, a commitment to the promulgation of results of performance monitoring to inform other land managers, designers, and practitioners engaged in estuarine restoration activities around Humboldt Bay.

Annual monitoring of the project by a qualified biologist will determine if the project is incrementally meeting the restoration and enhancement goals. Attainment of the performance and final success criteria will indicate that the project is well on its way towards meeting the long-term habitat goals with little chance of failure.

Specific Monitoring Goals

As elucidated in the *Monitoring Phases* section of this document, the project has monitoring goals and activities before, during, and after construction. With the exception of an additional round of pre-construction water quality monitoring, all pre-construction monitoring activities have already been concluded. Construction monitoring goals are briefly summarized in this Plan and will be included in the project's Pollution Prevention and Monitoring Plan (PPMP). Construction monitoring will ensure that the project has been built according to the approved project plans and specifications.

This Plan focused on and provides specific **post-construction** monitoring goals from the "as-built" condition out to Monitoring Year 5. Post-construction monitoring goals for the five parameters are presented in Table 1 below:

Table 1. Martin Slough Enhancement: Post-construction Monitoring Goals

Parameter	Monitoring Goal
Construction Compliance	Affirm that the project has been built according to the approved project plans and specifications
	Document that the temporary project impacts have been fully mitigated
	Document the post-construction "as-built" condition of the project upon which attainment of the long-term performance and success criteria will be based
Topography (NOAA Tier 1 Hydrologic Reconnection, Implementation, and Permit Monitoring)	Evaluate persistence of post-construction topographic conditions which increase areas subject to tidal inundation to ~15 acres
	Assess changes in width and depth of newly expanded first and second order tidal channels (7,000 linear feet)
	Assess changes in area and depth of off-channel freshwater rearing ponds upstream of the salinity sill
	Monitor marsh elevations and channel cross sections to evaluate rates of channel incision, scour, and sediment aggradation
Hydrology (Adaptive Management)	Measure MHHW and MLLW to evaluate the extent to which the as-built tidal range restores a muted tidal cycle
	Measure Mean of Maximum Monthly tidal elevation to

	assess extent of tidal effects, if any, on upland habitats
Water Quality (Adaptive Management Monitoring for Tide gate Operation)	Measure salinity, dissolved oxygen and water temperature to assess sufficiency of water quality for target habitats and species
Vegetation (Permit Monitoring)	Evaluate conversion of 8 acres of non-native grasslands back to tidal and brackish marsh
	Evaluate establishment of desired vegetative habitats, e.g., tidal marsh, brackish marsh, coastal prairie, freshwater marsh, and riparian habitats, as well as target brackish vegetation associations, i.e., Lyngbye's sedge/hairgrass
	Evaluate active vs. passive revegetation methods
	Evaluate exotic invasive weed establishment in active and passive revegetation areas
Fish Use (NOAA Tier 1 Fish Passage and Use Monitoring and Adaptive Management for Tide gate Operation)	Monitor access to Martin Slough, terminal and off-channel ponds for targeted fish species, i.e., native salmonids and tidewater goby
	Monitor presence/absence and use of targeted fish species in the various aquatic habitats created or enhanced by the project
Working Lands	Monitor use of 30-acres of dedicated agricultural area and effectiveness of exclusionary fencing to keep cattle out of enhancement areas

Performance and Success Criteria

The general monitoring goals above are further subdivided into performance and success criteria in the Monitoring Components section of this document. As previously stated, the performance and success criteria are based on physical, chemical, and biotic conditions and trends observed at reference sites and comparable estuarine enhancement projects. Performance criteria are annual qualitative and quantitative benchmarks against which project progress will be tracked. The final success criteria will be used to determine if the project has substantially met its individual and overall goals within the five (5) year monitoring period. Attainment of the final success criteria will indicate that the project is trending toward meeting the long-term habitat goals with little chance of failure. While overall monitoring will continue for a five year period, if final success criteria are reached for a particular parameter in less than five years, monitoring of that parameter may be discontinued or reduced in scope and frequency.

Vegetative trend characteristics, such as plant vigor/health, natural reproduction, recruitment, and invasive weed establishment are site characteristics to be monitored over time but, unlike simple plant survival which does have a quantitative goal under this Plan; these other characteristics have no fixed performance or success criteria. We cannot predict the rate of natural recruitment of desirable plant species into the passive

revegetation area. Similarly, monitoring of certain water quality parameters (temperature, dissolved oxygen, and salinity) and fish use will inform land managers of trends but do not have fixed performance criteria since these parameters are influenced by multiple off-site factors. For example, construction monitoring will confirm that fish access to the project site has been re-established through replacement of the tide gates and performance monitoring will evaluate if fish are entering the project area. We cannot, however, posit that there will be a certain number of salmonids present or even a percent increase in fish utilization of the project area. Hence, trend characteristics will provide valuable supplementary information concerning site development and use and will help guide maintenance activities and remedial action for some but not all parameters.

There are separate annual performance and final success criteria for each parameter and a correlating monitoring method and schedule. Specific performance and final success criteria are listed for each parameter in the next section of this Plan.

MONITORING COMPONENTS

This section is the heart of the monitoring plan and details the sampling techniques, data analysis methods, and schedule for each characteristic, function, or parameter to be monitored. Monitoring will occur in both *critical* and *key* areas. Critical areas are those aquatic habitats in the Wood Creek channel, tributary slough channels, off-channel and terminal ponds where endangered and listed fish species are most likely to occur. Key areas refer to the seven vegetative habitats to be established. Monitoring will include both large areas, herein referred to as macro-plots, as well as at discrete monitoring sites. Macro-plots are relatively large areas in which a single, or several, sampling units (e.g., line transects) are located, along which point data will be collected that should reflect what is happening within the larger macro-plot area.

Monitoring will include *permanent fixed* photo-points, channel cross-sections, and vegetation transects. Photo-points will show the direction of the photograph with an arrow. Photo-points are not in themselves considered sampling units since they will not be combined and analyzed as an aggregate sample.

Other monitoring activities, such as fish sampling will not be taken in permanent fixed locations but will be *temporary revolving* sites alternating among stream reaches as determined in the field by California Department of Fish and Game (DFG) monitoring biologists. Similarly, mapping of high tide wrack lines and other features that cover large portions of site will be visually determined in the field.

Monitoring activities are described below for each of the six parameters, including construction compliance, topography, hydrology, water quality, vegetation, and fish use. Each section is divided into three subsections as follows: 1) Methods, 2) Data Analysis, and 3) Schedule. Each section has a summary table a may include other figures and tables.

CONSTRUCTION MONITORING

The goal of construction monitoring is to ensure that the project has been built according the approved project plans and has complied with the temporary impact mitigations set forth in the project's Biological Assessment, Mitigated Negative Declaration, and project permits. Construction compliance monitoring will be implemented during the active construction period in accordance with the Martin Slough Enhancement Project Compliance Monitoring Plan, the project PPMP, and regulatory agency permit conditions which have been incorporated into the project's mitigation measures.

