



## **NORTH COAST RESOURCE PARTNERSHIP**

### **2018/19 IRWM Project Application**

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The North Coast Resource Partnership (NCRP) 2018/19 Project Application Instructions and additional information can be found at the NCRP 2018/19 Project Solicitation webpage (<https://northcoastresourcepartnership.org/proposition-1-irwm-round-1-implementation-funding-solicitation/>). Please fill out grey text boxes and select all the check boxes that apply to the project. Application responses should be clear, brief and succinct.

**Project Applications will be accepted until 5:00 pm, March 8, 2019.** It is important to save the application file with a distinct file name that references the project name. When the application is complete, please email to [kgledhill@westcoastwatershed.com](mailto:kgledhill@westcoastwatershed.com)

**If you have questions, need additional information or proposal development assistance please contact:**

- Katherine Gledhill at [kgledhill@westcoastwatershed.com](mailto:kgledhill@westcoastwatershed.com) or 707.795.1235
- Tribal Projects: Sherri Norris, NCRP Tribal Coordinator at [sherri@cieaweb.org](mailto:sherri@cieaweb.org) or 510.848.2043

**Project Name:** Carbon SequestLower Mattole River and Estuary Enhancement Project Phase II

#### **A. ORGANIZATION INFORMATION**

**1. Organization Name: Mattole Restoration Council**

**2. Contact Name/Title**

Name: Nathan Queener

Title: Executive Director

Email: [nathan@mattole.org](mailto:nathan@mattole.org)

Phone Number (include area code): 707-629-3514

**3. Organization Address (City, County, State, Zip Code):**

PO Box 160, Petrolia, Humboldt, CA, 95558

**4. Organization Type**

- ☐ Public agency  
☒ Non-profit organization  
☐ Public utility  
☐ Federally recognized Indian Tribe  
☐ California State Indian Tribe listed on the Native American Heritage Commission's California Tribal Consultation List  
☐ Mutual water company  
☐ Other:

**5. Authorized Representative (if different from the contact name)**

Name: Pam Conn

Title: Contract Manager

Email: pam@mattole.org

Phone Number (include area code): 707-442-4775

**6. Has the organization implemented similar projects in the past?** ☒ yes ☐ no

Briefly describe these previous projects.

Over the past 6 years we have been implementing the BLM 10 Year Estuary Restoration Plan. This included the installation of 21,000 ft. of trenched willow baffles, 5000 ft. of livestock exclusion fencing, placement of 400 whole trees in the estuary as individual structures, apex jams, and bank protection structures, installation of 20,000 native plants, and restoration of 800 ft. of historic slough channels. This proposal is a continuation of priority projects outlined in the BLM Plan.

**7. List all projects the organization is submitting to the North Coast Resource Partnership for the 2018/19 Project Solicitation in order of priority.**

1. Lower Mattole River and Estuary Enhancement Phase II

**8. Organization Information Notes:**

The Mattole Restoration Council (MRC) and Mattole Salmon Group (MSG) are both community based nonprofits that have worked together for over 35 years to improve the ecological conditions of the Mattole Watershed. The proposed work will be completed with guidance from the Mattole Technical Advisory Committee (TAC) which includes staff from BLM, Humboldt County Public Works, USFWS, CDFW, SCC, NOAA, NMFS, DWR, and adjacent landowners. The proposed project is the continuation of a collaborative effort with these stakeholders to improve aquatic and riparian habit, increase water quality, and address erosion issues in the lower Mattole River and Estuary. The group recently received the National Riparian Challenge Award from American Fisheries Society for work implemented in Phase 1.

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**B. ELIGIBILITY**

**1. North Coast Resource Partnership and North Coast IRWM Objectives**

GOAL 1: INTRAREGIONAL COOPERATION & ADAPTIVE MANAGEMENT

☒ Objective 1 - Respect local autonomy and local knowledge in Plan and project development and implementation

- ☐ Objective 2 - Provide an ongoing framework for inclusive, efficient intraregional cooperation and effective, accountable NCIRWMP project implementation
- ☐ Objective 3 - Integrate Traditional Ecological Knowledge in collaboration with Tribes to incorporate these practices into North Coast Projects and Plans

#### GOAL 2: ECONOMIC VITALITY

- ☒ Objective 4 - Ensure that economically disadvantaged communities are supported and that project implementation enhances the economic vitality of disadvantaged communities by improving built and natural infrastructure systems and promoting adequate housing
- ☒ Objective 5 - Conserve and improve the economic benefits of North Coast Region working landscapes and natural areas

#### GOAL 3: ECOSYSTEM CONSERVATION AND ENHANCEMENT

- ☒ Objective 6 – Conserve, enhance, and restore watersheds and aquatic ecosystems, including functions, habitats, and elements that support biological diversity
- ☒ Objective 7 - Enhance salmonid populations by conserving, enhancing, and restoring required habitats and watershed processes

#### GOAL 4: BENEFICIAL USES OF WATER

- ☒ Objective 8 - Ensure water supply reliability and quality for municipal, domestic, agricultural, Tribal, and recreational uses while minimizing impacts to sensitive resources
- ☐ Objective 9 - Improve drinking water quality and water related infrastructure to protect public health, with a focus on economically disadvantaged communities
- ☐ Objective 10 - Protect groundwater resources from over-drafting and contamination

#### GOAL 5: CLIMATE ADAPTATION & ENERGY INDEPENDENCE

- ☒ Objective 11 - Address climate change effects, impacts, vulnerabilities, and strategies for local and regional sectors to improve air and water quality and promote public health
- ☒ Objective 12 - Promote local energy independence, water/ energy use efficiency, GHG emission reduction, and jobs creation

#### GOAL 6: PUBLIC SAFETY

- ☒ Objective 13 - Improve flood protection and reduce flood risk in support of public safety

### 2. Does the project have a minimum 15-year useful life?

- ☒ yes ☐ no

If no, explain how it is consistent with Government Code 16727.

### 3. Other Eligibility Requirements and Documentation

#### CALIFORNIA GROUNDWATER MANAGEMENT SUSTAINABILITY COMPLIANCE

- a) Does the project that directly affect groundwater levels or quality?
  - ☐ yes ☒ no
- b) If Yes, will the organization be able to provide compliance documentation outlined in the instructions, to include in the NCRP Regional Project Application should the project be selected as a Priority Project?
  - ☐ yes ☐ no

#### CASGEM COMPLIANCE

- a) Does the project overlie a medium or high groundwater basin as prioritized by DWR?  
☐ yes ☒ no
- b) If Yes, list the groundwater basin and CASGEM priority:
- c) If Yes, please specify the name of the organization that is the designated monitoring entity:
- d) If there is no monitoring entity, please indicate whether the project is wholly located in an economically disadvantaged community.  
☐ yes ☐ no

#### URBAN WATER MANAGEMENT PLAN

- a) Is the organization required to file an Urban Water Management Plan (UWMP)?  
☐ yes ☒ no
- b) If Yes, list the date the UWMP was approved by DWR:
- c) Is the UWMP in compliance with AB 1420 requirements?  
☐ yes ☐ no
- d) Does the urban water supplier meet the water meter requirements of CWC 525?  
☐ yes ☐ no
- e) If Yes, will the organization be able to provide compliance documentation outlined in the instructions, to include in the NCRP Regional Project Application should the project be selected as a Priority Project?  
☐ yes ☐ no

#### AGRICULTURAL WATER MANAGEMENT PLAN

- a) Is the organization – or any organization that will receive funding from the project – required to file an Agricultural Water Management Plan (AWMP)?  
☐ yes ☒ no
- b) If Yes, list date the AWMP was approved by DWR:
- c) Does the agricultural water supplier(s) meet the requirements in CWC Part 2.55 Division 6?  
☐ yes ☐ no

#### SURFACE WATER DIVERSION REPORTS

- a) Is the organization required to file surface water diversion reports per the requirements in CWC Part 5.1 Division 2?  
☐ yes ☒ no
- d) If Yes, will the organization be able to provide SWRCB verification documentation outlined in the instructions, to include in the NCRP Regional Project Application should the project be selected as a Priority Project?  
☐ yes ☐ no

#### STORM WATER MANAGEMENT PLAN

- a) Is the project a stormwater and/or dry weather runoff capture project?  
☐ yes ☒ no
- b) If yes, does the project benefit a Disadvantaged Community with a population of 20,000 or less?  
☐ yes ☐ no
- e) If No, will the organization be able to provide documentation that the project is included in a Stormwater Resource Plan that has been incorporated into the North Coast IRWM Plan, should the project be selected as a Priority Project?



☐ yes      ☐ no

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## C. GENERAL PROJECT INFORMATION

### 1. Project Name: Lower Mattole River and Estuary Enhancement Project Phase II

### 2. Eligible Project Type under 2018/19 IRWM Grant Solicitation

- ☐ Water reuse and recycling for non-potable reuse and direct and indirect potable reuse
- ☐ Water-use efficiency and water conservation
- ☐ Local and regional surface and underground water storage, including groundwater aquifer cleanup or recharge projects
- ☐ Regional water conveyance facilities that improve integration of separate water systems
- ☒ Watershed protection, restoration, and management projects, including projects that reduce the risk of wildfire or improve water supply reliability
- ☐ Stormwater resource management projects to reduce, manage, treat, or capture rainwater or stormwater
- ☐ Stormwater resource management projects that provide multiple benefits such as water quality, water supply, flood control, or open space
- ☐ Decision support tools that evaluate the benefits and costs of multi-benefit stormwater projects
- ☐ Stormwater resource management projects to implement a stormwater resource plan
- ☐ Conjunctive use of surface and groundwater storage facilities
- ☐ Decision support tools to model regional water management strategies to account for climate change and other changes in regional demand and supply projections
- ☒ Improvement of water quality, including drinking water treatment and distribution, groundwater and aquifer remediation, matching water quality to water use, wastewater treatment, water pollution prevention, and management of urban and agricultural runoff
- ☐ Regional projects or programs as defined by the IRWM Planning Act (Water Code §10537)
- ☐ Other:

### 3. Project Abstract

Summer and winter rearing habitat for juvenile salmon and steelhead will be improved within the lower two miles of the Mattole River by creating 1200 ft of slough/alcove, installing 12,000 ft. of willow baffles , and planting 8000 riparian trees and 4000 wetland plants. The project will have multiple long-term benefits for riparian habitat and water quality, as established riparian vegetation will slow floodplain turnover, store sediment and rack wood, and increase channel heterogeneity.

### 4. Project Description

The slough channel creation and riparian planting proposed here is part of a larger 10-year restoration plan implemented by the MSG, MRC, and BLM, with funding and technical support from CDFW, SCC, DWR, NMFS, NFWF, USFWS, and private landowners to enhance riparian and aquatic habitat in the lower two miles of the Mattole River. The work proposed here was designed and prioritized in this planning process, and builds on previous work to accelerate the recovery of riparian and floodplain processes and provide immediate habitat benefits for salmonids.

Historic logging and 100 year flood events led to massive sediment inputs that drastically altered conditions throughout the watershed. Sediment inputs have greatly decreased due to natural recovery and

restoration efforts in the upper watershed, but this land-use legacy lingers in the lower Mattole River - many of the floodplains lack riparian tree species to provide shade, flow resistance, and future wood recruitment. The river channel offers little cover to juvenile salmonids and a lack of high-flow velocity refuge. Summer water temperatures regularly reach stressful levels reducing growth and survival.

The project has two primary restoration elements:

1. : Slough Restoration - Create 1200' of historic slough channel at the tidal margin to provide alcove habitat for juvenile salmonids throughout a range of water levels.
  - 1.1 Excavate 3500 cubic yards of sediment according to design plans, and transport and re-grade off-site
  - 1.2 Install 25 wood features in slough

## 2: Riparian and Floodplain Restoration

- 2.1 With the TAC and HumCo Public Works finalize planting site selection to provide maximum ecological benefit as well as reduce the chance of erosion of Lighthouse Road
- 2.2 Remove 100 whole trees from grassland restoration sites on the Prosper Ridge Prairie Restoration Project (BLM) and place at bank protection and willow baffle sites; grade tree-removal sites and install native grass and forb seed
- 2.3 Install 12,000 ft. of willow baffles at bank protection and floodplain sites
- 2.4 Install 8000 riparian trees and 4000 wetland plants; seed and mulch all bare soils

The placement of large wood and willow baffles at on floodplains and eroding terrace margins will facilitate stable island formation, multiple channel formation (anabranching), scour (where appropriate), and protect existing riparian woodlands, carbon sequestration BENEFITS BENEFITS

## 5. Specific Project Goals/Objectives

Goal 1: Improve high- and low-flow rearing habitat for salmon and steelhead

Goal 1 Objective: Complete excavation of 1200' of slough channel

Goal 1 Objective: Slough remains inundated through range of high and low flows

Goal 1 Objective: Maximum summer water temperatures in slough lower than in main channel

Goal 1 Objective: salmonids rear in completed slough at winter and summer conditions

Goal 2: Increase riparian forest cover

Goal 2 Objective: Install 12000' feet of willow baffles

Goal 2 Objective: Plant 8000' riparian trees

Goal 2 Objective: Plants meet survival targets in monitoring plan

Goal 2 Objective: Decreased proportion of un-vegetated gravel bar and terrace after five years

Goal 3: Increase channel heterogeneity and slow floodplain turnover

Goal 3 Objective: Increase in channel edge habitat through anabranching and growth of existing islands

Goal 3 Objective: Promote more variable topographic diversity in the reach

Goal 3 Objective: Promote native riparian vegetation colonization and growth

Additional Goals & Objectives (List)

Increase connectivity to existing sloughs, alcoves, and other off-channel habitat

## 6. Describe how the project addresses the North Coast Resource Partnership and North Coast IRWM Plan Goals and Objectives selected.

Intraregional cooperation /adaptive management: the Mattole TAC promotes cooperation and learning across watersheds, and incorporates adaptive management into the planning process

Economic vitality: improved habitat increases angling and recreational/wildlife viewing opportunity; slowing floodplain turnover reduces the chance of county road eroding into the river, preserving access to the Mattole Beach Campground and the Lost Coast Trail, one of the most popular backpacking destinations in the region.

Ecosystem Conservation: in addition to improving salmon habitat this project will benefit a suite of species, including wetland bird species and amphibians

Beneficial uses of water: reduced erosion and increased in-channel sediment storage improves water quality for recreation and wildlife

Climate adaptation: the project sequesters carbon through increase riparian forest, and reduces water temperatures

Public Safety: reduced chance of river eroding county road

**7. Describe the need for the project.**

The project is critical to efforts to restore Mattole salmon and steelhead runs that declined precipitously in the 1970s and '80s due to sedimentation and riparian destruction. In recent years, steelhead and Chinook salmon populations have shown a promising resurgence - likely due in part to improved conditions in the upper watershed - and have approached federal recovery targets in years with stronger runs, however Mattole coho remain at high risk of extinction, with most annual returns in the past decade no more than 50 adults. This project will provide an immediate benefit for all three species, but particularly coho given their greater need for low-velocity habitat. The wide valley of the estuary and lower Mattole River has great potential to offer extensive slough/wetland habitat, but the natural processes of large wood recruitment and island formation that create these features have been interrupted, leading to the need for this project.

**8. List the impaired water bodies (303d listing) that the project benefits:**

Mattole River, Cape Mendocino HU, Mattole River HA; CalWater Watershed #11230072: The Mattole is listed as impaired by both sediment and temperature, with a TMDL completed in 2002. Additionally, the Mattole drains into a unique overlap of the following designations: Critical Coastal Area, California Marine Protected Area, and Area of Special Biological Significance. This work builds on over three decades of watershed restoration work throughout the Mattole.

**9. Will this project mitigate an existing or potential Cease and Desist Order or other regulatory compliance enforcement action?** ☐ yes ☒ no

If so, please describe?

**10. Describe the population served by this project.**

Residents and landowners of the Mattole River watershed will be the primary population served by this project. The median household income for the area is less than 64% of the statewide average. The number of residents and landowners within the watershed is approximately 2500. In addition to these private residents, visitors to the popular BLM-managed Lost Coast Trail and Mattole Beach will benefit from the project's water quality and watershed enhancement goals.

**11. Does the project provide direct water-related benefits to a project area comprised of Disadvantaged Communities or Economically Distressed Communities?**

- ☒ Entirely
- ☐ Partially
- ☐ No

**List the Disadvantaged Community(s) (DAC)**

Petrolia

**12. Does the project provide direct water-related benefits to a project area comprised of Severely Disadvantaged Communities (SDAC)?**

- ☐ Entirely
- ☐ Partially
- ☒ No

**List the Severely Disadvantaged Community(s)**

**13. Does the project provide direct water-related benefits to a Tribe or Tribes?**

- ☐ Entirely
- ☐ Partially
- ☒ No

**List the Tribal Community(s)**

If yes, please provide evidence of support from each Tribe listed as receiving these benefits.

**14. If the project provides benefits to a DAC, EDA or Tribe, explain the water-related need of the DAC, EDA or Tribe and how the project will address the described need.**

This project benefits by creating jobs in fisheries restoration in the hopes of restoring fish populations so that one day the community can once again benefit from catching fish for their food supply. This project also improves the ecological health of the watershed, directly which benefits the health of the people in the community.

**15. Does the project address and/or adapt to the effects of climate change? Does the project address the climate change vulnerabilities in the North Coast region?** ☒ yes ☐ no

If yes, please explain.

The project improves ecological resiliency to climate change in several ways. Increased riparian shade and channel complexity decrease water temperatures and increase the incidence of cool water refugia, features which will be even more important for salmonids in a warming world. The project also reduces wildfire risk by removing encroaching, extremely dense Douglas fir from coastal prairie. Increased riparian tree extent increases floodplain resiliency in the incidence of increased flood flows

**16. Describe how the project contributes to regional water self-reliance.**

The project will improve local residents of watershed processes and improve land stewardship.

**17. Describe how the project benefits salmonids, other endangered/threatened species and sensitive habitats.**

The project increases high-flow refugia, decreases water temperatures, and increases habitat complexity and cover for salmonids. All fish that leave the watershed pass through the project area prior to ocean

entry, and high-quality habitat that facilitates growth can be especially critical in improving smolt survival in the ocean. Decreased sediment input to the ocean will benefit the Critical Coastal Area, Marine Protected Area, and Area of Special Biological Significance just offshore.