The end-product of construction monitoring is the "as-built" plan set which sets the "time zero" baseline conditions upon which fulfillment of mitigations for permanent impacts and all other project goals will be weighed.

Methods

Table 2. Martin Slough Enhancement: Construction Compliance Monitoring

Parameter	Goal	Method	Schedule	Performance Criteria	Success Criteria	Responsible Party
Design Compliance	Affirm that the project has been built according to the approved project plans and specifications	Inspections and checklist	Weekly	All design elements built/installed within engineering tolerances	Channel bottom elevations within 1.0 ft. of design elevations Channel widths within 10% of design width Pond area within 10% of design area, bottom elevation within 1.0 ft. of design elevation	RCAA
PPMP Compliance	Document that the temporary storm-	Inspections and BMP checklist	Pre-, during, and post-cons-truction as	All BMPs installed and maintained	No discharge of pollutants into waters	RCAA

	water impacts have been fully mitigated		per PPMP schedule			
As-built Plan (structural)	Compare historic topography to post-construction topo. Document the post-construction "time-zero" condition of the project	Produce as-built plan set (plan view, X-sec, profile drawings)	Within 120 days of completion of hard construction	As-built plan set complete	Plan made available to agencies and monitors	RCAA
As-built Plan (Revegetation)	Document the post-planting Year 1 condition	Final reveg plan (species, # plants, location, areas)	Within 30 days of vegetation installation	As-built plan set complete	Plan made available to agencies and monitors	RCAA

Construction monitoring will also document information collected during construction relevant to long-term monitoring which may include but not be limited to the following:

- Any construction-related pollutant contamination or spills on site that could affect water quality, soils, or revegetation.
- Turbidity readings in excess of PPMP allowances
- Native plants salvaged or transplanted during construction
- Fish (species and number) captured and relocated during channel dewatering activities
- A map of construction photo-point locations if different from those in this monitoring plan

Data Analysis

Construction compliance inspections will follow checklists developed from the all relevant construction plans, environmental documents, and permits. Completed checklists and photo-documentation of construction activities will provide the basis for determining that the construction phase of the project has been accurately completed and in compliance.

The as-built plan will not simply be a reprint of the project plans and specifications. The as-built plans will compare physical baseline and as-built conditions, in addition to

comparing historical topographic data to current topography. Moreover, the as-built plan will specifically document any changes or deviations from the approved plans, as well as provide additional details about project components, such as revegetation and water quality BMPs that are monitored in the long-term.

Schedule

Construction compliance monitoring will be phased based on the actual construction schedule but will generally be anticipated between October 31, (during the relevant year) and completion of revegetation activities in Spring of that year.

TOPOGRAPHIC MONITORING –NOAA Tier 1 Hydrologic reconnection, implementation monitoring, permit Monitoring

Topographic monitoring is focused on *critical* aquatic areas and *key* revegetation areas. Critical areas include aquatic habitats in the Martin Slough channel, tributary slough channels, and in- and off-channel ponds where the potential for occurrence of endangered and listed fish species is highest. Key areas refer to topographically sensitive vegetative habitats to be established on tidal marsh plains, pond margins, and riparian zones.

Methods

Topographic monitoring is a structural monitoring parameter and is intended to first compare historical topography to current topography to document the as-built condition and then to monitor time-zero topography against annual changes in topography. Quantitative comparison of baseline and as-built topographic conditions will help evaluate the numerous project goals including:

- estimate the increase in tidal range
- determine the number of acres subject to tidal inundation
- evaluate changes in channel geometry and pond bathymetry
- evaluate sedimentation rates

Qualitative changes in topography will be assessed annually while quantitative changes will numerically evaluated bi-annually per Table 3.

Table 3. Martin Slough Enhancement Project: Topographic Monitoring

Parameter	Goal	Method	Schedule	Performance Criteria	Success Criteria	Responsible Party
As-built Plan	Survey "time-zero" topography	Install and survey channel and pond sections	Within 120 days of completion of hard construc-	As-built plan set complete and long-term x-sec transect	AutoCAD file made available to monitors	RCAA

			tion	monuments in place		
Tidal prism	Limit extent of tidal prism in main channel to channel downstream of Pond s G & H	Continuous salinity monitoring in channel with data sondes	Year 0, 1, 3, & 5	Salinity should be less than 1 PPT upstream of Station 62+50	Salinity is less than 1 PPT upstream of Station 62+50	RCAA
Sediment	Evaluate channel geometry and rates of scour and aggradation in channels	Survey fixed X-sections locations to be determined	Year 0, 1, 3, & 5	<20% net annual aggradation or degradation of channel and ponds	<25% net aggradation or degradation of channels and ponds within project site after 5 years	RCAA
Sediment	Evaluate bathymetry and rates of aggradation in terminal and off-channel ponds	Place permanent staff gauge in middle of pond and measure sediment at low tide or low water	Year 0, 1, 2, 3, 4, & 5	<20% net annual aggradation	<25% net aggradation of ponds within project site after 5 years	RCAA
Sediment	Evaluate rates of aggradation on the marsh plain, in channels and in ponds	Photo-points: take photo and estimate sedimenta-tion as N, L, M, or H	Year 0, 1, 2, 3, 4, & 5	Ocular estimation of aggradation is None or Low	Ocular estimation of aggradation is Low or Medium	RCAA

Data Analysis

Tidal Prism: The elevation of the salinity sill determines the extent of tidal influence in the main channel. If the salinity sill settles or scours saline waters will intrude into the upper reach of the channel and the off-channel pond intended to provide freshwater refugia for juvenile salmonid rearing. Hence, maintenance of the salinity sill at an elevation that inhibits saltwater intrusion up to Mean Higher High Water (MHHW) ~6.08 feet (NAVD88) into the upper channel is important. The elevation of the salinity sill will be compared with known tidal elevation data to determine if it is effective as salinity

barrier. Water quality grab samples (discussed later) will also be collected above the salinity sill to compare data sets.

Sediment: Comparison of sequential years of cross-sectional topography at cross-sections and/or staff gauge data will reveal relative rates of channel scour and/or aggradation, as well as overall physical site stability. Quantitative calculation of percent aggradation will be determined by dividing the depth of accumulated sediment by the channel or pond depth multiplied by 100.

Qualitative estimates of sedimentation of channels and pond will be made via annual photo-point documentation and qualitative ocular estimation of sediment rates from those points will be assessed as N=none, L=low, M=medium, or H=high. "None" or "Low" sedimentation rates will indicate that the marsh was excavated "at maturity" meaning no sediment aggradation is required to sustain the targeted hydrologic regime and marsh vegetation and the marsh is not recruiting sediment at a high rate.

High sediment rates approaching >20% bi-annually or >25% aggradation over 5 years have the potential of covering marsh plants with excessive sediment, clogging channels, reducing the extent of tidal inundation, and reducing the overall quality of habitat for fish.

Schedule

As-built topographical survey will be conducted within 120 days of the completion of construction. Pond staff gauge readings will be taken once annually at low tide at the terminal ponds and once annually at maximum draw down of the off-channel pond in September. Photographs of the main channel and pond will be taken annually at photo-points and qualitative estimates of sedimentation rates will be assessed at low tide or maximum pond draw down. Cross-sectional surveys will be shot at permanent fixed transects at Mean Lower Low Water (MLLW) or any low tide event which exposes the channel bottom in Years 0, 1, 3 & 5.

HYDROLOGIC MONITORING -Adaptive management for tide gate operation

Hydrology is a structural (physical) monitoring parameter. The hydrologic goals of the project include restoring a muted tide cycle, expanding brackish marsh habitat, and modifying the primary barrier to fish migration into martin Slough in order to enhance salmonid and tidewater goby access. Replacement of the tide gates and inclusion of a habitat door immediately achieves the latter goal of improved fish migration. Achieving and sustaining the targeted hydrologic regime, however, is critical to establishing a high-functioning muted-tidal marsh with representative brackish marsh vegetation. Vegetative conversion to brackish marsh is predicted to occur out to the blue line, the Mean of Maximum Monthly Tide elevation.

Methods

Tidal stages within the project site will be further monitored via deployment of data loggers (sondes) placed in the following locations:

1) Swain Slough – to assess the background condition
2) Martin Slough Tide gate – to evaluate the influence of Martin Slough
3) Upper Martin Slough channel – to evaluate Martin Slough above the salinity sill

Data sondes will provide continuous download of data, including tidal stage, for the month they are installed. Topographic monitoring alone is not sufficient in assessing the increase in tidal range and determining the acreage subject to tidal inundation. A combination of annual hydrologic mapping and annual photo-documentation, however, will provide quantitative and qualitative measures to evaluate the extent of the as-built tidal range. High tides rather than low tides will have a greater influence over the establishment of brackish marsh on the project site, so mapping the variation within Spring and Neap high tides is more important than mapping the range between MHHW and MLLW.

Table 4. Martin Slough Enhancement: Hydrologic Monitoring

Parameter	Goal	Method	Schedule	Performance Criteria	Success Criteria	Responsible Party
Tidal stage	To further evaluate tidal stages for adaptive manage-ment	Three data sondes collecting DO, salinity, stage and temp will be installed at 3 locations explained below	Four times annually in Nov., Feb., May. & Aug. for one year in Year 0	None – for research, design refinement, and adaptive management	None	RCAA
Mean high tidal range	Restoration of a muted tidal cycle to ~15 acres of slough channel	Walk tidal boundary (MHHW wrack line and lowest of the high tides)	Twice annually during a high Spring tide (full & new moon) and a high	No criteria	A minimum of 1 acre of new wetlands must be created to meet 1:1 mitigation	RCAA

		with GPS to map annual range of high tides; Take photos at photo points	Neap tide (first quarter/third quarter moon) in Years 0, 1, 3, & 5		obligations: restoration of over 15 acres is anticipated at a ratio of 15:1 mitigation: impacts	
Mean of maximum monthly	Predict the maximum extent of vegetation changes from tidal influence	Walk estimated mean maximum tide with GPS; Take photos at photo points	Once annually during high Spring tide ~7.63 ft. NAVD in Years 0, 1, 3, & 5	No criteria	Same as above	NRLT

Data Analysis

Data sonde data will be analyzed to develop tidal stage information and monitor water quality.

Multiple GPS point data will be utilized to map the extent of tidal inundation at selected high tide stages. Comparison of the existing MHHW and the as-built MHHW will provide an estimate of the increase in area of muted tidal marsh created by the project. The area of new wetlands created will be compared to the project's mitigation burden to calculate the acreage of new wetlands created above the required mitigation ratio.

Multiple point GPS data will be utilized to map the proposed Mean of Maximum Monthly tidal elevation in order to predict the maximum extent of vegetation changes resulting from muted tidal influence. This hydrologic mapping will be compared to the results of vegetation monitoring to analyze the qualitative correlation between ecological gradients, revegetation success, and invasive weed recruitment and selected tidal stages.

Photographs taken annually at fixed photo-points will provide additional qualitative information about tidal hydrology and vegetation establishment.

Schedule

Data sondes will be deployed at 3 locations longitudinally distributed throughout the project area (The exact locations are TBD) starting in Feb of 2017 and will be in place for

at least the first two years post construction (until 2019) measuring continuously with the goal to keep them in place as long as possible dependent on necessary funding. This will enable us to adaptively manage the operation of the tide gates to ensure that water quality objectives are met.

The MHHW tidal boundary will be walked with a GPS unit twice annually: once during a high Spring tide during a full or new moon and once during a high Neap tide in the first quarter or third quarter moon. Mapping of the tidal boundary will occur in Year 0 and then bi-annually in monitoring Years 1, 3, & 5. The estimated Mean of Maximum Monthly high tide will be mapped once annually during a high Spring tide ~7.63 ft. NAVD in Years 0, 1, 3, & 5.

Photographs will be taken from fixed photo-points annually.

WATER QUALITY MONITORING -Adaptive management for tide gate operation and fish use

Water quality is the third structural (chemical) monitoring parameter as defined by NOAA fisheries.

Methods

From 2006 – 2017, Michael Wallace collected grab samples of salinity, dissolved oxygen (DO), and temperature as part of his fish monitoring project.

One year of water quality (DO, PH, salinity) data was collected by RCAA in 2015 throughout the project area to provide a baseline data set that complements the water quality data collected by CDFW during their fish sampling from 2006- 2017. RCAA data was acquired using a YSI meter. 3 Data sondes collecting DO, PH, salinity, temp, and water stage will also be deployed when funds are available for their purchase, which is anticipated to occur in February of 2017 or earlier. They will collect continuous data for at least two years post construction with the goal to leave them in place as long as we are able to continue to fund this effort.

Table 5. Martin Slough Enhancement: Water Quality Monitoring

Parameter	Goal	Method	Schedule	Performance Criteria	Success Criteria	Responsible Party
Salinity Dissolved Oxygen Tempera-ture	Restore salt and brackish marsh to lower portion of project and maintain freshwater in upper project	Year 0-5 Data sondes Year 2-5 Grab samples	Salinity DO and Temp will be monitored continuously with data sondes over the course of the project starting in Feb of 2017 (see discussion above for baseline monitoring already completed	daily salinity mean $\leq$ 5 ppt above salinity sill and mean $\geq$ 5 ppt below salinity sill daily D.O. mean $\geq$ 6 mg/l Average daily temperature mean $\leq$ 20^{o}c,	Same as performance criteria	RCAA and DFG
Same as above	Assess WQ sufficiency for target fishes	Same as above	Same as above	Same as above	Same as above	Same as above

Data Analysis

Salinity, dissolved oxygen, and temperature will be measured using data loggers and data will be analyzed by RCAA with consultation from contractors over the course of the project. Numeric values for salinity, dissolved oxygen, and temperature will be compared to the threshold values in Table 5 to evaluate if the water quality is sufficient to sustain revegetation efforts and anticipated fish use. CDFW water quality grab samples include salinity, D.O., and temperature and will be analyzed using field kits by Mike Wallace and submitted in monthly reports.