**18. Describe local and/or political support for this project.**

Mattole restoration groups enjoys strong political and local support for our work. Congressman Jared Huffman, former State Senator Pat Wiggins, former State Assemblyman Wes Chesbro, as well as Humboldt and Mendocino County supervisors have all expressed support through the years. This project is supported by BLM, local landowners, the SCC, CDFW, NFWF, the USFWS, the County of Humboldt, and Sanctuary Forest.

**19. List all collaborating partners and agencies and nature of collaboration.**

Mattole Restoration Council: Project lead, will implement riparian restoration and manage contract

Mattole Salmon Group: Project collaborator and partner, will manage slough excavation and fish and water quality post-project monitoring

BLM will provide permitting and planning, save the 1602 permit; and donate whole trees for instream use  
BLM, CDFW, USFWS, SCC, Humboldt County, SWRCB and NMFS will all provide technical support and advice through the TAC

**20. Is this project part or a phase of a larger project?** ☒ yes ☐ no

**Are there similar efforts being made by other groups?** ☒ yes ☐ no

**If so, please describe?**

Over the past 6 years the MRC and MSG working with the BLM and other agencies have completed 21,000 ft. of trenched willow baffles, 5000 ft. of livestock exclusion fencing, placement of 400 whole trees installation of 20,000 native plants, and restoration of 800 ft. of historic slough channels in the Lower Mattole River. This proposal is also a component of a watershed-wide restoration collaboration that includes Sanctuary Forest, an NGO based in Whitethorn.

**21. Describe the kind of notification, outreach and collaboration that has been done with the County(ies) and/or Tribes within the proposed project impact area, including the source and receiving watersheds, if applicable.**

The MRC and MSG have worked with Humboldt County over the past decade to implement high priority restoration projects within the Mattole watershed, and will continue to coordinate with Public Works when projects interface with county infrastructure. The County passed a resolution in support of this multi-phased project as part of a submittal to the State Coastal Conservancy in 2015. Members of the Bear River Tribe have reviewed the BLM 10 Year plan and are supportive.

**22. Describe how the project provides a benefit that meets at least one of the Statewide Priorities as defined in the 2018 IRWM Grant Program Guidelines and Tribal priorities as defined by the NCRP?**

This projects meets at least two of the statewide priorities: Protect and Restore Important Ecosystems, and Increase Operational and Regulatory Efficiency. Estuaries, wetlands, and riverine floodplains are all highly productive ecosystems with high biodiversity potential. Additionally, the lower Mattole River is the northern gateway to the King Range National Conservation Area and 30,000 acre King Range Wilderness, and adjacent to multiple marine protected areas. The creation of the 10-year estuary restoration plan that included permitting for a broad suite of restoration actions on BLM land achieved significant administrative efficiency and has facilitated the implementation of a large number of projects in only six years.

**23. Project Information Notes:**

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## D. PROJECT LOCATION

### 1. Describe the location of the project

Geographical Information

**The proposed project will be implemented in the lower two miles of the Mattole River mainstem, including the Mattole River estuary.**

**Downstream extent: 124°20'57.09"W,40°17'25.61"N**

**Upstream extent: 124°20'57.09"W,40°17'25.61"N**

### 2. Site Address (if relevant):

The project will occur directly north of ~2000-3500 Lighthouse Road, Petrolia.

### 3. Does the applicant have legal access rights, easements, or other access capabilities to the property to implement the project?

☒ Yes If yes, please describe

☐ No If No, please provide a clear and concise narrative with a schedule, to obtain necessary access.

☐ NA If NA, please describe why physical access to a property is not needed.

Project will occur entirely on BLM-managed land. Arcata BLM and restoration NGOs have been working collaboratively on restoration projects for decades - this project is part of 10-yr restoration plan developed in collaboration with BLM, and the agency has been intimately involved in project.

### 4. Project Location Notes:

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## E. PROJECT TASKS, BUDGET AND SCHEDULE

### 1. Projected Project Start Date: 6/1/18

**Anticipated Project End Date: 6/1/2021**

### 2. Will CEQA be completed within 6 months of Final Award?

☒ Yes State Clearinghouse Number: 2018024001

☐ NA, Project is exempt from CEQA

☐ NA, Not a Project under CEQA

☐ NA, Project benefits entirely to DAC, EDA or Tribe, or is a Tribal local sponsor. [Projects providing a water-related benefit entirely to DACs, EDAs, or Tribes, or projects implemented by Tribes are exempt from this requirement].

☐ No

### 3. Please complete the CEQA Information Table below

Indicate which CEQA steps are currently complete and for those that are not complete, provide the estimated date for completion.

CEQA STEP	COMPLETE? (y/n)	ESTIMATED DATE TO COMPLETE
Initial Study	y	
Notice & invitation to consult sent to Tribes per AB52	y	
Notice of Preparation	y	
Draft EIR/MND/ND	y	
Public Review	y	
Final EIR/MND/ND	y	
Adoption of Final EIR/MND/ND	y	
Notice of Determination	y	
N/A - not a CEQA Project		

If additional explanation or justification of the timeline is needed or why the project does not require CEQA, please describe.

**4. Will all permits necessary to begin construction be acquired within 6 months of Final Award?**

- ☒ Yes  
☐ NA, Project benefits entirely to DAC, EDA, Tribe, or is a Tribal local sponsor  
☐ No

**5. PERMIT ACQUISITION PLAN**

Type of Permit	Permitting Agency	Date Acquired or Anticipated
CWA Section 404	Army Corps of Engineers	8/2/18
401 certification	SWRCB	6/12/18
ESA Section 7 consultation	NMFS	6/18/18
Neg. Determination Concurrence	CA Coastal Commission	3/30/18
1602 LSA	CA DFW	7/1/20

**For permits not acquired: describe actions taken to date and issues that may delay acquisition of permit.**

Application for CDFW 1602 permit will commence when contract for project is signed - we have received multiple 1602 permits for similar work in past years, CDFW staff have been involved in the Mattole TAC and are familiar with the project, and we do not anticipate any issues with promptly applying for and being issued permit.

**6. Describe the financial need for the project.**

Most riparian and stream restoration work is expensive, and both the MRC and MSG are unable to implement significant work at this scale without the support of federal or state contracts, as other large sources of funding do not exist.

**7. Is the project budget scalable?** ☒ yes ☐ no

**Describe how a scaled budget would impact the overall project.**

The budget is scalable but it would require us to seek other funding sources to complete project tasks. Scaling the project by 25% would allow us to fully complete one of the two major tasks, and then we would seek other funding for the other task. Scaling the project by 50% would require us to seek funding for both tasks because it would be financially and logistically inefficient to complete contracting and mobilizing heavy equipment twice for the same task.

**8. Describe the basis for the costs used to derive the project budget according to each budget category.**

The costs for each category are based on data from previously implemented projects. During phase 1 project managers kept detailed records of labor production rates and contractor cost by task. We used that data to estimate construction costs in 2020. All construction and labor rates are based on 2020 CA Prevailing Wage rates listed on the DIR website for each particular craft. Our accounting software is able to track project costs associated to labor, construction and admin.

**9. Provide a narrative on cost considerations including alternative project costs.**

The project uses a mix of restoration strategies that we have found to be the most cost-effective for working in this particular environment.

**10. List the sources of non-state matching funds, amounts and indicate their status.**

CDFW FRGP (NOAA Funds) - \$78,000 secured 6/1/18, \$26,000 secured 6/1/17  
USFWS Coastal Program - \$25,000 secured 6/1/18, \$25,000 anticipated May 2019  
Pacific Marine Estuary Program - \$49,000 anticipated April 2019  
BLM - \$60,800 Secured 1/1/18

**11. List the sources and amount of state matching funds.**

State Coastal Conservancy - \$289,000 secured 6/1/2018

**12. Cost Share Waiver Requested (DAC or EDA)?** ☐ yes ☒ no

Cost Share Waiver Justification: Describe what percentage of the proposed project area encompasses a DAC/EDA, how the community meets the definition of a DAC/EDA, and the water-related need of the DAC/EDA that the project addresses. In order to receive a cost share waiver, the applicant must demonstrate that the project will provide benefits that address a water-related need of a DAC/EDA. The project is within a DAC, but we do not request a cost-share waiver since we have secured the required cost-share amount.

**13. Major Tasks, Schedule and Budget for NCRP 2018 IRWM Project Solicitation**

Please complete MS Excel table available at <https://northcoastresourcepartnership.org/proposition-1-irwm-round-1-implementation-funding-solicitation/>; see instructions for submitting the required excel document with the application materials.

**14. Project Tasks, Budget and Schedule Notes:**

Task A. Project Administration - \$42,600 4/1/2019 - 6/1/2021  
Task C. Planning and Permitting - \$11,000 1/1/18 - 12/31/20  
Task D. Construction/Implementation - \$602,565 6/1/18 - 1/31/21  
D.3 Middle Slough Restoration - Excavate 1200 ft of slough; install 25 wood structures  
D.4 Riparian and Floodplain Restoration



- D4.1 Harvest 100 whole trees from Prosper Ridge Prairie Restoration Project; grade; seed  
 D4.2 Install 100 trees and 12,000 ft of willow baffles at bank protection and floodplain sites  
 D4.3 Plant 8000 riparian trees and 4000 wetland plants at riparian and slough restoration sites

## F. PROJECT BENEFITS & JUSTIFICATION

1. Does the proposed project provide physical benefits to multiple IRWM regions or funding area(s)?

☐ yes ☒ no

If Yes, provide a description of the impacts to the various regions.

2. Provide a narrative for project justification. Include any other information that supports the justification for this project, including how the project can achieve the claimed level of benefits. List any studies, plans, designs or engineering reports completed for the project. *Please see the instructions for more information about submitting these documents with the final application.*

The project is the result of a collaborative, multi-disciplinary process facilitated by the BLM involving biologist, engineers, and physical scientists. Projects in this proposal are described in the following attached plans: the BLM EA completed for the project, also known as the 10-year estuary plan; the Lower Mattole Riparian Restoration Plan completed by the Mattole Restoration Council; and the slough excavation plans completed by Mike Love and Associates. Projects proposed here have been vetted by this multi-disciplinary team, and are also the result of having seen and learned from some less successful and transitory projects implemented in the Mattole estuary in past decades.

3. Does the project address a contaminant listed in AB 1249 (nitrate, arsenic, perchlorate, or hexavalent chromium)? ☐ yes ☒ no

If yes, provide a description of how the project helps address the contamination.

4. Does the project provide safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes consistent with AB 685? ☐ yes ☒ no

If Yes, please describe.

5. Does the project employ new or innovative technologies or practices, including decision support tools that support the integration of multiple jurisdictions, including, but not limited to, water supply, flood control, land use, and sanitation? ☐ yes ☒ no

If Yes, please describe.

6. For each of the Potential Benefits that the project claims complete the following table to describe an estimate of the benefits expected to result from the proposed project. [See the NCRP Project Application Instructions, Potential Project Benefits Worksheet and background information to help complete the table. The NCRP Project Application, Attachment B includes additional guidance, source materials and examples from North Coast projects.]

## PROJECT BENEFITS TABLE

Potential Benefits Description	Physical Amt of Benefit	Physical Units	Est. Economic Value per year	Economic Units
<b>Water Supply</b>				
<b>Water Quality</b>				
Sediment Reduction	6200 tons	tons	\$68,200/year	\$11/ton/year
Decrease in max daily water temperature (contributes to smolt production, below)	1.5 deg. C		Included below	
<b>Other Ecosystem Service Benefits</b>				
Fishery Improvement - increased smolt production - avoided cost of captive broodstock program	8700	smolts/year	\$100,050/year	11.50/smolt/yr
Habitat restoration - acre of wetland created	0.75	acres	\$3000/year	\$4000/acre/year
Habitat Restoration - acre of riparian habitat created	4	acres	\$480/year	\$120/acre/year
<b>Other Benefits</b>				
Carbon Sequestration - Conifers planted	2000	trees planted	\$980/year	\$0.49/conifer
Carbon sequestration - hardwood planted	7200	Trees planted	\$5258/year	\$0.64/hardwood
Reduced chance of flood damage to Lighthouse Road due to riparian slowing floodplain turnover and channel migration rates	0.25	miles of road	\$250,000/year	\$1 million/mile

### 7. Project Justification & Technical Basis Notes:

Sediment reduction value includes estimated deposition around willow baffles (2200 tons) and reduced terrace erosion (4000 tons)

Decrease in max daily temperature is based on data from pilot 250' of slough excavation completed in 2014 - temperature data logger in slough showed summer max temperatures consistently 1.5C less than in mainstem outside of slough mouth

Fishery Improvement value: number of smolts is based on max count of Chinook and Steelhead parr/pre-smolts observed in 2014 slough excavation (3,000), increased based on increased area of completed slough - 17,400, divided by two to represent conservative assumptions about length of slough use by individual fish and mortality. Dollar value is approximate cost to rear a single coho smolt at the Kingfisher Flat Conservation Hatchery in Santa Cruz - benefit is avoided cost of needing to implement a captive rearing program by avoiding population declines through improved habitat

Reduced chance of flood damage to Lighthouse Road due to riparian slowing floodplain turnover and channel migration rates - avoided cost based on estimated road replacement cost of \$1mil/mile, with 0.25 miles of road at greatest risk

Carbon Sequestration - used number of conifer planted at 0.49/tree and number of hardwood planted =7200 at 0.64/tree (included willow assuming one "tree" every 10' of baffle over long term)

## Major Tasks, Schedule and Budget for North Coast Resource Partnership 2018/19 IRWM Project Solicitation

**Project Name:** Lower Mattole River and Estuary Restoration - Phase 2  
**Organization Name:** Mattole Restoration Council

Task #	Major Tasks	Task Description	Major Deliverables	Current Stage of Completion	IRWM Task Budget	Non-State Match	Total Task Budget	Start Date	Completion Date
<b>A Category (a): Direct Project Administration</b>									
1	Administration	In cooperation with the County of Humboldt sign a sub-grantee agreement for work to be completed on this project. Develop invoices with support documentation. Provide audited financial statements and other deliverables as required. Register with DIR and provide weekly certified payroll, financial tracking	Invoices, audited financial statements and other deliverables as required	0%	\$27,600.00	\$0.00	\$27,600.00	6/1/18	1/31/21
2	Monitoring Plan	Develop Monitoring Plan to include goals and measurable objectives	Final Monitoring Plan	0%	\$0.00	\$2,000.00	\$2,000.00	3/1/18	6/1/18
3	Labor Compliance Program	Execute service agreement with Labor Compliance Program company	NA - Project will register with DIR and provide certified payroll	0%	\$0.00	\$0.00	\$0.00	6/1/20	1/31/21
4	Reporting	Develop monthly reports describing work completed, challenges, and strategies for reaching remaining project objectives. Develop Final Report	Quarterly and Final Reports; Shapefiles; Project Maps; Pre and Post Drone Photos	0%	\$15,000.00	\$0.00	\$15,000.00	4/1/20	6/1/21
<b>B Category (b): Land Purchase/Easement</b>									
1				0%	\$0.00	\$0.00	\$0.00		
<b>C Category (c): Planning/Design/Engineering/Environmental Documentation</b>									
1	Final Design /Plans	100% Design Plans for Middle Slough Restoration (Mike Love and Assoc.) and Lower Mattole Riparian Enhancement Plan (MRC)	100% Design Plans	100%	\$0.00	\$26,000.00	\$26,000.00	6/1/17	3/1/18
2	Environmental Documentation: CEQA/NEPA	CEQA and NEPA permitting completed by BLM staff including site visits, meeting with agencies, and documentation	Permit	100%	\$0.00	\$8,000.00	\$8,000.00	6/1/17	6/30/18
3	Permit Development *: SWRCB 401 and ACE 404	SWRCB 401 and Army Corps 404 permitting completed by BLM staff including site visits, meeting with agencies, and documentation	Permit	100%	\$0.00	\$2,000.00	\$2,000.00	6/1/17	6/30/18
4	Permit Development *: Coastal Commission	Coastal Commission Negative Determination completed by BLM staff including site visits, meeting with agencies, and documentation	Permit	100%	\$0.00	\$1,000.00	\$1,000.00	6/1/17	6/30/18
5	Permit Development *: NMFS Section 7	NMFS Section 7 permitting completed by BLM staff including site visits, meeting with agencies, and documentation	Permit	100%	\$0.00	\$2,000.00	\$2,000.00	6/1/17	6/30/18
6	Permit Development: CDFW LSA 1602	1602 permitting completed by MRC staff for 2018 Slough and Riparian work including permit fee and staff time	Permit	100%	\$0.00	\$4,000.00	\$4,000.00	5/1/18	6/15/18
7	Permit Development: CDFW LSA 1602	1602 permitting to be completed by MRC staff for proposed Slough and Riparian work including permit fee and staff time	Permit	0%	\$7,000.00	\$0.00	\$7,000.00	4/1/20	6/1/20
8	Project Planning	Meet with Mattole Technical Advisory Committee (TAC) pre and post project; Meet with HumCo Public Works to coordinate willow baffle installation with Lighthouse Rd flood protection; Pre-Project Drone images and photo points	Pre-Project Drone Imagery, Mattole TAC sign-in sheet	50%	\$4,000.00	\$4,800.00	\$8,800.00	1/1/18	1/31/21
<b>D Category (d): Construction/Implementation</b>									
1	Construction/Implementation Contracting	Contract with licensed heavy equipment contractors and engineers including staff time for price negotiations and contract creation	Sub-Contracts	40%	\$2,000.00	\$4,000.00	\$6,000.00	6/1/18	7/1/20
2	Mobilization and Site Preparation	Mobilize tools, pumps, tool storage, security, and safety equipment to project site	NA	50%	\$1,032.00	\$1,000.00	\$2,032.00	6/1/18	10/15/20
3	Project Construction/Implementation: Middle Slough Restoration	Survey and stake slough channel; Clear vegetation and excavate 1200 ft. of historic slough channel, install 25 large wood habitat features; de-watering during construction	Pre and Post Project Drone Photos, Project Photos	40%	\$211,425.00	\$99,000.00	\$310,425.00	6/1/18	10/15/20
4	Project Construction/Implementation: Riparian and in-stream Restoration and Bank Stabilization	Remove and truck 100 whole trees from 2 acre encroached grassland to in-stream, riparian and bank stabilization sites; grade and install native seed at removal/grassland restoration sites; install trees and 12,000 ft of willow baffles; irrigation, native seed and mulching; Install 12,000 native plants at Slough and Riparian sites	Pre and Post Project Drone Photos, Project Photos	25%	\$379,108.00	\$94,000.00	\$473,108.00	6/1/18	1/31/21
5	Project Signage	Create a project sign describing work and install at Mattole Estuary Overlook	Project Sign	100%	\$0.00	\$1,000.00	\$1,000.00	6/1/18	10/15/18
6	Project Close Out, Inspection & Demobilization	Inspect project components and establish that work is complete. Verify that all project components have been installed and are functioning as specified will be conducted as part of construction inspection and project closeout. Conduct project completion photo monitoring. Prepare record drawings.	As-Built and Record Drawings; Project completion site photos	40%	\$1,000.00	\$1,000.00	\$2,000.00	8/1/18	10/15/20
7	Project Performance Monitoring	The performance of the project will be monitored in accordance to the Monitoring Plan using the following tools and methods: seedling survival plots, dissolved oxygen and temperature monitoring, and juvenile salmonid snorkel surveys	Annual Monitoring Reports with seedling survival data and juvenile dive/WQ data and project photos	0%	\$0.00	\$8,000.00	\$8,000.00	6/1/21	5/30/24
8	Construction Administration	Complete tasks necessary to administer construction contract. Keep daily records of construction activities, inspection, and progress. Conduct project construction photo-monitoring.	Construction Management Logs; Completed construction administration tasks documented in monthly progress reports	0%	\$8,000.00	\$6,000.00	\$14,000.00	6/1/18	11/1/20
<b>Total North Coast Resource Partnership 2018/19 IRWM Grant Request</b>					<b>\$656,165.00</b>	<b>\$263,800.00</b>	<b>\$919,965.00</b>		
<b>Is Requested Budget scalable by 25%? If yes, indicate scaled totals; if no delete budget amount provided.</b>					<b>\$492,123.75</b>	<b>\$263,800.00</b>	<b>\$689,973.75</b>		
<b>Is Requested Budget scalable by 50%? If yes, indicate scaled totals; if no delete budget amount provided.</b>					<b>\$328,082.50</b>	<b>\$263,800.00</b>	<b>\$459,982.50</b>		