Schedule

Year 0 - Pre-construction monitoring: Continuous monitoring starting in Feb of 2017 with data sondes by RCAA and NRLT which will include post construction monitoring for 2 years 2017-2019 funded through NOAA fisheries. It is our objective to provide the continuous monitoring beyond 2019 but will be dependent on necessary funds to continue the monitoring effort.

VEGETATION MONITORING –Permit monitoring

Vegetation is a functional (biological) monitoring parameter as defined by NOAA Fisheries. Of the three structural monitoring parameters (topography, hydrology, water quality) and two functional monitoring parameters (vegetation and fish use), vegetation is one of the most observable indicators of project success. Reconversion of pastoral grasslands back to brackish marsh can only occur if the topography, hydrology, and water quality support the vegetation to be established. Hence, vegetation establishment is an indicator that these structural parameters are sufficiently established for vegetation success. Therefore, vegetation monitoring under this Plan is somewhat more robust and detailed than is monitoring of the other parameters.

The principal revegetation goal of the project is to establish 10 acres of vegetative habitats, including tidal marsh, brackish marsh, freshwater marsh, riparian, and coastal prairie plant associations through both passive and active revegetation. Hydrologic and topographic design elements work in concert to diversify micro-habitats and discourage noxious weed establishment. Hence, vegetation monitoring includes the selection of macro-plots to assess vegetation trends and micro-plots to assess success of a given plant species.

Internal to the project site, we similarly chose *critical areas* and *key areas* to monitor. Critical areas include aquatic habitats in the Martin Slough channel, tributary slough channels, and on-channel pond where endangered and listed fish species occur. Key areas refer to the seven vegetative habitats to be established. The key vegetation habitats are relatively large areas in which a single, or several, sampling units (e.g., line transects) are located along which point data will be collected that should reflect what is happening within those larger area.
Vegetation monitoring will measure multiple structural and functional components, including seedling survival, stem density, percent cover, natural recruitment of native plants, and invasive weed intrusion.

Native Plan Revegetation/Recruitment:
facilitate re-conversion of 8 acres of non-native grasslands back to tidal and brackish marsh vegetation through both active and passive revegetation;
revegetate the off-channel pond perimeter and a portion of the riparian corridor with 1 small fruited bulrush (*Scirpus microcarpus*) and willow (*Salix* spp.) sprigs;
minimize surface erosion in areas disturbed by construction activities via temporary seeding with sterilized erosion control grasses and forbs species;

encourage passive revegetation of salt marsh, brackish marsh in the lower third of the Martin Slough and adjacent marsh plain;
minimize exotic invasive plant species on the marsh plain, including aforementioned pasture grasses, by passive tidal inundation, in addition to manual removal of invasive dense-flowered cord grass (*Spartina densiflora*) that may colonize the restoration area after tide gate removal.

Methods

Table 6. Martin Slough Enhancement: Vegetation Monitoring

Parameter	Monitoring Goal
Vegetation	Evaluate conversion of 8 acres of non-native grasslands back to tidal and brackish marsh
	Evaluate establishment of desired vegetative habitats, e.g., tidal marsh, brackish marsh, coastal prairie, freshwater marsh, and riparian habitats, as well as target brackish vegetation associations, i.e., Lyngbye's sedge/hairgrass
	Assess the success of passive revegetation
	Evaluate active vs. passive revegetation methods
	Evaluate exotic invasive weed establishment in active and passive revegetation areas

Sampling Site Selection

Vegetation data will be collected by means of permanent plot sampling. Twelve, 900 square foot plots will be located on the site using a random, stratified sampling method. Within each plot data will be collected on plant survival, percent cover, tree height, site maintenance, plant health and vigor, and natural recruitment. The location of each permanent plot will be established according to the following protocol:

A baseline will be established in four areas proposed for channel or pond expansion. In each of the sites, one transect will be randomly established perpendicular to the baseline at intervals that will vary with each site according to the site's acreage. A minimum of one plot will be randomly assigned to each transect. The northern boundary of each plot will be represented by the transect.

In addition to permanent plot sampling, a qualitative assessment of the entire site will be undertaken to assess the performance of areas outside the sampling plots. This visual reconnaissance could reveal aspects of site performance not exhibited in the sampling plots. Key indicators to be observed would be clusters of mortality, stunting, erosion, fire, vandalism, sedimentation, or changes in channel configuration.

Natural Reproduction/Recruitment

Natural reproduction and recruitment of woody plant species will be monitored in the sample plots. Native and non-native woody plants that become established will be counted and reported by species.

Plant Vigor and Health

A qualitative assessment of overall plant vigor and health will be made. Taken into consideration will be factors such as plant color, bud development, new growth, herbivory, drought stress, fungal/insect infestation, and physical damage. Overall health and vigor will be rated as high, medium, or low as follows:

High =	1-3 =	67-100% healthy foliage
Medium =	4-6 =	34-66% healthy foliage
Low =	7-9 =	0-33% healthy foliage

If a plant's foliage is abnormally sparse, then the health/vigor rating will be lowered accordingly, even if the foliage present is healthy.

A quantitative assessment of plant vigor and health will be made once per year for each woody species planted. A minimum of five percent or 5 individuals (whichever is greater) of each species installed at each site will be sampled. Individuals sampled will be selected at random. Selected individuals will be evaluated and given numerical ratings. These ratings will be compiled by species to provide an overall species health and vigor rating. Data will be used to determine temporal trends in vigor for each species at each site, to help determine the cause of poor survival and growth of certain species, and to assist with development of remedial action recommendations. Once monitoring has transitioned from survival counts to cover sampling, vigor assessments will be done only in monitoring years preceded by 2 sampling periods in which no increase in cover has occurred.
The foliage, wood, and root crown, will be given a separate vigor rating for each individual sampled. Factors such as color, bud development, new growth, herbivory, drought stress, fungal/insect infestation, and physical damage will be taken into consideration when rating the foliage, wood, and root crown. Non-lethal ailments typically associated seasonally with certain species (e.g. summer mildew on box elder, spring anthracnose on sycamore) shall not be cause for down-grading. Vigor ratings will be assigned on a scale of 0 to 4 (Table 7).

Table 7. Health and Vigor Rating Scale.

Health and Vigor Numerical Rating	General Condition	Specific Criteria
0	Dead	
1	Poor	> 75 % of plant affected by cumulative symptoms

2	Fair	25 - 75 % of plant affected by cumulative symptoms
3	Good	< 25 % of plant affected by cumulative symptoms
4	Excellent	< 5 % of plant affected by cumulative symptoms

An overall rating for each plant sampled will be calculated by averaging the ratings for foliage, wood, and root crown.

For example: Plant Sample # 133
Foliage Rating = 2; Wood Rating = 3; Root crown Rating = 2
Overall Rating = (2+3+2)/3 = 2.33

Photo-documentation

Photo-documentation of the site will be conducted from a number of fixed locations. Photographs also will be taken to record any events that may have a significant effect on the success of restoration, such as flood, fire, or vandalism. The locations for photo-documentation will be selected prior to construction.

Qualitative Measures/Methods. Photographs shall be taken of the existing wetlands from different vantage points both at mid-winter (hydrologic peak) and mid-summer (vegetative peak) to document the relative habitat quality of the site, including the obligate and facultative wetland plants occurring on site, the period of inundation/saturation, and evidence of wildlife use. A similar number of photo-points (3) will be established at each wetland pond and photos will be taken annually as described previously. Reference photographs from the impact wetland will be compared to the mitigation wetlands by a qualified biologist, botanist, or wetlands ecologist to determine the relative ecological and hydrological success of the replacement wetlands on a qualitative basis.

Quantitative Measures. Vegetative success shall be measured based on a minimum relative cover of 60% herbaceous hydrophytes (e.g. combined obligate wetland, facultative wetland, and wetland transition species) within the wetland ponds. *Coverage* is defined as the proportion of the ground occupied by a perpendicular projection to the ground from the outer or aerial parts of the members of a plant species, whereas *relative coverage* is the proportion of that coverage represented by hydrophytic plant species compared to that of all plant species in the wetlands area. It is not necessary to monitor plant density, frequency, species richness, and mortality to determine relative cover of hydrophytic species.
Both planted and naturally recruited hydrophytic plants may be included in the calculation of total cover. We include all hydrophytes in the evaluation of percent cover because the wetlands hydrology is expected to vary significantly from year to year and pond to pond favoring certain species above others. When ponds or parts of ponds are subject to longer periods of inundation they will likely be dominated by obligate wetland

plant species such as cattail, spike rush and beard grass. Shorter periods of inundation in the ponds (or parts of ponds) will likely favor facultative species such as sedge and dock. Ponds that experience soil saturation without inundation will probably be dominated by rushes and grasses.

Data Analysis

Data analysis will be conducted as soon as possible following collection of field data. Minimizing delays between data collection and data analysis provides an opportunity to return to the site to verify any discrepancies encountered in the original data set and to conduct further sampling as necessary before the site evolves significantly. Data analysis will be conducted using standard spreadsheet, data base, and statistical computer applications. Data input will be spot checked and results will be carefully reviewed by the project supervisor. All data will be presented separately for each mitigation site, as well as combined for an overall review of the project as a whole. The yearly monitoring results will be compared with results from previous years to evaluate site progress. The data will be analyzed using a standard spreadsheet, data base, and statistical package.

Plant Survival

The overall survival rate and survival rate of each species will be compared to survival rates in previous years and to the performance criteria. Survival rates will be based on the original number of plants installed.

Percent Cover

Total tree and shrub cover will be compared to values determined in previous years, as well as to cover goals and performance criteria. Each transect will be considered a replicate in the data analysis. Significant differences in total cover between years will be tested using Analysis of Variance (ANOVA). A Tukey's test will be used to test for significant differences between individual years.

Average percent cover by native woody species is expected to be relatively low during the first three years following plant installation, but should increase quickly thereafter. Table 8 provides the performance criteria for percent cover.

Table 8. Riparian Mitigation Site Percent Cover Performance Criteria.

Monitoring Year	Average Percent Cover of Native Trees	Average Percent Cover of Native Shrubs
Year 2	2 %	1 %
Year 3	4 %	3 %
Year 4	8 %	5 %

Year 5	15 %	7 %
Year 6	25 %	10 %
Year 8	35 %	15 %

Natural Reproduction/Recruitment

Natural recruitment rates will be recorded each monitoring year on the basis of recruit density and frequency for all woody species within the mitigation sites. Mean, range and variances for recruit densities and absolute and relative frequencies will be presented separately for native and non-native woody species. It should be noted, however, that the maintenance program calls for the removal of all non-native woody plants during the plant establishment period.

Natural recruitment of seedlings of woody plant species will be monitored in a five-foot wide band along each transect. Native and non-native woody plants that become established will be counted and reported by species.

Photo-documentation

Photographs taken of the site will provide valuable visual information as a compliment to the graphs, figures and narrative material which will be included in the monitoring reports.

Plant Health and Vigor

Plant vigor and health will be reported as the average health and vigor of each species. Health and vigor ratings will be evaluated over time.

Schedule

Vegetation and wildlife monitored will be conducted at the sites between April and October of each monitoring year. The USACE jurisdictional area delineation will be conducted in the spring of Year 3 to take advantage of the best opportunities to examine the site's soils and hydrology. Table 9 lists the years in which each site characteristic will be monitored. Monitoring reports will be prepared following data collection and will be submitted to the permitting agencies by December 31 of each monitoring year.

Table 9. Riparian Mitigation Site Monitoring Schedule

Years	**1**	**2**	**3**	**4**	**5**	**6**	**8**	**10**
Survival	x	x	x	x	x			
Percent Cover	x	x	x	x	x	x	x	x
Tree Height	x				x			x

Site Maintenance	x	x	x	x	x			
Natural Recruitment	x	x	x	x	x	x	x	x
CDFG Delineation	x							
USACE Delineation			x					
Wildlife Use					x			x
Photo document	x	x	x	x	x	x	x	x

Vegetation Monitoring

- conduct vegetation transect surveys annually for 5 years
- evaluate exotics colonization on tidal hummocks
- map and evaluate extent of Lyngbye's sedge

The expected conversion of aquatic habitats and associated fish fauna, and conversion of marsh types from seasonal grazed wetland to higher quality brackish marsh is the primary goal of this project. The project proponents and design team are committed to working with the grant funding agencies to obtain additional project funds to monitor the specific biological responses to the implementation of this project.

- Seasonal Wetland Forbs Plantings—at least 15 percent cover by the plantings in Year 1, 30 percent in Year 3, and 50 percent in Year 5. Final success shall be determined by a formal wetland delineation certified by the USACE.
- Grass and Forbs Seeding—50 percent cover by the seeded species in Year 1, 60 percent in Year 2, 75 percent cover in Year 3.

Herbaceous Wetland Plant Cover

Monitoring parameters for herbaceous wetland plants will include percent cover and health and vigor.

Percent cover will be monitored in Years 1, 3, and 5; longer if needed. Percent cover by species will be determined by the quadrat method (Bohnam 1989). This technique may be refined using a gridded quadrat (subdivided quadrat). Quadrats shall be $1m^2$ plots sampled at random locations along permanent transects in a stratified-random design. The percent cover of each species rooted within the plot will be visually estimated to the nearest 5%. The wetland indicator status (WIS) according to the United States Fish and Wildlife Service (USFWS) National List of Plant Species that Occur in Wetlands (1988) of each species will be determined, and the average percent cover attributable to the wetland indicator statuses shall be calculated. Those totals shall then be presented according the WIS classifications provided in the United States Army Corps of Engineers (USACE) Delineation Manual (Environmental Laboratory 1987).

Sampling shall continue until an adequate sample size is attained. Sufficiency shall be determined by running a cumulative percent cover average of the quadrats sampled until site variability is adequately sampled (Kershaw 1973). Thus, the sampling area will vary among years depending upon interannual plant cover variability. This is accomplished

by graphing the cumulative average percent cover on the Y-axis against the number of quadrats on the X-axis during sampling.