## Budget Detail for North Coast Resource Partnership 2018/19 IRWM Project Solicitation

**Project Name:** Lower Mattole River and Estuary Restoration - Phase 2

**Organization Name:** Mattole Restoration Council

### Budget Detail

Row (a) Direct Project Administration Costs					
Project Management Type	Personnel by Discipline	Number of Hours	Hourly Rate	% of Cost (if applicable) *	Total Admin Cost
Administration	Executive Director	100	\$90		\$9,000
Administration	Bookkeeper	60	\$60		\$3,600
Administration	Contract Manager	500	\$60		\$30,000
<b>Total</b>					<b>\$42,600</b>
* What is the percentage based on (including total amounts)?		n/a			
* How was the percentage of cost determined?		n/a			

Row (b) Land Purchase/Easement

Row (c) Planning/Design/Engineering & Environmental Documentation					
Personnel (Discipline)	Major Task Name	Number of Hours	Hourly Rate	Total Cost	
Project Manager	C8- Project Planning	50	\$80.00	\$4,000	
Project Manager	C7- Permit Development	25	\$80.00	\$2,000	
Materials -1602 Permit	C7- Permit Development			\$5,000	
<b>Total</b>				<b>\$11,000</b>	

Row (d) Construction/Implementation				
Personnel (Discipline)	Work Task and Sub-Task (from Work Task Table)	Number of Hours	Hourly Rate	Total Cost
Project Manager	D1 - Construction Contracting	25	\$80.00	\$2,000
Project Manager	D2 - Mobilization	6	\$80.00	\$480
Project Manager	D-6 - Project Close-out	12.5	\$80.00	\$1,000
Project Manager	D-8 Construction Administration	100	\$80.00	\$8,000
Laborer (Prevailing Wage Area 2 Group 3)	D2 - Mobilization	6	\$92.00	\$552

## Budget Detail for North Coast Resource Partnership 2018/19 IRWM Project Solicitation

**Project Name:** Lower Mattole River and Estuary Restoration - Phase 2

**Organization Name:** Mattole Restoration Council

Laborer (Prevailing Wage Area 2 Group 3)	D-4 Riparian, In-stream, Bank stabil,	1841	\$92.00	\$169,372
Sub - Contractor Mattole Salmon Group	D-3 Middle Slough Restoration	Sub Amount		\$206,625
Heavy Equipment Sub-Contractors	D-4 Riparian, In-stream, Bank	Sub Amount		\$160,000
Engineering Firm	D-3 Middle Slough Restoration	Sub Amount		\$4,800
<b>Materials and Equipment</b>	<b>Work Task and Sub-Task (from Work Task Table)</b>	<b>Number of Units</b>	<b>Unit Cost</b>	
Plants (Riparian Size d-25)	D-4 Riparian, In-stream, Bank, Tree Removal	4000	\$6.00	\$24,000.00
Plants (Wetland Size AB4)	D-4 Riparian, In-stream, Bank, Tree Removal	4000	\$2.00	\$8,000.00
Pump Rental (4 3" Pumps and Discharge)	D-4 Riparian, In-stream, Bank, Tree Removal	2	\$1,000.00	\$2,000.00
Tool Rental (months)	D-4 Riparian, In-stream, Bank, Tree Removal	1	\$436.00	\$436.00
Chainsaw Rental (hours)	D-4 Riparian, In-stream, Bank, Tree Removal	400	\$5.00	\$2,000.00
Vehicle rental (Days)	D-4 Riparian, In-stream, Bank, Tree Removal	45	\$100.00	\$4,500.00
Fuel for Pumps (gallons)	D-4 Riparian, In-stream, Bank, Tree Removal	200	\$4.00	\$800.00
Native Grass and Forb Seed (lbs)	D-4 Riparian, In-stream, Bank, Tree Removal	200	\$30.00	\$6,000.00
Drone Rental (months)	D-3 and D-4	2	\$500.00	\$1,000.00
Laser Rental (months)	D-3	2	\$500.00	\$1,000.00
<b>Total</b>				<b>\$602,565</b>

**Grand Total**

**\$656,165**

# MATTOLE SALMON GROUP

PLANS FOR CONSTRUCTION OF

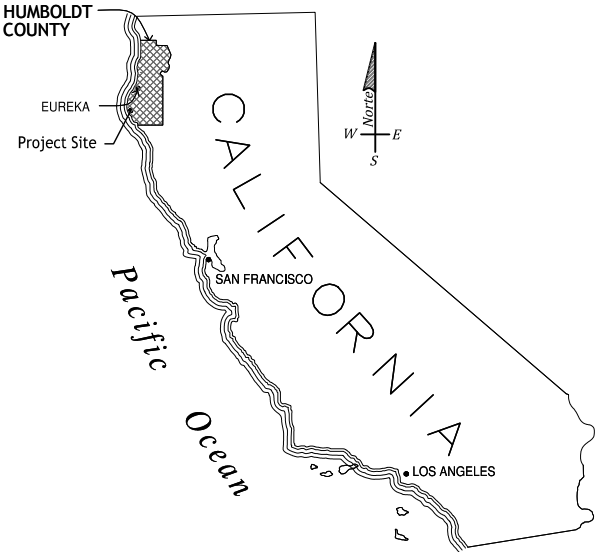
## MATTOLE RIVER ESTUARY MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT MATTOLE RIVER, PETROLIA, CA

MARCH, 2018

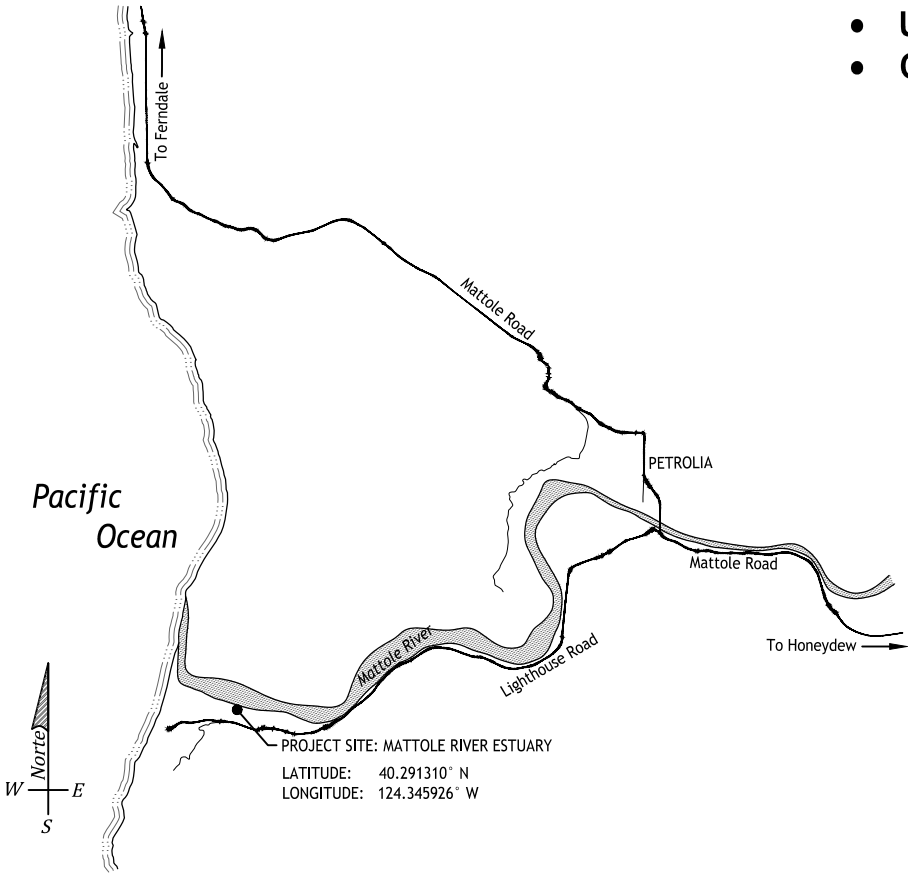
FINAL DESIGN

Prepared For:

- CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, FISHERIES RESTORATION GRANTS PROGRAM, AGREEMENT No. P1410536
- MATTOLE SALMON GROUP
- BUREAU OF LAND MANAGEMENT
- US FISH AND WILDLIFE SERVICE
- CALIFORNIA COSTAL CONSERVANCY



VICINITY MAP  
NOT TO SCALE



LOCATION MAP  
NOT TO SCALE

### SHEET INDEX

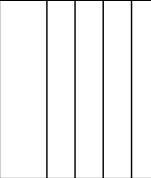
No.	SHEET TITLE
1	TITLE SHEET
2	SYMBOLS & ABBREVIATIONS
3	GENERAL NOTES
4	WATER MANAGEMENT
5	SITE ACCESS AND PLANTING AREA OVERVIEW
6	PROFILE REACH C1 AND C2
7	REACH C1 PLAN AND SECTIONS
8	REACH C2 PLAN AND SECTIONS
9	TYPICAL DETAILS
10	WOOD HABITAT DETAILS
11	CONSTRUCTION ENTRANCE



**Michael Love & Associates, Inc.**  
PO Box 4477 • Arcata, CA 95518 • (707) 822-2411



**Bureau of Land Management**  
Mattole Salmon Group  
PO Box 188  
Petrolia, CA 95558



VERIFY SCALE  
THIS BAR IS  
ONE INCH LONG  
AT FULL SCALE

MATTOLE SALMON GROUP

MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT  
MATTOLE RIVER ESTUARY, PETROLIA, CA

TITLE SHEET

DATE	MAR 2018
SUBMITTAL	FINAL
DESIGN	AL, ML
DRAWN	AL
SHEET	1 of 11





GENERAL NOTES

- THIS PROJECT REQUIRES A CLASS A GENERAL ENGINEERING CONTRACTOR LICENSE OR LANDSCAPING CONTRACTOR LICENSE IN THE STATE OF CALIFORNIA.
- THE CONTRACT OWNER FOR THE PROJECT IS THE MATTOLE SALMON GROUP (MSG) AND THE PROPERTY OWNER IS THE BUREAU OF LAND MANAGEMENT (BLM)
- THE TERM "CONTRACT OWNER REPRESENTATIVE (COR)" IS DEFINED AS AUTHORIZED QUALIFIED PROFESSIONAL DESIGNATED BY THE MSG.
- ALL IMPROVEMENTS SHALL BE ACCOMPLISHED UNDER THE APPROVAL, INSPECTION AND TO THE SATISFACTION OF MSG.
- IN THE EVENT CULTURAL RESOURCES (I.E., HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES, OR HUMAN REMAINS) ARE DISCOVERED DURING GRADING OR OTHER CONSTRUCTION ACTIVITIES, WORK SHALL BE HALTED WITHIN A 100 FOOT RADIUS OF THE FIND. A QUALIFIED ARCHEOLOGIST RETAINED BY MSG SHALL BE CONSULTED FOR AN ON-SITE EVALUATION. ADDITIONAL MITIGATION MAY BE REQUIRED, AT MSG'S EXPENSE PER THE ARCHEOLOGIST'S RECOMMENDATIONS. IF HUMAN BURIALS OR HUMAN REMAINS ARE ENCOUNTERED, THE CONTRACTOR SHALL STOP ALL WORK IMMEDIATELY AND NOTIFY THE COUNTY CORONER.
- IF HAZARDOUS MATERIALS OR WHAT APPEAR TO BE HAZARDOUS MATERIALS ARE ENCOUNTERED, STOP WORK IN THE AFFECTED AREA IMMEDIATELY AND CONTACT 911 OR THE APPROPRIATE AGENCY FOR FURTHER INSTRUCTION.
- REFERENCES TO CALTRANS (2017) IN THE CONTRACT DOCUMENTS REFER TO STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION MAY 2010 STANDARD PLANS & SPECIFICATIONS (CALTRANS 2017).
- CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL PROJECT PERMITS. COPIES OF ALL PERMITS SHALL REMAIN ON SITE AT ALL TIMES DURING CONSTRUCTION ACTIVITIES.
- A SET OF SIGNED WORKING DRAWINGS SHALL BE KEPT ON SITE AT ALL TIMES ON WHICH CONTRACTOR SHALL RECORD VARIATIONS IN THE WORK, INCLUDING ALL EXISTING UTILITIES. THESE DRAWINGS SHALL BE SUBMITTED TO THE COR UPON COMPLETION OF WORK.
- CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE WORK AREA DURING THE COURSE OF CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE PROPERTY OWNER, THE CONTRACT OWNER AND ITS REPRESENTATIVES HARMLESS FROM ANY LIABILITY, REAL AND OR ALLEGED, IN CONJUNCTION WITH THE PERFORMANCE OF THIS PROJECT.
- PLACED MATERIALS NOT CONFORMING TO SPECIFICATIONS SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE COR AT NO ADDITIONAL COST TO THE PROPERTY OWNER.
- THE CONTRACTOR, BEFORE SUBMITTING A BID FOR THIS PROJECT, SHALL VISIT THE CONSTRUCTION SITE AND THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL EXISTING CONDITIONS ABOVE AND BELOW GROUND. BEFORE SUBMITTING A BID, BIDDERS SHALL BE SATISFIED AS TO THE ACCURACY AND COMPLETENESS OF THESE SPECIFICATIONS AND CONSTRUCTION DOCUMENTS REGARDING THE NATURE AND EXTENT OF ALL WORK DESCRIBED.
- THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR UPON DISCOVERING SIGNIFICANT DISCREPANCIES, ERRORS OR OMISSIONS IN THE PLANS. PRIOR TO PROCEEDING, THE COR SHALL HAVE THE PLANS REVISED TO CLARIFY IDENTIFIED DISCREPANCIES, ERRORS OR OMISSIONS.
- TRAFFIC CONTROL SHALL CONFORM TO CALIFORNIA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (2012).
- CONTRACTOR IS RESPONSIBLE FOR OBTAINING A COUNTY ENCROACHMENT PERMIT, IF REQUIRED.
- CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THEIR OWN WATER AND POWER FOR OPERATIONS, IRRIGATION AND DUST CONTROL. WATER SHALL NOT BE PUMPED FROM THE CREEK OR RIVER FOR THESE USES.
- NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALE.

CLEARING AND GRUBBING NOTES

- CLEARING AND GRUBBING SHALL BE IN ACCORDANCE WITH SECTION 16 OF CALTRANS CONSTRUCTION SITE BEST PRACTICES MANUAL (2017) UNLESS OTHERWISE SPECIFIED.
- THE EXTENT OF CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE WITHIN THE PROJECT AREA TO ALLOW MANEUVERABILITY OF EQUIPMENT.
- TREE REMOVAL SHALL BE LIMITED TO NON-CONIFEROUS SPECIES.
- IF FEASIBLE, RIPARIAN TREES SHALL BE LIMBED RATHER THAN REMOVED.
- WILLOW CLUSTERS TO BE REMOVED SHALL BE SALVAGED WITH ROOT BALL AND RE-PLANTED AT DIRECTION OF COR .
- LOGS AND BRUSH SHALL BE SALVAGED AND INCORPORATED INTO WOOD STRUCTURES AS SPECIFIED.

SITE ACCESS AND RESTORATION NOTES

- CONSTRUCTION ACCESS AND SENSITIVE AREAS SHALL BE INDICATED BY COR IN THE FIELD.
- AT PROJECT COMPLETION, THE ACCESS ROAD FROM LIGHTHOUSE ROAD TO THE PROJECT SITE SHALL BE RIPPED AND REVEGETATED TO RESTORE THE AREA TO PRE PROJECT CONDITIONS.
- AT PROJECT COMPLETION, CONSTRUCTION ACCESS ROADS THROUGH RIPARIAN AREAS AND SOIL REUSE AREAS SHALL BE RIPPED TO A MINIMUM DEPTH OF 6" INCHES AND CONTAIN PARTICLE SIZES NO GREATER THAN 3 INCHES. AREAS SHALL BE SEEDED AND STRAW MULCHED AS SPECIFIED IN THESE CONTRACT DOCUMENTS. RIPARIAN AND WETLAND AREAS SHALL BE PLANTED AS SPECIFIED IN THESE DOCUMENTS.
- UPON SEASONAL COMPLETION OF WORK ENSURE ACCESS ROADS FROM LIGHTHOUSE ROAD PROHIBIT VEHICLE ENTRY BY PLACING DEBRIS, TANK TRAPS OR OTHER BARRICADES THAT MINIMIZE VISUAL IMPACT. TO BE APPROVED BY THE COR AND BLM.

EXCAVATION NOTES

- ALL EXCAVATION AND BACKFILL FOR THE PROJECT SHALL BE IN ACCORDANCE WITH CALTRANS (2017) SECTION 19, AND AS INDICATED IN THESE CONSTRUCTION DOCUMENTS.
- EXCAVATION MAY INCLUDE EXCAVATION AND HANDLING OF SATURATED SOILS. CONTRACTOR SHALL BE PREPARED TO DEWATER AND /OR TRANSPORT SATURATED SOIL IN A MANNER THAT PREVENTS EXCESS DISCHARGE OR SPILLAGE OF SOILS OR WATER WITHIN THE CONSTRUCTION ACCESS AREA OR ON ADJACENT PROPERTIES OR ROADWAYS. SHOULD ANY DISCHARGE OCCUR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATE AND COMPLETE CLEANUP. MULTIPLE HANDLING OF MATERIAL MAY BE NECESSARY.
- UNSUITABLE MATERIAL FOUND WITHIN THE PROJECT AREA SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR FOR DISPOSAL IN AN APPROVED LOCATION. UNSUITABLE MATERIAL INCLUDES THOSE DEFINED IN SECTION 19-1 OF CALTRANS (2017) AND INCLUDES CONCRETE, GROUTED RIPRAP, PIPES AND OTHER MANMADE MATERIALS.
- SUITABLE EXCAVATED MATERIAL SHALL BE SORTED AND STOCKPILED AT THE DIRECTION OF THE COR FOR USE AS BACKFILL FOR HABITAT STRUCTURE INSTALLATION OR TRANSPORTED TO THE DESIGNED SOIL REUSE AREAS. IN SOIL REUSE AREAS, MATERIAL SHALL BE SPREAD AT THE DIRECTION OF THE COR AND HAVE A FINISHED SURFACE THAT MAINTAINS POSITIVE DRAINAGE.
- ALL TYPICAL AND GRADING SECTIONS ARE LOOKING UP STATION.
- UNLESS OTHERWISE SPECIFIED, TOLERANCE FOR FINISHED GRADE SHALL BE ± 0.3 FEET AND TOLERANCE FOR HORIZONTAL LOCATIONS SHALL BE ± 0.5 FEET. THE COR MAY ADJUST THESE TOLERANCES TO FIT THE SITE CONDITIONS.

UTILITY NOTES

- ALL UTILITIES SHOWN (IF ANY) WERE LOCATED FROM ABOVE GROUND VISUAL STRUCTURES. NO UTILITY RESEARCH WAS CONDUCTED FOR THE SITE. NOTIFY UNDERGROUND SERVICE ALERT (DIGALERT) AT LEAST TWO DAYS PRIOR TO ANY GRADING OR EXCAVATION WITHIN THE SITE BY CALLING 811 OR 1-800-227-2600.
- CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES AND STRUCTURES LOCATED IN THE PROJECT AREA AND CONSTRUCTION ACCESS ROUTES. CONTRACTOR SHALL AVOID DISRUPTION OF ANY UTILITIES UNLESS PREVIOUSLY ARRANGED WITH THE COR.
- CONSTRUCTION MAY TAKE PLACE IN THE VICINITY OF OVERHEAD UTILITY LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE AWARE OF AND OBSERVE THE MINIMUM CLEARANCES FOR WORKERS AND EQUIPMENT OPERATING NEAR HIGH VOLTAGE, AND COMPLY WITH THE SAFETY ORDERS OF THE CALIFORNIA DIVISION OF INDUSTRIAL SAFETY AS WELL AS OTHER APPLICABLE SAFETY REGULATIONS.

SPECIFICATION FOR DEEP TRENCH WILLOW BAFFLES

MATERIAL SPECIFICATIONS

- ALL LOGS SHALL BE SOUND, NON-ROTTED AND UNBROKEN DOUGLAS FIR, OR PINE WITH A MINIMUM DIAMETER OF 18 INCHES.
- WILLOW CUTTINGS SHALL BE STORED IN WATER AND BE SUFFICIENT LENGTH TO BE PLACED AT THE BOTTOM OF THE TRENCH AND EXTEND A MINIMUM OF 1 FOOT ABOVE FINISHED GRADE.
- BRUSH INCORPORATED INTO THE STRUCTURE SHALL BE SMALL TRUNKS, LIMBS AND BRANCHES A MINIMUM OF 5 FEET IN LENGTH SALVAGED FROM THE CONSTRUCTION ACCESS AREAS.
- LOAMY NUTRIENT RICH SOIL SHALL BE DERIVED FROM THE SLOUGH AND TRENCH EXCAVATION AND SHALL MEET APPROVAL OF THE COR OR MSG REPRESENTATIVE.


INSTALLATION SPECIFICATIONS

- CONSTRUCT DEEP TRENCH WILLOW BAFFLES AS SPECIFIED ON THE CONSTRUCTION DOCUMENTS.
- TRENCHING SHALL BE TO A DEPTH AS SHOWN AND THAT PROVIDES A MINIMUM DEPTH OF 2 FEET OF GROUNDWATER.
- PLACE LIVE STAKES VERTICALLY WITH BASAL END DOWN AND SUBMERGED IN GROUNDWATER AND LEAVING 1-FOOT OF STAKE EXTENDING BEYOND FINISHED GRADE.
- LOGS SHALL BE PLACED AT THE BOTTOM OF THE TRENCH AND USED TO ANCHOR WILLOW STAKES ALONG ONE EDGE OF THE TRENCH.
- PLACE LOAMY SOILS AND BRUSH ABOVE LOG AT LEAST 2 FOOT THICKNESS.
- BACKFILL TRENCH WITH MATERIAL SALVAGED FROM THE EXCAVATION OF THE SLOUGH AND TRENCHES.
- TRENCHES SHALL BE EXCAVATED AND BACKFILLED IMMEDIATELY TO AVOID HAVING AN OPEN TRENCH THAT IS DEEPER THAN 4 FEET FOR AN EXTENDED PERIOD OF TIME.
- CREATE A CONTINUOUS MOUND PARALLEL AND ADJACENT TO TRENCHES TO A HEIGHT OF 2 TO 3 FEET USING SALVAGED BACKFILL.


SEQUENCE OF CONSTRUCTION

FOR EACH PHASE OF THE WORK CONSTRUCTION SHALL OCCUR AS FOLLOWS:


- MOBILIZATION
- ESTABLISH STAGING AND STOCKPILE AREAS AND ACCESS ROAD LOCATIONS
- INSTALLATION OF SEDIMENT CONTROL AS NEEDED WITHIN WORK AREA
- CLEARING AND GRUBBING OF WORK AREA AND ACCESS ROADS, INCLUDING SELECTIVE TREE REMOVAL
- EXCAVATION OF NEW SLOUGH CHANNEL, WHILE LEAVING A PLUG OF EARTHEN MATERIAL BETWEEN THE NEW CHANNEL AND THE EXISTING ALCOVE
- CONSTRUCTION OF LOG HABITAT STRUCTURES
- CONSTRUCTION OF DEEP TRENCH WILLOW BAFFLES
- COMPLETION OF SLOUGH CHANNEL EXCAVATION AND CONNECTION WITH EXISTING ALCOVE
- REMOVAL OF TEMPORARY ISOLATION MEASURES
- STABILIZATION OF THE WORK AREA
- REHABILITATION OF ACCESS ROUTES AND TEMPORARY HAUL ROADS.
- DEMOBILIZATION




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**Bureau of Land Management**  
1695 Heintzen Road  
Arcata, CA 95521-6573



**Mattole Salmon Group**  
PO Box 188  
Petaluma, CA 95558



VERIFY SCALE

THIS BAR IS ONE INCH LONG AT FULL SCALE

MATTOLE SALMON GROUP

MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT

MATTOLE RIVER ESTUARY, PETROLIA, CA

GENERAL NOTES

DATE

MAR 2018

SUBMITTAL

FINAL

DESIGN

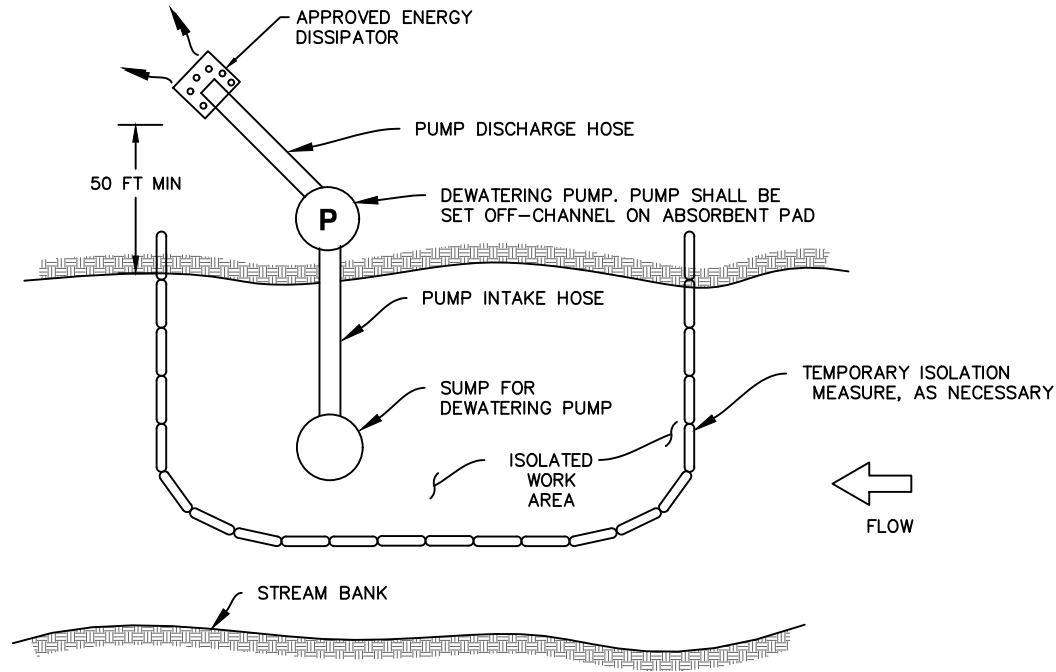
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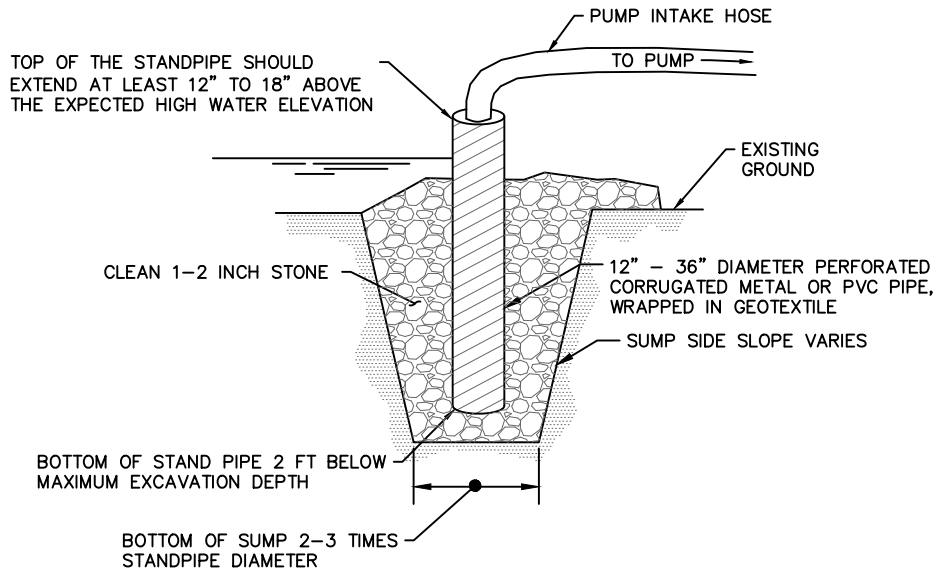
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SHEET

3 of 11



1 **WATER ISOLATION AND DEWATERING**  
TYPICAL PLAN NTS



2 **SUMP PIT**  
TYPICAL NTS

#### WATER MANAGEMENT SPECIFICATIONS

- CONTRACTOR SHALL SUBMIT A WATER MANAGEMENT PLAN (PLAN) FOR APPROVAL BY THE COR PRIOR TO CONSTRUCTION. NO CONSTRUCTION ACTIVITY MAY BEGIN UNTIL THE PLAN HAS BEEN APPROVED. THE PLAN SHALL INCLUDE MATERIALS, METHODS, AND APPROXIMATE LOCATIONS OF WATER MANAGEMENT DEVICES, AS WELL AS A CONTINGENCY PLAN FOR ADDRESSING UNFORESEEN WATER MANAGEMENT ISSUES, SUCH AS STORM EVENTS, GROUNDWATER, ETC.
- WATER MANAGEMENT SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 13 OF CALTRANS (2017) AND AS SPECIFIED IN THE CONTRACT DOCUMENTS.
- THE NEED FOR A CLEARWATER DIVERSION IS NOT ANTICIPATED, THOUGH ISOLATION MAY BE NECESSARY.
- IN THE MIDDLE SLOUGH ALCOVE WORK AREAS SHALL BE TEMPORARILY ISOLATED AND FISH SHALL BE REMOVED BY A QUALIFIED BIOLOGIST PROVIDED BY THE CO. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE BIOLOGIST SUCH THAT FISH REMOVAL, IF NEEDED, DOES NOT IMPACT THE CONSTRUCTION SCHEDULE.
- DEWATERING OF WORK AREAS MAY BE NECESSARY. CONTRACTOR SHALL BE PREPARED TO IMPLEMENT ISOLATION AND DEWATERING OPERATIONS SUCH THAT THEY OCCUR IN A TIMELY MANNER AND DO NOT IMPACT THE WORK SCHEDULE.
- DIKES, COFFERDAMS, OR OTHER SUITABLE MEASURES SHALL BE USED TO ISOLATE AREAS REQUIRING DEWATERING. ADDITIONAL CONTROL MEASURES IN ISOLATED AREAS WHERE DEWATERING IS NOT REQUIRED SHALL INCLUDE TURBIDITY CURTAINS, FILTER FABRIC ISOLATION, OR OTHER SUITABLE MATERIALS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PUMPS AND PIPES WITH ADEQUATE CAPACITY TO MAINTAIN SUITABLE DEWATERED WORKING CONDITIONS WITHIN THE WORK AREA.
- THE OUTLET OF THE DEWATERING PUMP SHALL BE DIRECTED ONTO A FLAT AREA ABLE TO RECEIVE WATER AND ALLOW IT TO PERCOLATE INTO THE SOILS SUCH THAT IT DOES NOT RETURN TO WORK AREA.
- ANY GAS POWERED PUMPS USED ON-SITE SHALL BE PLACED ON ABSORBENT PADS OUT OF THE STREAM CHANNEL.
- THE CONTRACTOR SHALL HAVE SPILL CONTAINMENT MATERIALS LOCATED AT THE SITE WITH OPERATORS TRAINED IN SPILL CONTROL PROCEDURES.

#### WATER POLLUTION CONTROL NOTES

- AT MINIMUM THE CONTRACTOR SHALL EMPLOY THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPS) AS APPLICABLE, AS DESCRIBED IN THE CURRENT CALIFORNIA STORMWATER BMP HANDBOOK FOR CONSTRUCTION (WWW.CASQA.ORG):

- EC-1 SCHEDULING
- EC-2 PRESERVATION OF VEGETATION
- EC-6 STRAW MULCHING
- EC-8 WOOD MULCHING
- NS-9 VEHICLE EQUIPMENT AND FUELING
- NS-10 VEHICLE AND EQUIPMENT MAINTENANCE
- SE-1 SILT FENCE
- SE-5 FIBER ROLLS
- WM-1 MATERIALS DELIVERY AND STORAGE
- WM-2 MATERIAL USE
- WM-3 STOCKPILE MANAGEMENT
- WM-4 SPILL PREVENTION AND CONTROL
- WM-5 SOLID WASTE MANAGEMENT
- WE-1 WIND EROSION CONTROL

NOT ALL NECESSARY EROSION AND SEDIMENT CONTROL BMP'S ARE DESIGNATED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR, AS NECESSARY, SHALL IMPLEMENT OTHER BMP'S AS SPECIFIED IN THE BMP HANDBOOK DICTATED BY SITE CONDITIONS OR AS DIRECTED BY THE COR. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FINES AND CLEANUP RESULTING FROM A STORMWATER POLLUTION VIOLATION.

- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MINIMIZE EROSION AND PREVENT THE TRANSPORT OF SEDIMENT TO SENSITIVE AREAS.
- SUFFICIENT EROSION CONTROL SUPPLIES SHALL BE AVAILABLE ON-SITE AT ALL TIMES TO DEAL WITH AREAS SUSCEPTIBLE TO EROSION DURING RAIN EVENTS.
- MINIMIZE DISTURBANCE OF EXISTING VEGETATION TO THAT NECESSARY TO COMPLETE WORK.
- THE CONTRACTOR SHALL MAKE ADEQUATE PREPARATIONS, INCLUDING TRAINING AND EQUIPMENT, TO CONTAIN SPILLS OF OIL AND OTHER HAZARDOUS MATERIALS.
- ACTIVITIES SUCH AS VEHICLE WASHING ARE TO BE CONDUCTED AT AN OFF-SITE FACILITY WHEREIN THE WATER IS DISCHARGED TO A SANITARY SEWER.
- THE CONTRACTOR SHALL PROVIDE COVERED WASTE RECEPTACLE FOR COMMON SOLID WASTE AT CONVENIENT LOCATIONS ON THE JOB SITE AND PROVIDE REGULAR COLLECTION OF WASTES.
- THE CONTRACTOR SHALL PROVIDE SANITARY FACILITIES OF SUFFICIENT NUMBER

AND SIZE TO ACCOMMODATE CONSTRUCTION CREWS AND ENSURE ADEQUATE ANCHORAGE OF SUCH FACILITIES TO PREVENT THEN TO BEING TIPPED BY THE WEATHER OR VANDALISM.