Seeded Grass Cover

Grasses will be monitored during each of the first three years after seeding using the quadrant method (Bonham, 1989) as described above. Seeded areas outside of the seasonal wetland mitigation area need not be summarized by WIS. The data will be averaged to determine the cover of seeded and naturally recruited grasses and forbs.

Plant Survival

All trees and shrubs shall show 80% survival during the 3-year plant establishment period. All dead plants will be replaced if survival falls below this performance criterion. In Year 5, two years after the completion of plant establishment and the cessation of artificial irrigation, survival shall not be lower than 70%. If survival falls below the Year 5 performance criterion, the causes of plant mortality will be assessed and remedial actions to increase plant survival will be implemented. Survival results following the cessation of irrigation will indicate whether plants' roots are sufficiently developed to support the plants under natural conditions.

Percent Cover

Table 10 lists the performance criteria for present cover.

Table 10. Riparian Mitigation Site Percent Cover Performance Criteria

Monitoring Year	Tree Cover	Shrub Cover
Year 2	2%	1%
Year 3	4%	3%
Year 4	8%	5%
Year 5	15%	7%

FISHERIES MONITORING – NOAA Tier 1 monitoring fish passage, adaptive management monitoring for tide gate operation

Methods

The pre project fish monitoring has been conducted by CDFW from 2006- 2017 at 6 sites throughout Martin Slough (Figure 4). The post project monitoring will include CDFW's original 6 sites and add an additional 6 sites for a total of 12 sites. CDFW fish monitoring was instigated to determine juvenile salmonid utilization of Martin Slough as a non-natal rearing area and to obtain water quality data. DFG was trying to ascertain if conditions Martin Slough allow juvenile salmonids to rear here in the summer or seek refuge out of the main channel of Elk River during high stream flows in the winter and spring. DFG was also collecting baseline information prior to and during planned habitat restoration and tide gate modification in Martin Slough.

DFG conducted fish sampling at selected sampling sites with minnow traps baited with small pieces of frozen salmon roe in Martin Slough. WQ measurements were gathered using a YSI Model 85 handheld water quality meter.

Tidewater goby will be monitored annually for 3 years in conjunction with salmonid monitoring.

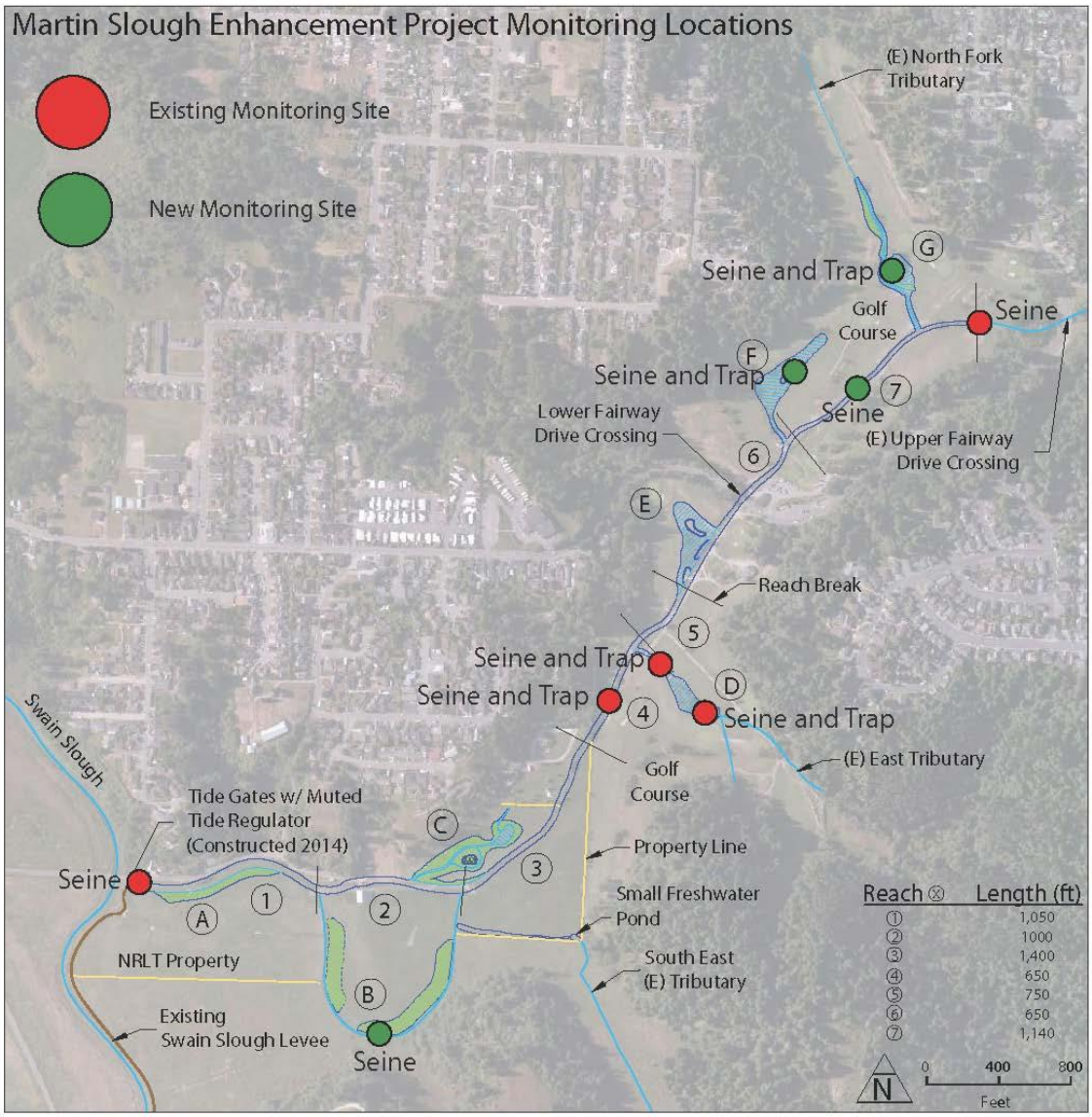

Figure 4: Fish sampling locations in Martin Slough showing the established CDFW monitoring locations in red and the new sites in green. Post project monitoring will include all the sites shown.

Table 11. Martin Slough Enhancement: Fish Monitoring Goals

Parameter	Monitoring Goal
Fish Use	Monitor access to the main stem of martin Slough, its tributary sloughs, terminal and off-channel ponds for targeted fish species, i.e., native salmonids and tidewater goby Sites and methods will mirror the monitoring effort from CDFW 2006-2017 (Figure 4).
	Monitor presence/absence and use of targeted fish species in the various aquatic habitats created or enhanced by the project

Data Analysis

Data analysis will consist of tabulating the results of fish monitoring surveys and calculating fish usage on a fish per area basis. Fish abundance is influenced by many factors, such as spawning run size, spawning success, survival from egg to fry, and successful downstream migration and re-distribution. Therefore data has to be considered in context of the annual spawning run for coho salmon, the main target species.