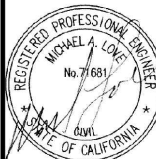
- COVERED AND SECURED STORAGE AREAS FOR POTENTIALLY TOXIC MATERIALS SHALL BE PROVIDED. ALL HAZARDOUS MATERIAL CONTAINERS SHALL BE PLACED IN SECONDARY CONTAINMENT.
- VEHICLE AND EQUIPMENT MAINTENANCE SHALL BE PERFORMED OFF-SITE WHENEVER PRACTICAL.
- SOIL STOCKPILES SHALL BE COVERED, AND LOCATED AT LEAST 50 FEET FROM DRAINAGE CHANNELS AND STORMWATER SYSTEMS.
- CONTRACTOR MUST ENSURE THAT THE CONSTRUCTION SITE IS PREPARED PRIOR TO THE ONSET OF ANY STORM.
- ALL SEDIMENT DEPOSITS ON PAVED SURFACES SHALL BE SWEEPED AT THE END OF EACH WORKING DAY, AS NECESSARY OR AS DIRECTED BY THE COR. A STABILIZED CONSTRUCTION ENTRANCE MAY BE REQUIRED TO PREVENT SEDIMENT FROM BEING DEPOSITED ON PAVED ROADS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FINES AND CLEANUP RESULTING FROM VIOLATIONS.
- ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED IN ACCORDANCE TO THEIR RESPECTIVE BMP FACT SHEET UNTIL DISTURBED AREAS ARE STABILIZED.
- THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF OR AT THE DISCRETION OF THE COR.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIX ANY DEFICIENCIES TO PREVENT EROSION AND CONTROL SEDIMENT.
- PRIOR TO FINAL ACCEPTANCE ALL DISTURBED AREAS OF THE SITE SHALL BE PERMANENTLY STABILIZED AS SPECIFIED AND TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE REMOVED AS DIRECTED.

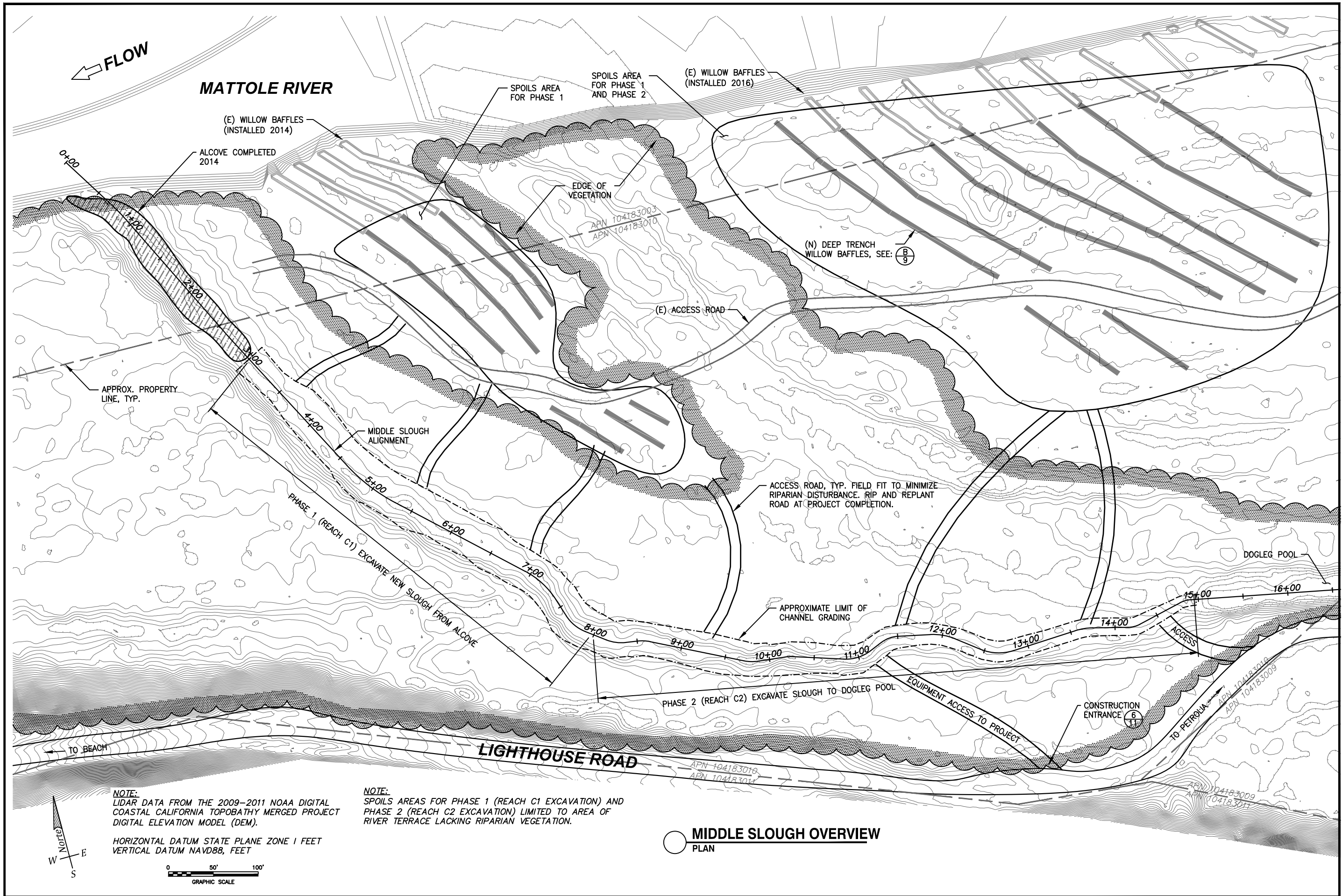
VERIFY SCALE  
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AT FULL SCALE



MATTOLE SALMON GROUP  
MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT  
MATTOLE RIVER ESTUARY, PETROLIA, CA  
**WATER MANAGEMENT**

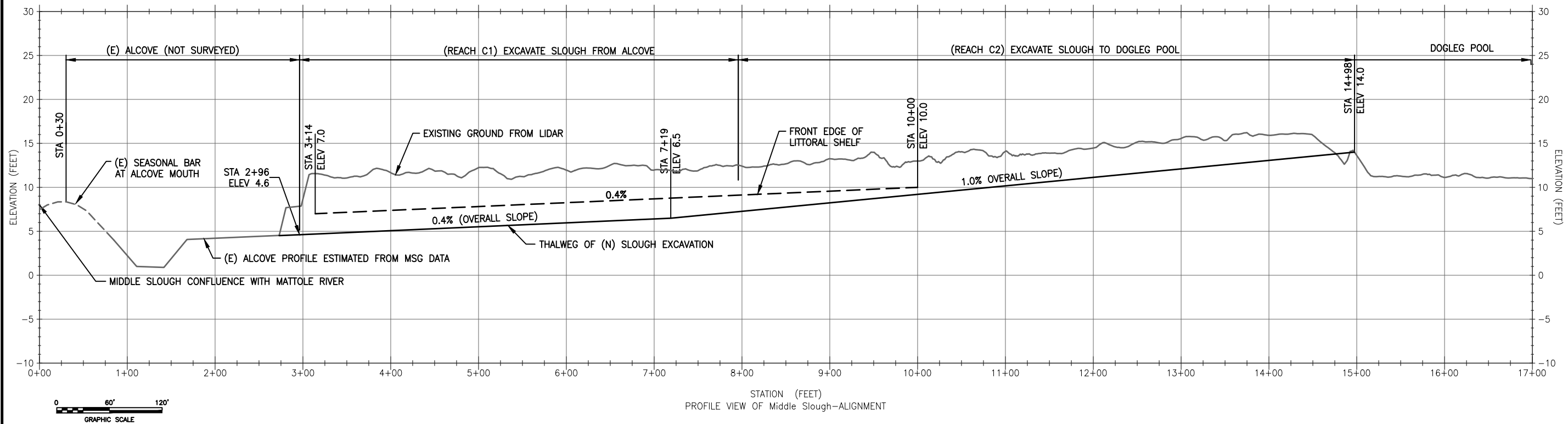
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MAR 2018  
SUBMITTAL  
FINAL  
DESIGN  
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DRAWN  
AL  
SHEET  
4 of 11

**Michael Love & Associates, Inc.**  
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**Bureau of Land Management**  
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Arcata, CA 95521-4573  
**Mattole Salmon Group**  
PO Box 188  
Petrolia, CA 95558

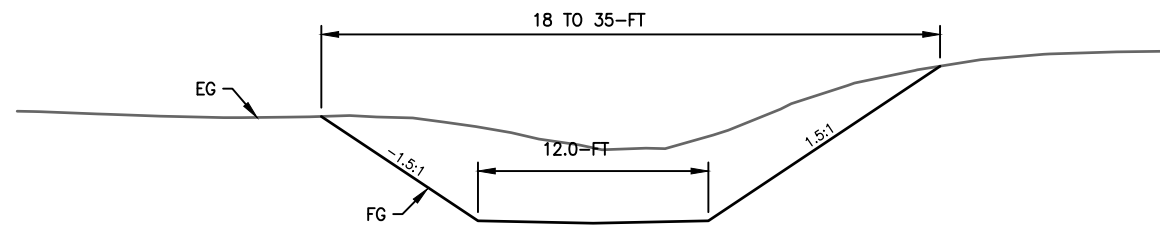
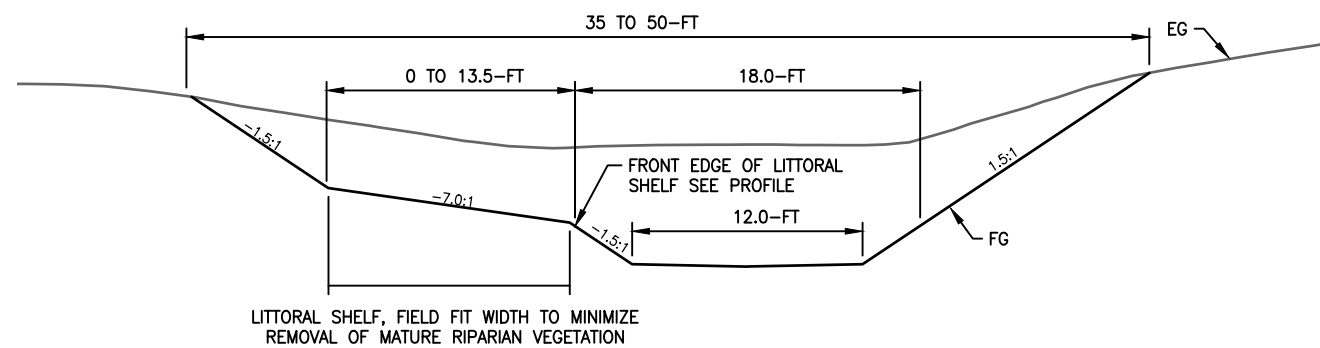




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VERIFY SCALE THIS BAR IS ONE INCH LONG AT FULL SCALE	
<b>MATTOLE SALMON GROUP</b> MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT MATTOLE RIVER ESTUARY, PETROLIA, CA	
<b>SITE ACCESS AND PLANTING AREA OVERVIEW</b>	
DATE	MAR 2018
SUBMITTAL	FINAL
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SHEET	5 of 11



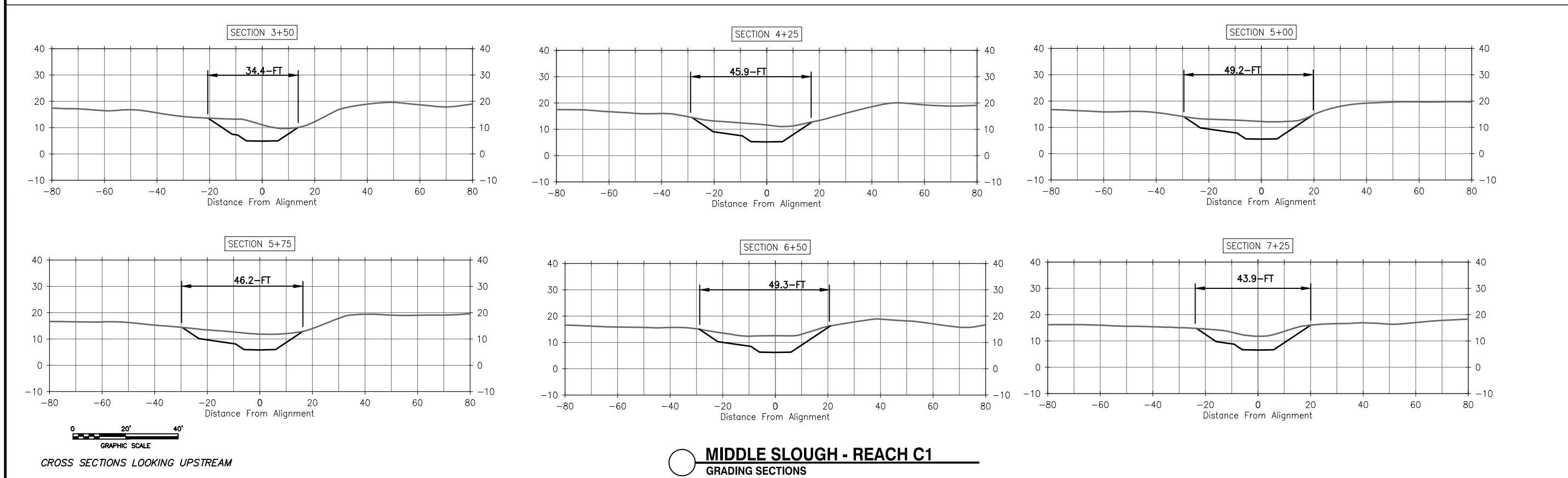
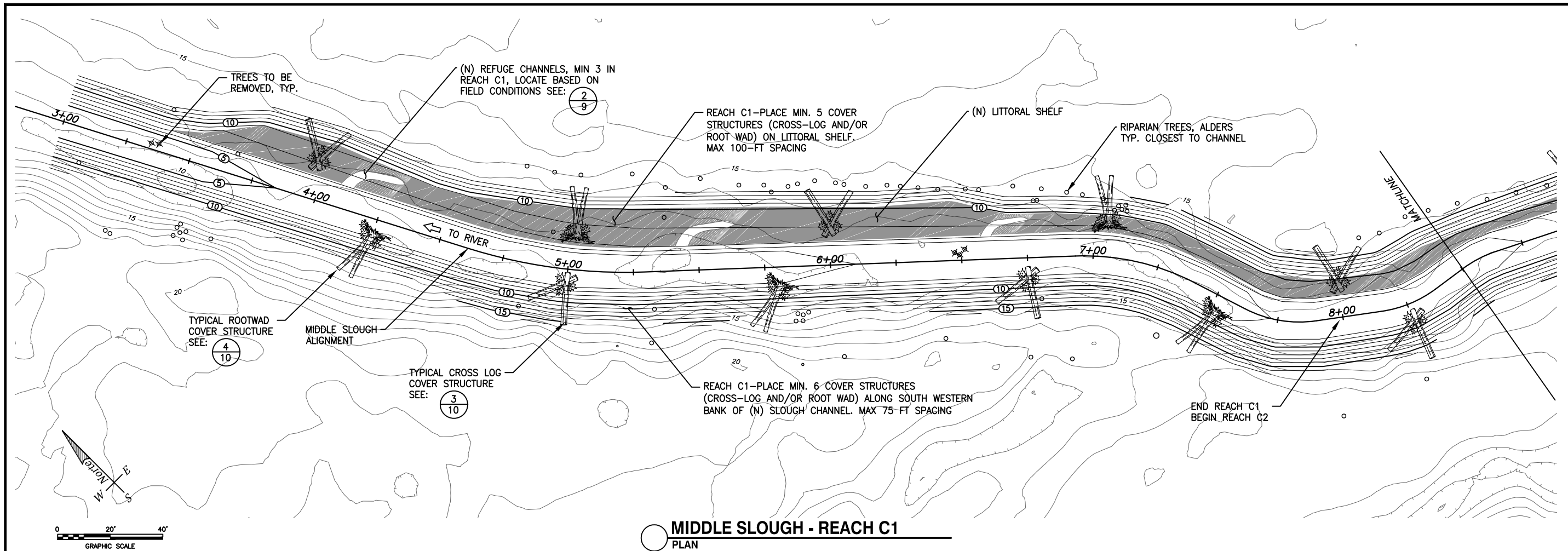
PROFILE



CROSS SECTIONS LOOKING UPSTREAM

**A SLOUGH SECTION**  
TYPICAL STA 3+00 TO 10+00

**B SLOUGH SECTION**  
TYPICAL STA 10+00 TO 15+00



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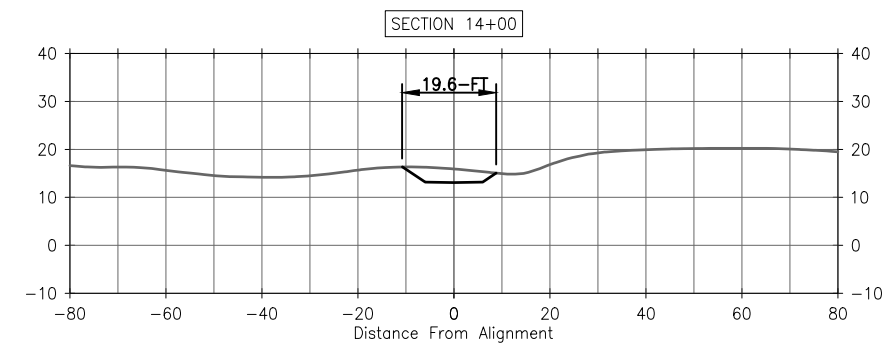
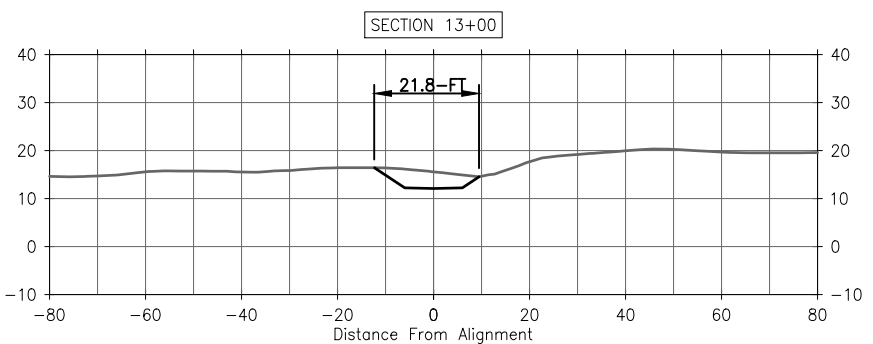
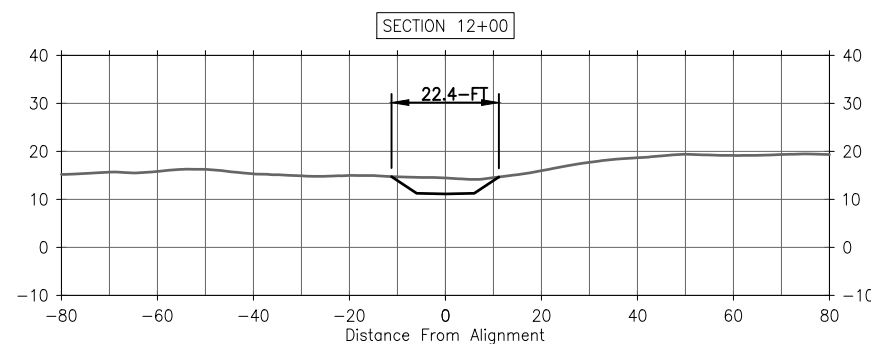
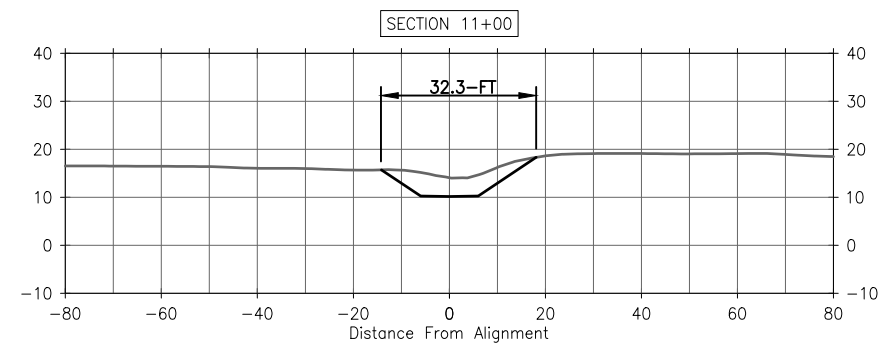
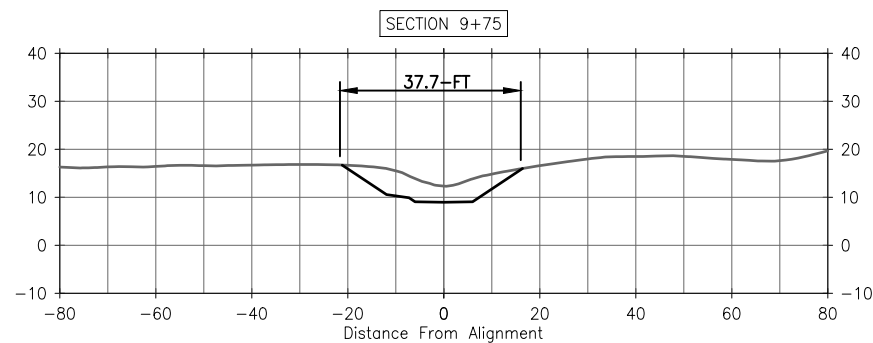
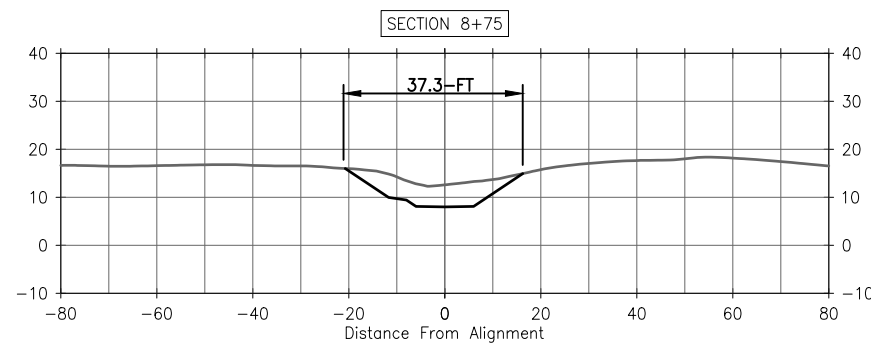
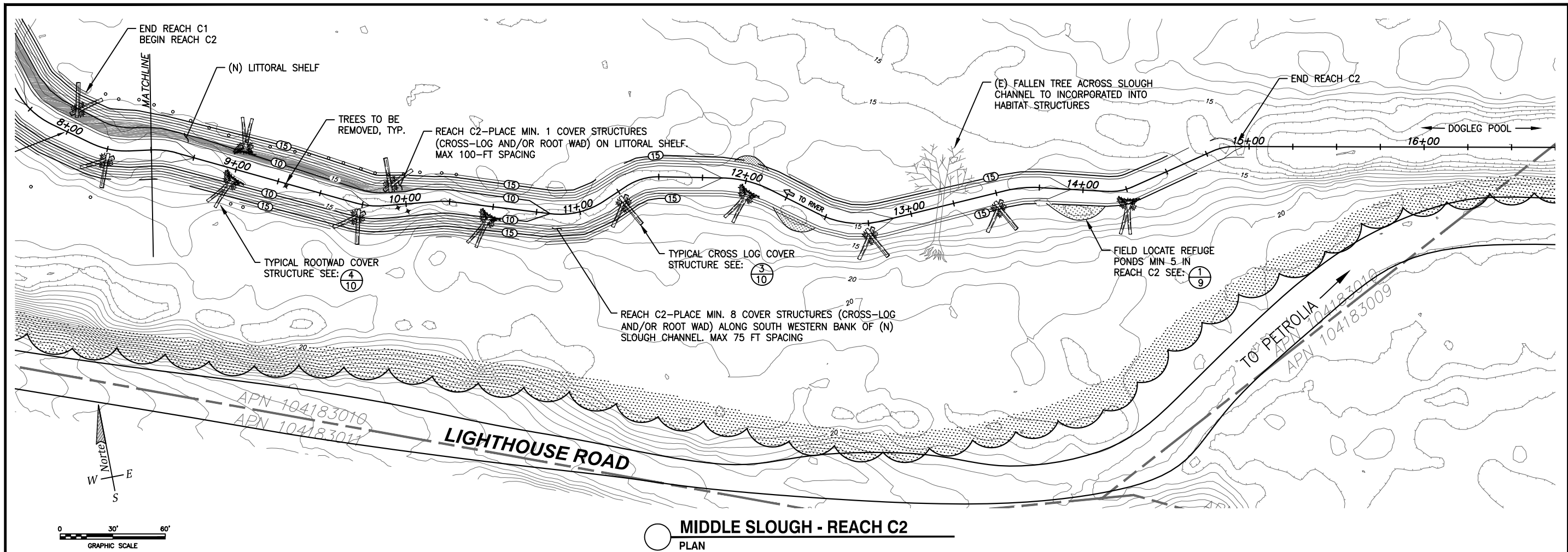
REGISTERED PROFESSIONAL ENGINEER  
 MICHAEL A. LOVE  
 No. 71681  
 CIVIL  
 STATE OF CALIFORNIA

VERIFY SCALE  
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 AT FULL SCALE

MATTOLE SALMON GROUP  
 MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT  
 MATTOLE RIVER ESTUARY, PETROLIA, CA

**REACH C1 PLAN AND SECTIONS**

DATE: MAR 2018  
 SUBMITTAL: FINAL  
 DESIGN: AL, ML  
 DRAWN: AL  
 SHEET: 7 of 11



GRAPHIC SCALE: 0 20' 40'

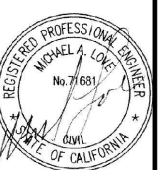
CROSS SECTIONS LOOKING UPSTREAM

**MIDDLE SLOUGH - REACH C2**  
GRADING SECTIONS

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Petrolia, CA 95558



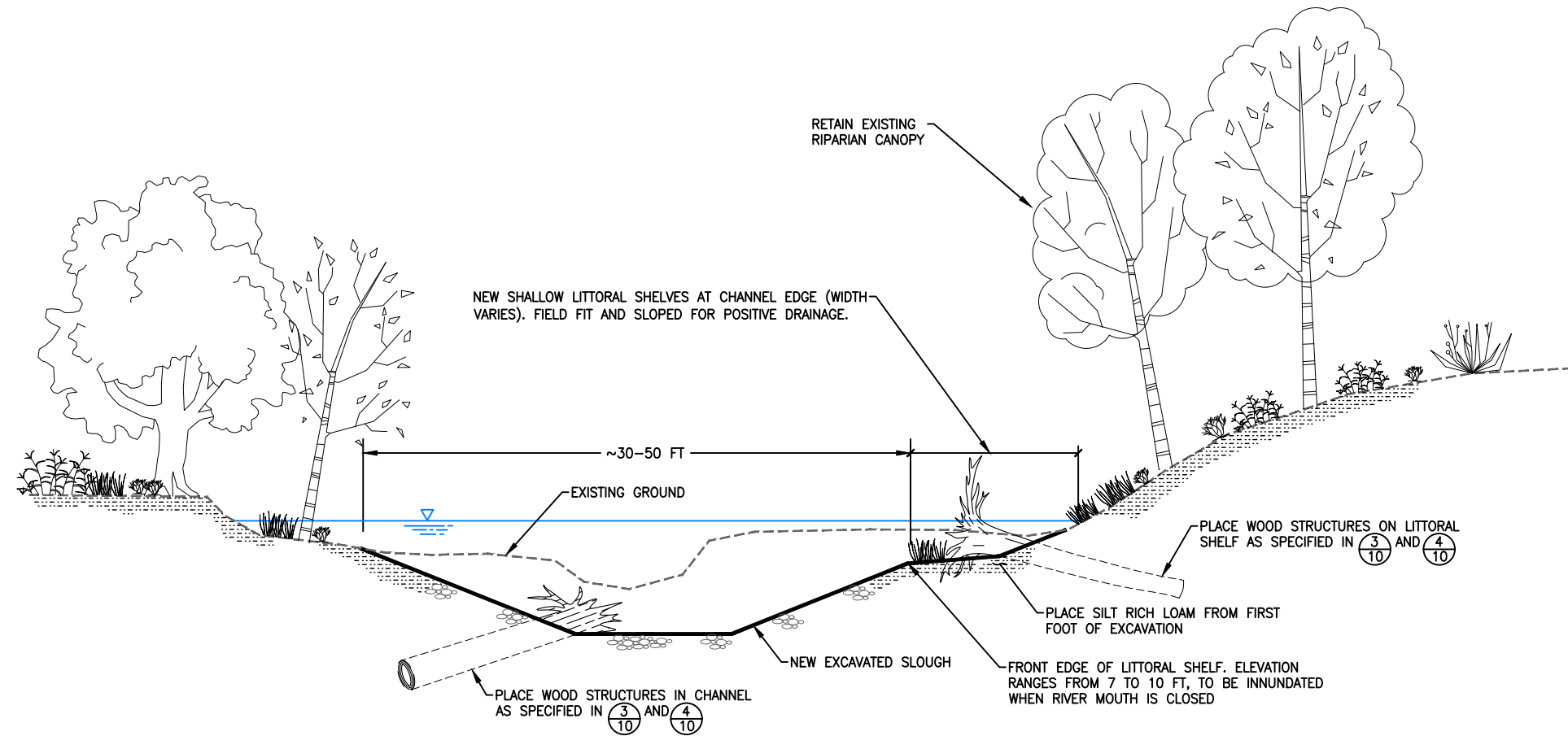
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MATTOLE SALMON GROUP  
MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT  
MATTOLE RIVER ESTUARY, PETROLIA, CA

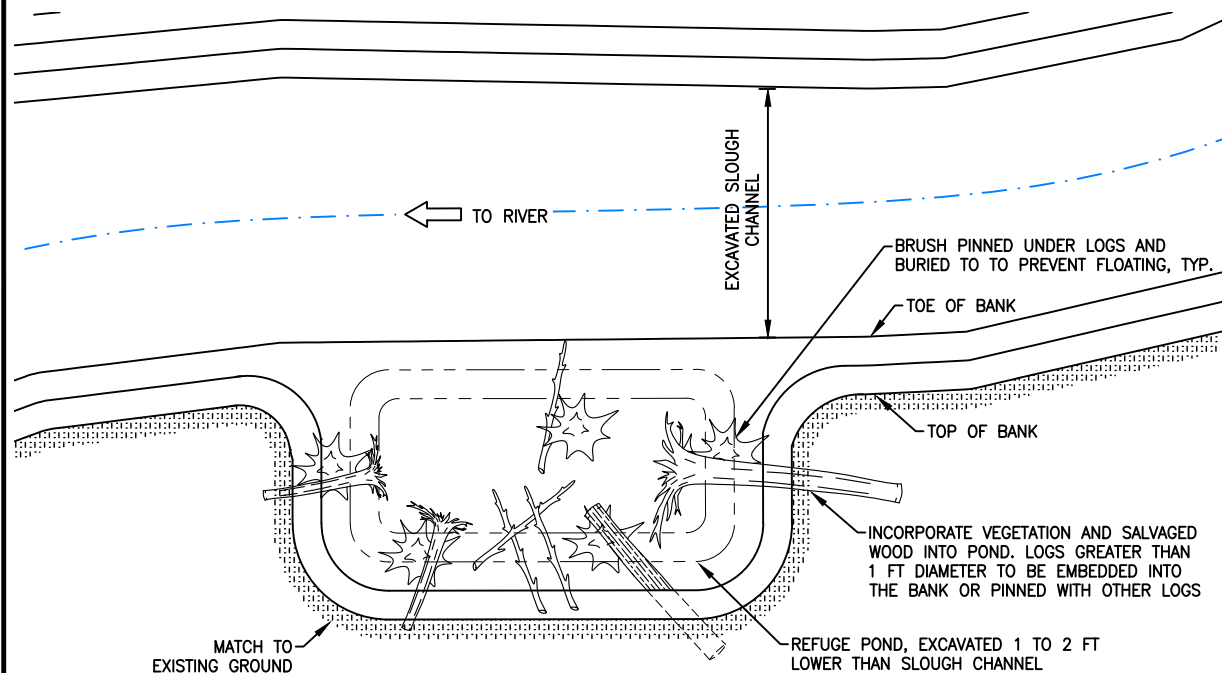
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SHEET: 8 of 11

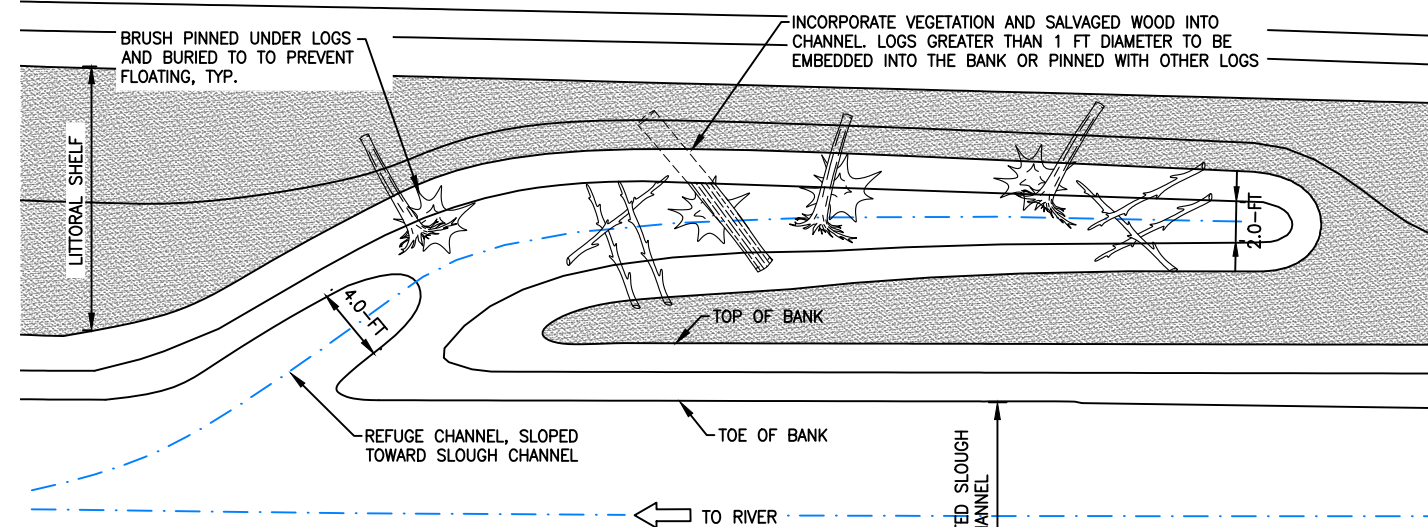




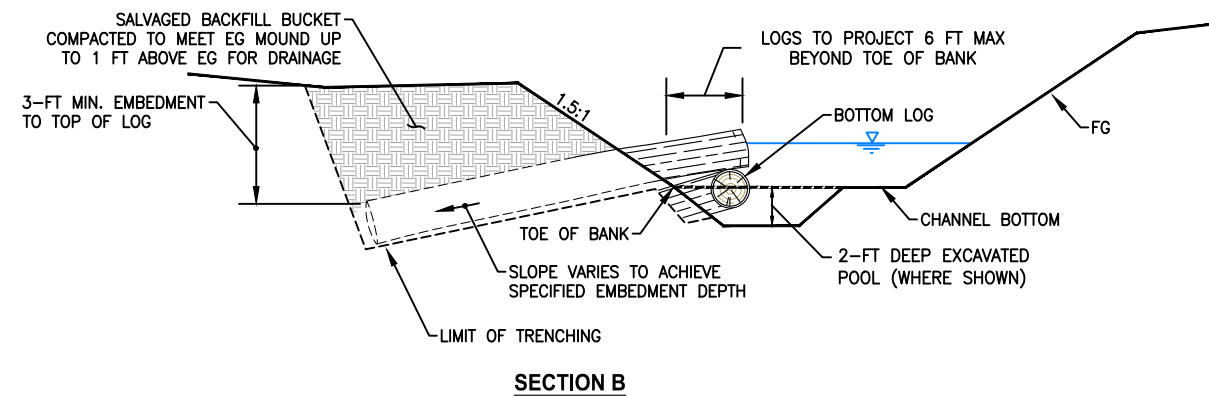
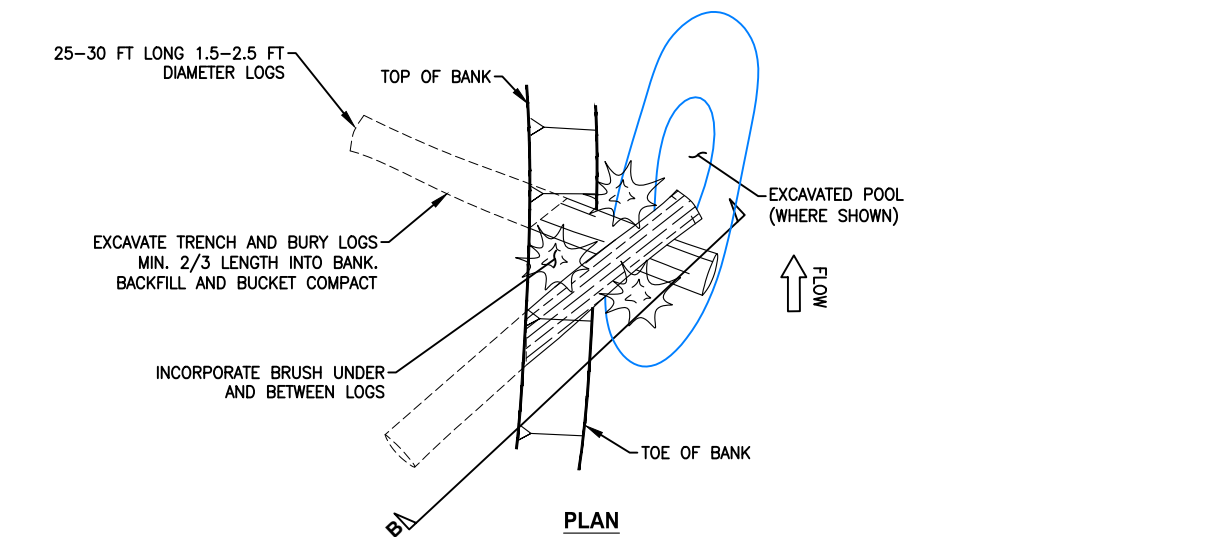
**(N) SLOUGH CHANNEL**  
TYPICAL SECTION NTS