Analysis will also include a narrative assessment of the size of the spawning run as reported by California Department of Fish & Wildlife in order to obtain an order of magnitude assessment of the number of fish inhabiting off-channel rearing ponds and in-channel habitat in relationship to observations from other Humboldt Bay tributaries.

Schedule

Fish monitoring will be conducted on a monthly basis throughout the year for 2 years.

Fisheries

Monthly fisheries monitoring for juvenile salmonid use will be conducted by CDFW and/or licensed fisheries biologists, including monitoring for tidewater goby colonization into new slough channels. Continued monitoring will provide information to better understand their habitat needs and distribution. From the USFWS website: "The species, which is endemic to California, is typically found in coastal lagoons, estuaries, and marshes with relatively low salinities (approximately ten parts per thousand (ppt)). Its habitat is characterized by brackish shallow lagoons and lower stream reaches where the water is fairly still but not stagnant. However, tidewater gobies can withstand a range of habitat conditions: they have been documented in waters with salinity levels from 0 to 42 parts per thousand, temperatures from 8 to 25º Celsius, depths from 25 to 200 centimeters, and dissolved oxygen levels of less than one milligram per liter."

Water Quality Monitoring with Fish Sampling

Standard protocols will be used that have been established by CDFW for discrete water quality samples collected during fish monitoring and will record temperature, salinity, water depth, DO and conductivity.

Performance Monitoring

PARAMETER	TYPE OF MONITORING	FREQUENCY	SCHEDULE	SUCCESS CRITERIA	REMEDIAL ACTIONS
Topography	Longitudinal channel profile of Martin Slough , and cross section survey to replicate cross sections and profiles in Design Report; and plot	Collected in Years 1, 3 and 5	Once per year during summer	Less than twenty five percent net aggradation of channels and ponds within project site after 5 years (some deposition and scour is anticipated but no net volume decrease of ponds and channels	Excavate material to achieve as-built condition unless otherwise agreed by regulatory agencies
Tidal stage	Data logger for tidal stage	Continuous, download monthly	Continuous for one year and through the period where the MTR is being adjusted	Not Applicable (NA) – for research purposes to inform/ refine future designs	NA
Water quality	Temperature, salinity, dissolved oxygen (DO) at upstream of project	Continuous, download monthly for year one and through the period where the MTR is being adjusted; once per month years two through five	Continuous for year one and through the period where the MTR is being adjusted; monthly readings for years two though five	Avg. Max daily wa. temp. $\leq$ 22^{o}c, Avg. daily wa. temp $\leq$18 ^{o}c Avg. daily DO $\geq$ 4 ppm, Avg. daily salinity $\leq$ 1 ppt in pond G	Modify tide regulator; install shade cover (native willows, alders, spruce)
Vegetation	Plant survival and species composition	Once per year	Annually for 5 years	80% survival of woody plants; 70% cover by native brackish marsh plants on tidal hummocks above MHHW after 5 years	Replant, re-seed until criteria met; mechanically or manually remove invasive plants within re-constructed tidal channels and tidal hummocks
Fisheries - salmonids	Seining, minnow traps	Once per month	Monthly for 2 years post project	Annual average net increase of 50% over pre-project coho salmon numbers (combined total for juvenile young-of-the-year and one-year old fish) monitored by CDFW	None – uncontrollable variables (ocean conditions, run size) can affect numbers; this is a continuation of CDFW's monitoring
Fisheries – tidewater goby	Seining,	Once per year	Annually between May 1 to June 30 for 2-5 years	Presence in new terminal ponds at upper end of new slough channels B10 and B11 (Design Report, p. 56; and pond at sta.	None – uncontrollable variables affect tidewater goby distribution including

				18+00 Design Report, p. 53, Fig 3-1); continued presence in pond at auxiliary tide gate	predation by birds and fish.
Photographic Record for overall site evolution, visual aesthetics	Photo monitoring	Once/year during the same season	Annually for 5 years		

REPORTING

To be useful, monitoring data, results, and "lessons learned" have to be shared.

As-built Plans

After project construction is complete, an as-built report will be prepared. This report will include a copy of the time-zero as-built plans and will provide a thorough description of the status of the site, with particular attention paid to any adjustments to the final restoration plan. This report will be completed within 4 months of the completion of site implementation and will be submitted to the permitting agencies.

Within 8 weeks of the completion of mitigation site construction, the monitoring biologist will prepare marked-up "time zero" landscaping plans. These plans will show all significant deviations from the planting plans including the number of plants installed, species installed, deviations from plant installation locations, unplanted areas, changes to floodplain construction, and any features added to the site that were not included in the landscape plans. Future analysis of the site will be based on these plans.

Annual Reports

Monitoring of vegetation, hydrology, and soil stability in the mitigation sites will take place in April-September of each monitoring year. Monitoring reports will be submitted to the regulatory permitting agencies by December 31 of each monitoring year. Hard copy reports will be provided to funding agencies, the Coastal Commission, the CA Department of Fish and Game, and other regulatory agencies who request a hard copy. Electronic copies in PDF format will be placed on the RCAA web site and will be provided to other interested parties who request a copy of the report. Copies of photo-documentation and maps showing monitoring areas will be included in the annual reports. Field data sheets will be available for review by the agencies upon request.
A final report summarizing the restoration project, evaluating the sites' overall performance and providing maintenance recommendations will be prepared and submitted 60 days prior to the end of monitoring. Monitoring will cease when the site has met all of the project goals or when the reviewing agencies agree that the site is expected to meet the goals with little chance of failure.
Reports will be prepared in the following format:

1. Introduction
2. Materials/Methods
3. Results
4. Discussion
5. Recommendations
6. References
7. Appendixes

Trend Characteristics

Trend characteristics to be monitored include natural recruitment, tree height and wildlife use. The results of the trend characteristics monitoring will aid in the assessment of the site's progress.

Final Report

A final monitoring report will be prepared at the end of the five-year monitoring period by a qualified wetlands biologist. The report will evaluate whether the enhancement site conforms to the goals, objectives, and performance standards set forth in the approved final restoration and enhancement plan. The report will address all of the monitoring data collected over the five- year period.

MAINTENANCE, CONTINGENCIES, AND REMEDIAL ACTIONS

Provisions will be included to ensure that the enhancement site will be remediated within one year of a determination that monitoring results indicate that the sites do no meet the goals, objectives, and performance standards in the approved final monitoring plan.

If annual performance criteria are not met for any portion of the restoration project in any year, or if any of the final success criteria are not met, the owners or owners' representative will work with the permitting agencies to prepare an analysis of the cause(s) of failure. If requested by the permitting agencies, a remedial action plan will be prepared in concert with the permitting agencies' action plan within 2 months of the initial request. Implementation of remedial actions will depend on the nature of the work; thus, a schedule will be presented to the agencies for review and approval as part of the remedial action plan. Alternative mitigation site planning will begin if it becomes apparent that the long-term success criteria for the sites will not be achieved in a timely fashion.

Monitoring protocols and results will be reviewed annually. Adjustments to monitoring procedures or schedule may need occasional adjustments to remain accurate, complete and feasible. Such adjustments will be developed by monitoring staff and project managers and presented to the permitting and resource agencies prior to application. After reviewing annual reports the agencies may also have suggestions for adjustments to the monitoring program. Agency suggestions will be reviewed, and if appropriate will be incorporated into the following year's monitoring program. The key is to anticipate that the monitoring program is flexible and adaptable to meet unanticipated or changing conditions.

Monitoring Procedure Adjustments

The protocol and results of the monitoring program will be reviewed annually by the monitoring biologists. Adjustments to monitoring procedures or schedule may be required as the site changes over time, or if logistical problems render a procedure unduly difficult to conduct. Such adjustments would be developed by the project biologist and reported to the permitting and resource agencies and proposed for approval prior to

application. After reviewing annual reports the agencies may also have suggestions for adjustments to the monitoring program. Agency suggestions will be reviewed, and if appropriate will be incorporated into the following year's monitoring program. The key is to anticipate that the monitoring program may need occasional adjustments to remain accurate, complete and feasible.

Monitoring results from Years 1 through 5 will be compared to the performance criteria to evaluate progress toward the goals and to provide a basis for remedial action recommendations. The results of the monitoring in Year 5 will be compared to the final success criteria to determine if these criteria have been met. If the final success criteria have not been met, remedial actions and monitoring will continue until they have been met.

Replanting

Replanting will be performed if plant mortality of any species exceeds the performance criteria. Monitoring will start anew if mortality exceeds 30% in a given year, or if at the end of Year 5, survival is less than 50%.

ADAPTIVE MANAGEMENT STRATEGIES

Analysis of monitoring results will be used as part of an adaptive management strategy to ensure that the goals and objectives of the project are met. There are four general areas that may require remedial action if goals and objectives are not met:

- Topography
- Tidal Stage
- Water Quality
- Vegetation

The other two areas are fisheries – salmonids and tidewater goby. Because there are so many factors that affect abundance of fish species the project cannot be expected to guarantee numbers of fish, but rather only providing the right kind of habitat and access to the habitat. The 4 parameters mentioned above will assess whether the habitat goals were met and if adaptive management needs to be employed.
The Performance Monitoring table on page 43-44 describes the remedial action required if success criteria are not met. These actions are described in more detail below.
<u>Topography:</u>
By surveying cross sections and longitudinal profiles annually the project team will determine whether or not the success criteria have been met. While specific sites are expected to experience varying degrees of scour and deposition there is an expectation that the hydraulic analysis and modeling have accurately predicted the ratio of the tidal volume to channel and pond dimensions so that the tidal prism will maintain the design conditions within reason. The success criteria have been set as less than 25% net aggradation of channels and ponds within 5 years when looking at average scour and deposition over all cross sections surveyed.

If the success criteria are not met, maintenance dredging will be implemented and adjustments will be made to the operation of the tide gate as recommended by the engineers.

Tidal Stage:

Tidal stage in Swain Slough is controlled by tide levels in the Elk River estuary, Humboldt Bay, and the Pacific Ocean. Tidal stage within Martin Slough will be controlled by the muted tide regulator on the tide gates. There is no success criteria set for tidal stage as the desired outcome is not the tidal stage itself, but the habitats that the tidal prism will maintain. The initial objective of the project is to maintain the tide gates open up to elevation 6.0 (NAVD 88) and then allow the tide gates to close, keeping the habitat door open via the muted tide regulator to simulate the natural hydrograph so that it peaks at around 6.5 feet. The tide gates and habitat door can be adjusted to attain the desired tidal stage inside Martin Slough. The muted tidal stage inside Martin Slough may need to be adjusted as determined by the results of the topographic surveys. However an analysis of the reasons for the changes in topography will have to be made to determine whether the cause of failure to meet topographic goals is a result of sediment emanating from the upper watershed or failure of the muted tidal prism to transport sediment as predicted by the model. If the failure is due to miscalculations on the sediment transport capabilities of the tidal prism, adjustments to the muted tide regulator will be made and the response of channel sediment will be measured and re-evaluated at the next monitoring. If the failure is due to excess sediment entering the project site from upstream, channel dredging may be performed to correct the immediate situation. However, such a scenario would also require investigation into the cause of the excess sediment and an analysis of what the appropriate treatment should be.

Water Quality:

Water quality goals include temperature, salinity, and dissolved oxygen. Water Temperature in Martin Slough under a muted tide regime will be largely controlled by water temperatures in Swain Slough, the source of the incoming tide. Water temperature can be positively influenced in Martin Slough by increasing shade cover and maintaining adequate depth of the channel. With the tidal marshes and the tidal plains in the lower channel, there will be ample areas of shallow water that will be subject to solar heating during the summer, even on cloudy days. Therefore the average daily temperature will be the criteria. If temperature goals are not met, an assessment of the factors causing the failure to meet the criteria will be made, including monitoring water temperatures in Swain Slough and in Martin Slough upstream of the project. If water temperature upstream and downstream does not meet the success criteria, it will be difficult if not impossible to make changes at the project site that will affect water temperature. If water temperature upstream and downstream does meet the success criteria but water temperature at the project site does not, additional plantings of riparian vegetation to create shade will be made. If topographic monitoring shows the channel has net aggradation greater than the success criteria, loss of depth will likely be a contributing factor to the failure to meet temperature objectives, in which case actions taken to restore the topographic objectives will also contribute to correcting the problem that is causing the failure to meet the temperature objectives.

Salinity objectives are set to maintain mostly fresh water conditions at Pond G, designated as tidally influenced freshwater habitat. If salinity objectives are not met, the

options will be to adjust the tide regulator to shut off at a lower elevation or to install a salinity sill downstream of Pond G. Because the channel grade through the project is so low, it may be necessary to install the salinity sill.

Dissolved oxygen objectives are set to maintain the minimum observed DO levels currently used by coho salmon juveniles. Failure to meet the DO objectives would likely be due to vegetation conditions in the pond or channel. If DO objectives are not met, an assessment of aquatic vegetation will be made to determine if that is the causative factor. If it is, the aquatic vegetation will be mechanically removed. If the low DO is caused by another factor, an assessment of contributing factors will be made and a remediation plan will be developed.

Vegetation:

Plant survival and species composition will be monitored annually for five years. Success criteria include 80% survival of woody plants and 70% cover by native brackish marsh plants on tidal hummocks above MHHW after 5 years. Adaptive management strategies if the criteria are not met include replanting or re-seeding until criteria met; and mechanically or manually remove invasive plants within re-constructed tidal channels and tidal hummocks. Due to the climate conditions at the project site (foggy summers, abundant rain from Fall through Spring), irrigation is not planned. Irrigation would also not be applicable to salt and brackish marsh plants. However if the freshwater plantings in the riparian zone do not meet the success criteria, an assessment of the causative factors will be made and the appropriate remedial action will be implemented. Remedial action could include installing irrigation or implementing a weed control program consisting of weed eradication and use of weed cloth to suppress weeds.

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