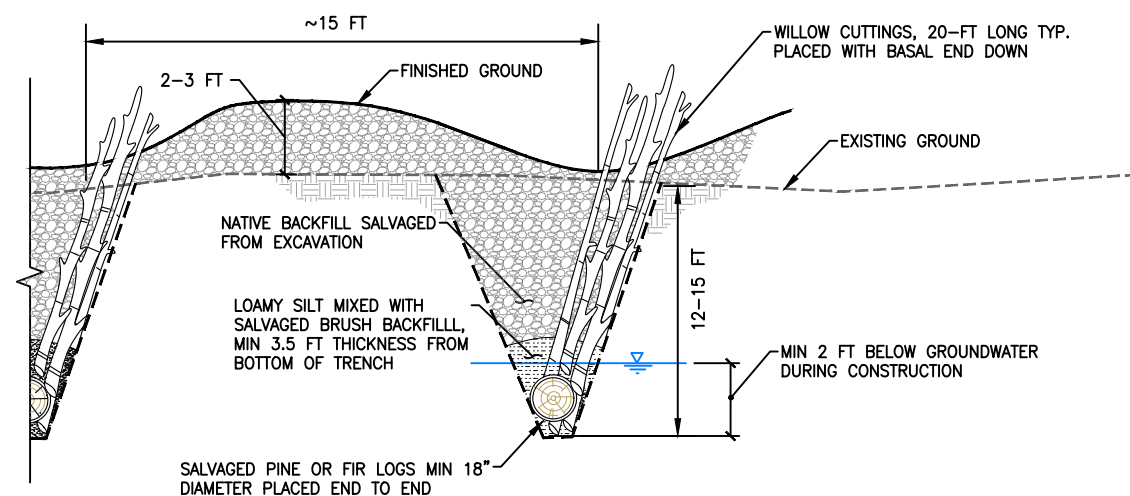
**1 REFUGE POND**  
TYPICAL PLAN NTS



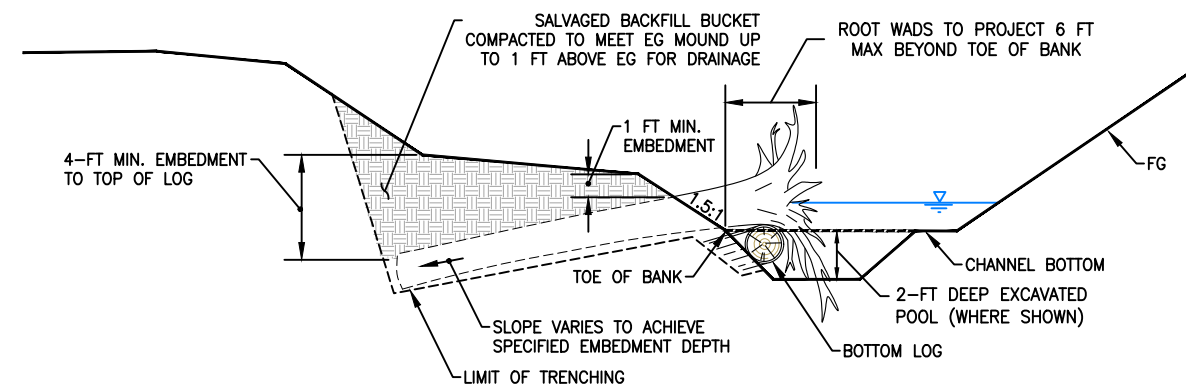
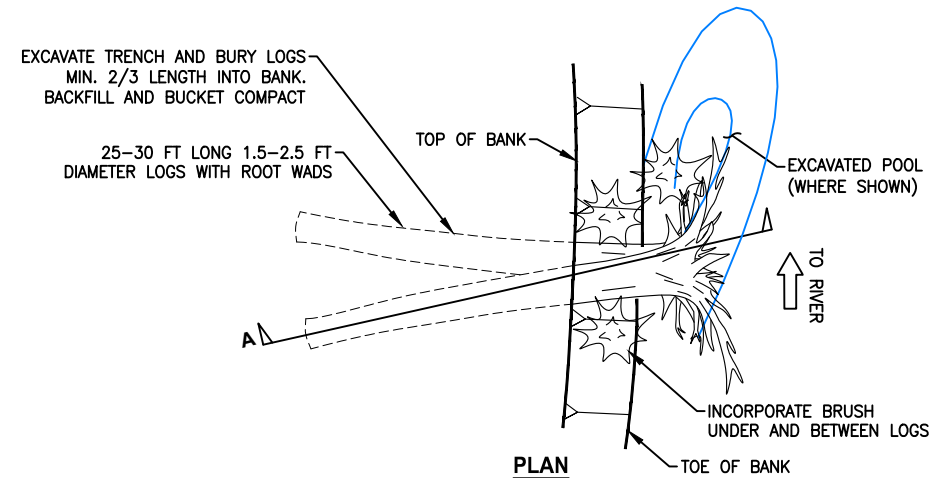
**2 REFUGE CHANNEL**  
TYPICAL PLAN NTS



**3 CROSS LOG COVER STRUCTURE**  
DETAIL NTS



**(N) DEEP TRENCH WILLOW BAFFLE**  
TYPICAL SECTION NTS



**4 ROOT WAD COVER STRUCTURE**  
DETAIL NTS

#### SPECIFICATIONS FOR LOG STRUCTURES (INCLUDING BRUSH)

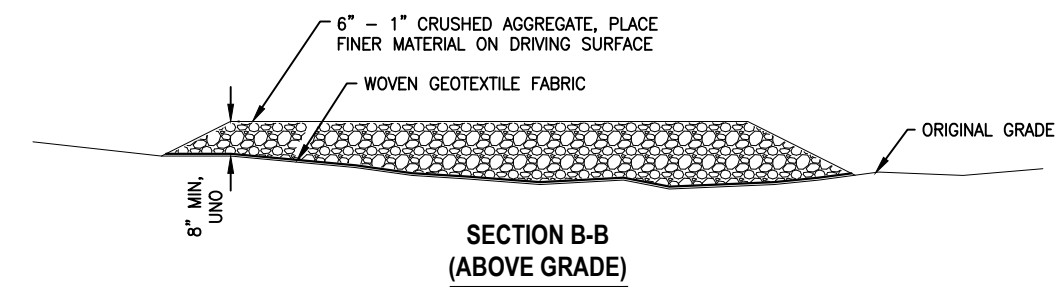
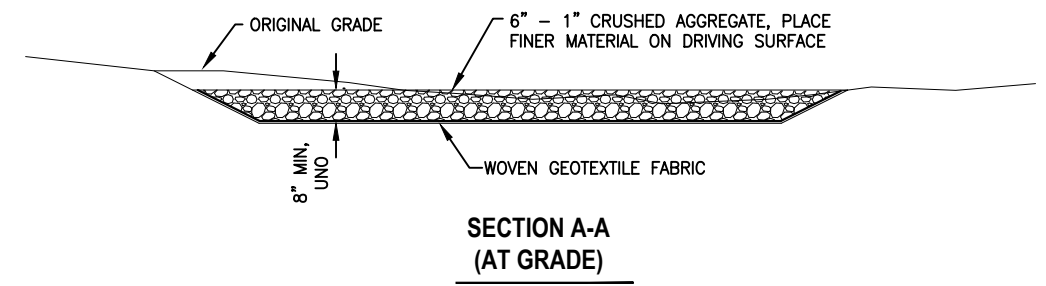
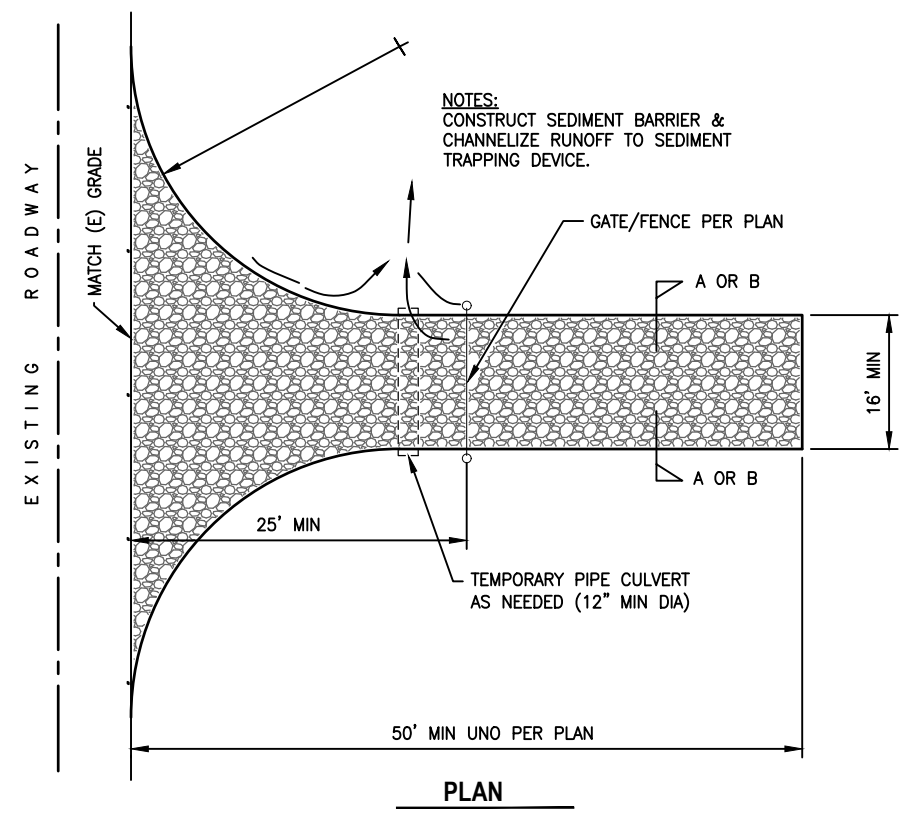
##### MATERIALS

- LOGS SHALL BE SOUND, NON-ROTTED AND UNBROKEN DOULAS FIR, PINE OR REDWOOD WITH INTACT ROOTBALL WHEN SPECIFIED
- CONTRACT OWNER (MSG) WILL PROVIDE ALL LOGS. CUTTING OF LOGS SHALL NOT BE PERFORMED WITHOUT PERMISSION OF COR.
- LOGS SHALL MEET THE DIMENSIONS SHOWN ON THE CONTRACT DOCUMENTS. LOG DIAMETER SHALL BE THE AVERAGE (MIDPOINT) DIAMETER OF THE SPECIFIED LENGTH LOG.
- LOG LENGTHS SHALL NOT BE ACCOMPLISHED BY JOINING MULTIPLE LOGS, UNLESS APPROVED BY ENGINEER.
- BACKFILL MATERIAL SHALL BE AS SPECIFIED ON THE DESIGN PLANS.
- SALVAGED BRUSH SHALL BE MATERIAL STOCKPILED DURING CLEARING AND GRUBBING OPERATIONS OR PROVIDED BY THE COR.
- BRUSH INCORPORATED INTO STRUCTURES SHALL BE SMALL TRUNKS, LIMBS AND BRANCHES A MINIMUM OF 5 FEET IN LENGTH SALVAGED FROM THE CONSTRUCTION ACCESS AREAS. LARGE INTACT BRUSH CLUMPS ARE THE MOST SUITABLE.

##### EXECUTION

- LOG STRUCTURES SHALL BE INSTALLED AS SPECIFIED ON THE CONTRACT DOCUMENTS AND AT THE DIRECTION OF THE COR. LOGS NOT MEETING cor'S APPROVAL SHALL BE REMOVED AND RESET
- EXCAVATE TRENCH TO THE MINIMUM DEPTH FOR THE ENTIRE STRUCTURE.
- INSTALL LOGS TO THE LINE AND GRADE SPECIFIED. TOLERANCE FOR FINISHED GRADE SHALL BE  $\pm 0.3$  FEET VERTICALLY AND  $\pm 1.0$  FEET HORIZONTALLY
- BACKFILL AND COMPACT TRENCH.
- MOUND MATERIAL OVER TRENCH TO PREVENT EXCESSIVE SETTLING OF BACKFILL.





**6 CONSTRUCTION ENTRANCE**  
TYPICALS (NTS)

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**Mattole Salmon Group**  
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Petrolia, CA 95558




VERIFY SCALE  
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MATTOLE SALMON GROUP MIDDLE SLOUGH SALMONID HABITAT ENHANCEMENT MATTOLE RIVER ESTUARY, PETROLIA, CA	<b>CONSTRUCTION ENTRANCE</b>
---	------------------------------

DATE	MAR 2018
SUBMITTAL	FINAL
DESIGN	AL, ML
DRAWN	AL
SHEET	11 of 11

## **LOWER MATTOLE RIVER AND ESTUARY RIPARIAN ENHANCEMENT PLAN - PHASE 2**



Prepared by:  
Hugh McGee, Program Director  
Mattole Restoration Council  
PO Box 160, Petrolia, CA 95558  
707.629.3514  
[mattole.org](http://mattole.org)



**Mattole Restoration Council**  
community watershed restoration since 1983

## **1. Proposed Project Location and Extent**

The proposed project will be implemented in the lower five miles of the Mattole River mainstem, including the Mattole River estuary (Map 1, Project Map and Map 2 Completed and Proposed Project Map). The Mattole River drains an area of approximately 300 square miles and enters the Pacific Ocean west of the town of Petrolia, California in Humboldt County. The Mattole River estuary is located at the northern end of the King Range National Conservation Area (NCA). For the purposes of this project the terms ‘lower Mattole River’ or ‘lower river’ refer to the lower five miles of the mainstem of the Mattole River. The extent of the work includes approximately 100 acres and 29,000 linear feet over the course of a 4 mile reach.

## **2. Cause of Existing Problems**

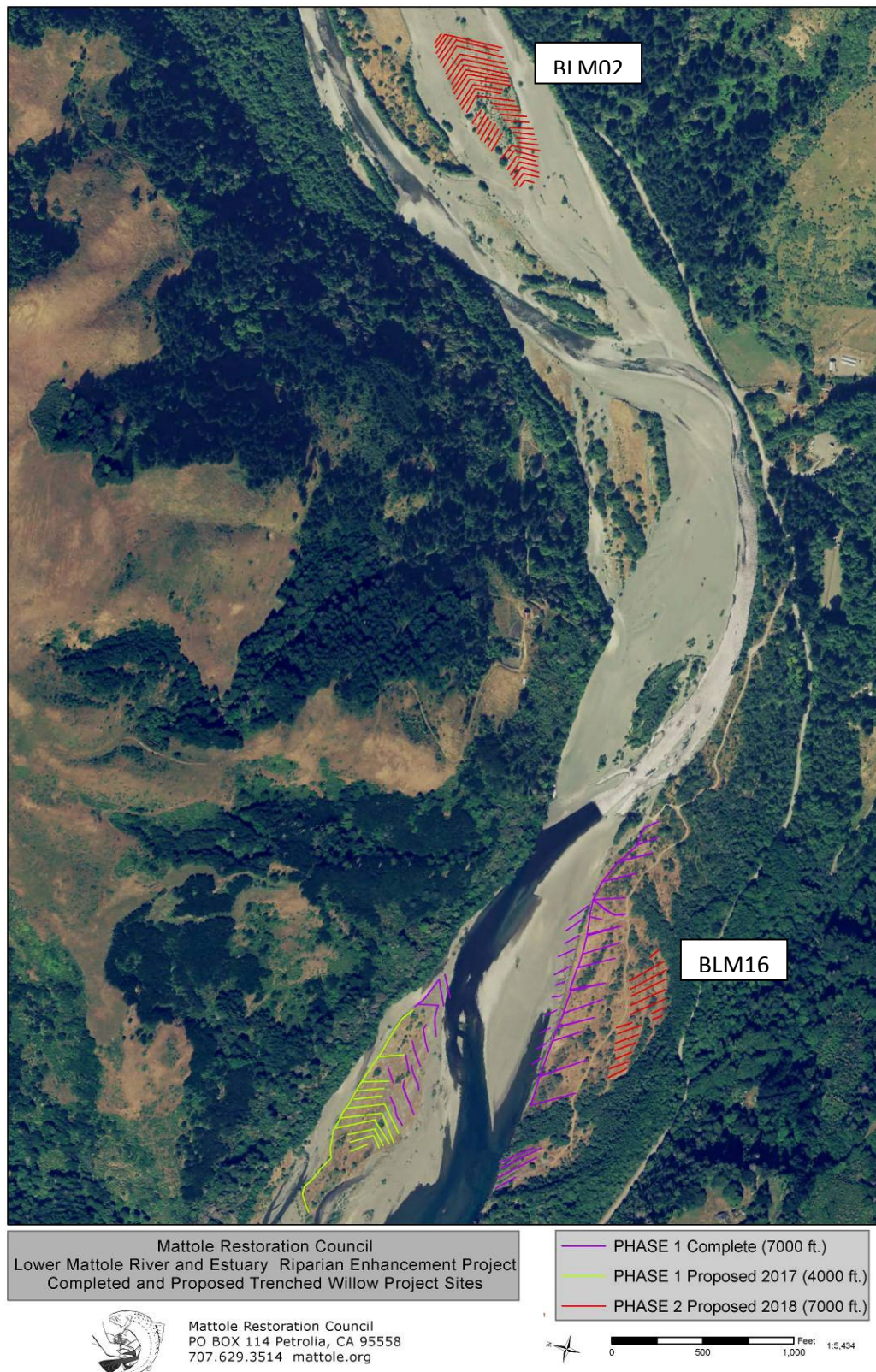
The lower Mattole River has been dramatically impacted by a history of timber harvesting. During a short 40-year window from 1947 to 1987, an estimated 82 percent of the timber in the Mattole watershed was harvested. The resulting destabilized hillsides and thousands of miles of poorly maintained or abandoned roads, combined with a highly seismically active landscape, resulted in watershed-wide large-scale erosion. This erosion has been exacerbated by extreme flood events, including ‘100 year floods’ in 1955 and 1964, and has resulted in the deposition of hundreds of tons of sediment into the Mattole River. This deposition has resulted in dramatic, lasting changes to the Mattole River, much of which has been concentrated in the lower river and estuary.

The Mattole River contains populations of three Pacific salmon species: Southern Oregon/Northern California Coast (SONCC) coho salmon, California Coastal (CC) Chinook salmon, and Northern California (NC) steelhead. These three distinct population segments of Pacific salmon are listed as “threatened” under the federal Endangered Species Act. Of the three listed species, coho salmon are of most concern because recent data show that this species is nearly extirpated in the Mattole River. Pacific salmon are anadromous, and thus the estuary and lower river environment are critical to the survival of individuals transitioning from a freshwater environment to a seawater environment.

Currently, summer habitat conditions in the lower river and estuary are generally poor for juvenile Pacific salmon. The area is broad, shallow, and lacks complex habitats for fish to hide from predators. Many of the riparian floodplains are void of long-lived riparian tree species that provide shade, floodplain stability, and future wood recruitment. Many mid-elevation islands that were relatively stable and vegetated with riparian trees species such as willow (*Salix* spp.), California black cottonwood (*Populus trichocarpa*), and red alder (*Alnus rubra*) prior to flood events, are now partially vegetated with non-native grasses and forbs and some native shrubs and lack stability and abundant riparian vegetation. In addition, summer water temperatures in the lower river regularly exceed levels thought to be stressful to Pacific salmon (Downie et al. 2003).

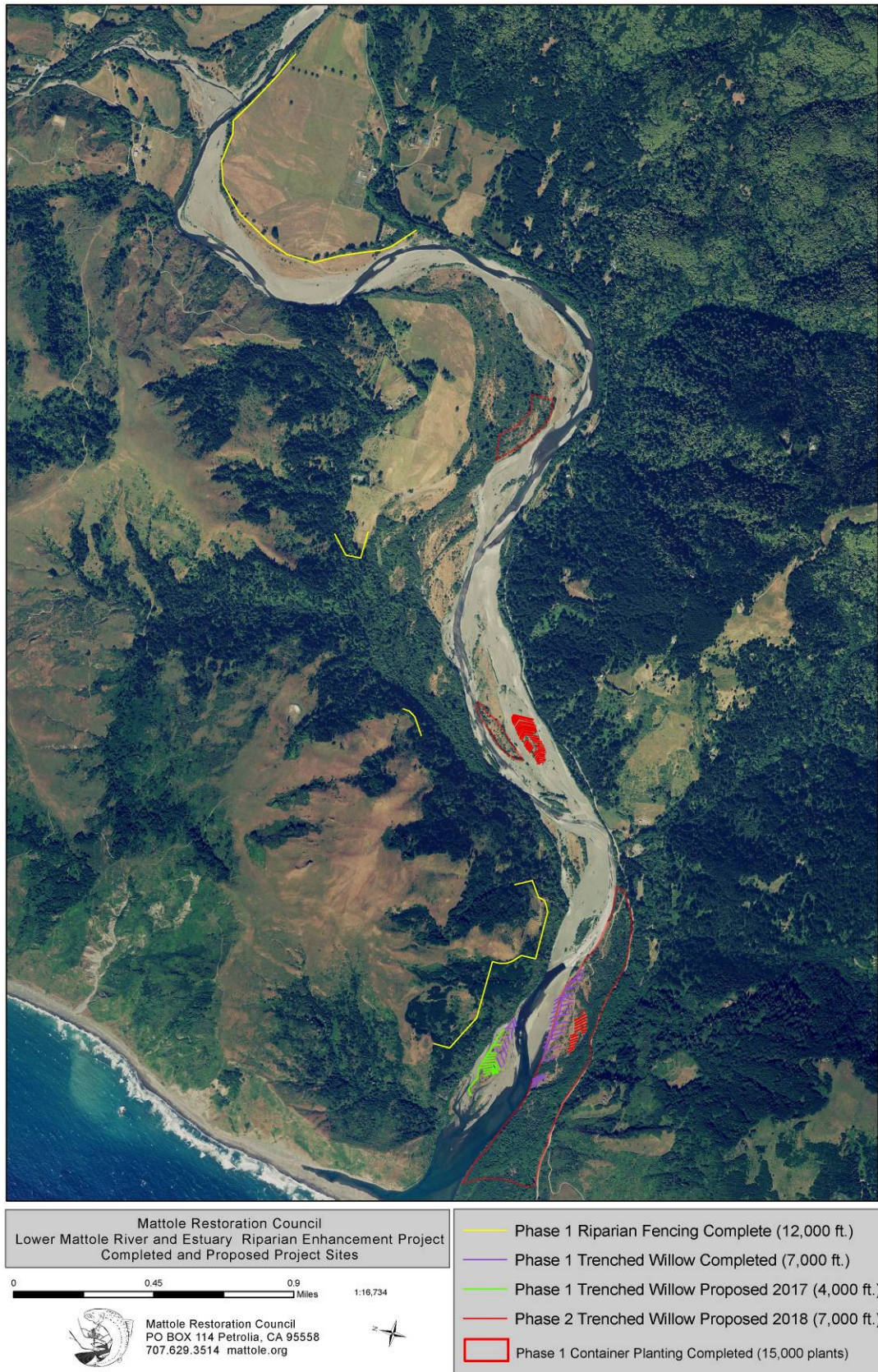


Map 1. Project Map





Map 2. Project Map of Completed and Proposed Project Sites



### 3 Lower Mattole River and Estuary Riparian Enhancement Plan

In an effort to improve instream and riparian habitat conditions in the lower river and estuary, the Bureau of Land Management, in collaboration with the Mattole Restoration Council (MRC), Mattole Salmon Group (MSG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (DFW) developed a five-year restoration plan for the Mattole estuary and lower river (BLM 2012). As a result, various habitat restoration projects have been planned and implemented by MRC and MSG in this project area over the past few years. These projects included riparian planting, bank stabilization, installation of fish habitat structures, wood loading projects, riparian fencing, and sediment reduction projects on adjacent roads and tributaries. In the last few years the MRC has planted over 15,000 riparian plants on lower-river floodplains just upstream of the project area and an additional 15,000 container plants within the project area, and installed over 12,000 ft. of willow baffles at bar apex jam and engineered log jam sites, bank stabilization sites, and installed 12,000 ft. of livestock exclusion fencing. See Map 2 for work completed and proposed.

### **3. Proposed Restoration Elements**

The two proposed restoration elements include: 1) trenched willow baffle installation on intermediate elevation islands and floodplain terraces and 2) riparian containerized planting at trenched willow sites on floodplain terraces and intermediate elevation islands. All activities are outlined in the BLM Estuary 10 Year Plan as high priority objectives to enhance lower river and estuary conditions, and would be a continuation of the ongoing work in the Mattole Estuary. These projects will be implemented in coordination with MSG wood-loading, large wood installation projects, and estuary slough restoration projects proposed over a 5 year period.

The proposed activities in this plan directly address both biological and physical salmonid habitat issues in the lower river and estuary. The purpose of these treatments is to:

- Improve juvenile salmonid survival during summer, low-flow periods
- Increase availability of suitable winter habitat
- Increase channel stability
- Increase instream habitat complexity
- Promote riparian vegetation colonization and growth
- Create a mosaic of varying streambed sediment sizes
- Promote more variable topographic diversity in the reach
- Increase connectivity to existing sloughs, alcoves, and other off-channel habitat
- Increase stream nutrients available to native species

### *Element 1. Trenched Willow Baffle Installation on Intermediate Elevation Islands, Floodplain Terraces and Terrace Margin*

A minimum of 4,000 large willow cuttings will be installed into 7,000 ft. of trench on 7.6 acres of project sites adjacent to MSG wood loading projects and slough excavation sites. The purpose of this task is to improve riparian habitat conditions by installing trenched willow baffles in and adjacent to MSG large wood installation sites. Proposed activities directly address lack of riparian habitat and in-stream complexity by promoting the establishment and growth of riparian vegetation that will aid in the formation and building of vegetated mid-channel islands. This task will directly increase the amount of riparian edge habitat in the estuary and lower river, promote stability of intermediate elevation islands, increase deposition of fine sediment that will aid in island building, and promote development of side channel habitat. See Map 1 for project locations.

### *Element 2. Riparian Container Planting at Trenched Willow Sites Intermediate Elevation Islands, Floodplain Terrace, and Terrace Margins*

A total of 4,000 container plants (with up to 2,000 replaced over the next 5 years to attain survivorship targets) will be planted on approximately 7.6 acres of floodplains in the lower 5 miles of the Mattole River and maintained for a five year period. The purpose of this task is to enhance riparian floodplain forests along the Lower Mattole River. Many lower river floodplains are lacking long-lived riparian tree species such as Douglas-fir (*Pseudotsuga menziesii*), Oregon ash (*Fraxinus latifolia*), big-leaf maple (*Acer macrophyllum*), and California black cottonwood (*Populus trichocarpa*), among others, that provide floodplain stability, riparian habitat, and sources for large wood recruitment. This project directly address the issues of lack of floodplain forests, riparian cover, floodplain stability, channel stability, and a source of large trees for wood recruitment for in-stream habitat complexity. Riparian planting will create the foundation for creating diverse riparian forests, stable floodplains that provide long term wood recruitment and shade for salmonid species, as well as habitat for other plant and animal species. Several floodplain terraces have been planted over the last three years and these project sites directly tie into previously planted areas. See Map 1 and Map 2 for project locations.

## **4. Plant Materials**

### *Seed Collection*

Seed will be collected at pre-defined collection sites adjacent to proposed planting sites, or at sites with similar characteristics, in the lower 10 miles of the Mattole River. The MRC keeps an in depth database of seed collection locations and harvest amounts to ensure that collection sites are not over-harvested. No more than 5% of seed from individual plants will be collected. Seed will be collected from multiple individuals to ensure genetic diversity. Seed will be collected by interns, volunteers and field technicians. Seed will be processed, stored, cared for, and grown by interns, volunteers, and the Nursery Manager at the MRC Native Plant Nursery.

### *Plant Propagation*

The plant palette for this project was developed from site visits to nearby reference sites and analyzing monitoring data from previously planted sites to determine which species will have the highest survival rates. Species were chosen that will provide mature riparian forests and the highest survival rate for existing site conditions. Timing of propagation will depend on species. California black cottonwood will be grown in containers from vegetative cuttings. All other container plant species will be grown from seed. Large willow and cottonwood cuttings will be taken from live cuttings and planted directly at site. Seed collected for broadcast seeding will be stored and directly seeded at project sites in the fall. The project manager will work closely with the nursery manager to ensure that all plant materials are restoration grade at time of planting.

The MRC Native Plant nursery used best management practices to ensure that all native plant material is of the highest quality and void of pests and disease. All plant materials shall be free of pests and disease upon installation. Organic fertilizers are using during the propagation phase but will not be installed at individual planting sites.

### *Plant Protection*

Tree protection will not be installed on every plant at time of planting but as needed during the monitoring and maintenance phase. This is due to observations of planting on previous sites that proved that tree protection was not required on most sites where abundant shrubs, grasses, and forbs were present. If, during the monitoring phase, heavy browse is observed, tree protection will be installed and shall be 3 ft. in height and 4 inches in diameter Vexar Tree Protection. Tree protection should be installed with three (3) bamboo stakes that are 48 inches in length an 1/4 inch in diameter along with two (2) metal ground staple at the bottom of the protector.

## **5. Implementation - Site Preparation and Installation Methods**

### ***Element 1. Willow Baffle Installation on intermediate elevation islands, bar apices, and terrace margins***

Trenched willow baffle installation will take place at various islands, floodplain terraces and bar apices (BLM02, BLM16 and other sites identified as river conditions change) in the lower Mattole river and estuary from June 15 to October 15. These islands are partially vegetated with non-native annual grasses and forbs with some native shrubs and generally lack longer lived shrub and tree species such as willow and California black cottonwood. Willow baffle installation will take place on approximately 7.6 acres, measuring a total of 7,000 linear feet, of intermediate elevation islands and bar apices and not in the wetted channel. Project activities will not result in erosion or sediment delivery to adjacent waterways. Willow baffle installation at BLM02 will be implemented in conjunction with completed MSG wood installation projects. Willow baffle installation at BLM16 will be implemented in conjunction with MSG slough excavation projects. Soil excavated from slough channel will be installed in willow baffle sites.



Due to the dynamic nature of the lower river and estuary, we are proposing general areas for willow baffles to be installed. Exact planting locations will depend on the configuration of the channel at time of implementation. All willow baffle installation projects will take place on BLM property and all access to site will be through BLM property.

Large willow cuttings ranging size from 15 ft. to 25 ft. in length and 1 in. to 4 in. in diameter will be harvested from local populations of Pacific willow (*Salix lucida*), arroyo willow (*Salix lasiolepis*), and red willow (*Salix laevigata*), transported to project sites and directly planted into excavated trenches on 1 ft. centers. When materials are available, large cuttings and whole trees of California black cottonwood will be placed in trench with willow. Trenches will be dug by an excavator to a depth of 8 ft. to 10 ft. or until 2 ft. of standing water is present in trench. Trenches will vary in length from 50 ft. to 100 ft. When possible, conifer logs measuring 15 ft. to 20 ft. and at least 12 in. in diameter, will be placed vertically in trench every 10 ft. to provide structure to the trench and to aid in maintaining soil moisture in planting trench. Cuttings and excavated materials will be watered while the trench is being backfilled. Water will be pumped from an excavated hole with standing water in gravel floodplain adjacent to planting sites. Pump will be placed in a leak proof container lined with absorbent pads to mitigate for leaks and spills. BLM16 projects sites will be seeded with a riparian seed mix of 24 lbs. blue wildrye (*Elymus glaucus*), .5 lbs. coyote brush (*Baccharis pilularis*), and .5 lbs red alder (*Alnus rubra*) at a rate of 25 lbs per acre and mulched with native grass straw at a rate of 50 lbs. per acre. Trenches will be planted with container plants of *Alnus rubra*, *Fraxinus latifolia*, *Pseudotsuga menziesii* and *Populus trichocarpa* in the winter following installation.

*Large willow harvest specifications:*

1. Large willow and cottonwood cuttings shall be taken from harvest sites adjacent to project sites and at the willow coppice nursery on BLM property.
2. Cuttings will be harvested in late spring or early summer no more than 5 days prior to planting. If cutting are not planted on day of harvest, they shall be stored with cut ends placed in at least 2 ft. of standing water in a shaded location. All portions of cutting not in standing water will be watered with overhead irrigation to reduce desiccation.
3. Cuttings will be taken from young, straight, healthy specimens with smooth bark and no wounds or rotten bark should be present. See Photo 1. No more than 50% of individual plants will be harvested. Cuttings will not be taken from individual plants that are providing shade or bank stability to adjacent streams.
4. Cuttings will be harvested with a chainsaw with dimensions measuring 15 ft. to 20 ft. in length and 1 inch to 4 inches in diameter. Lateral branches may be removed to aid in transport, but is not necessary.

5. Live willow clusters may be harvested when available. These shall be dug out with excavator and transported directly to planting trench.

*Large willow installation specifications:*

1. Planting sites will be chosen in coordination with MSG staff to ensure that planting sites compliment adjacent large wood placement sites. This may include planting of cuttings at bar Apex jam, whole tree installation sites, or terrace margin sites where no wood has been installed. All sites shall be flagged prior to installation.

2. Planting sites shall be on bar apices and on intermediate elevation islands at locations where groundwater is no more than 10ft. below grade.

3. Planting trenches shall be excavated with an excavator to a depth of 10 ft. to 12 ft. or to a depth where at least 2 ft. of standing water is present in trench. Trenches will vary in length from 50 ft. to 100ft. and be spaced 50 ft. to 100 ft. apart both throughout the treatment site. Trenches will be dug perpendicular to flow, facing slightly downstream. No trenches will be excavated in the wetted channel and trenching activities will not cause increased erosion or sediment delivery to nearby waterways.

4. Cuttings shall be planted by hand with assistance from excavator and spaced in trench on 1 ft. to 2 ft. centers with bottom of cutting submerged in 2 ft. of water. At least 2/3 of cutting shall be below grade and 1/3 shall be above grade. Ratio of quantity of willow to cottonwood cutting will depend on availability of young cottonwood cuttings.

5. After cuttings are installed in excavated trench, trench shall be backfilled with excavated material, placing finer material in direct contact with cutting. When available, conifer logs that are 15 ft. to 20 ft. and at least 12 in. in diameter shall be placed upright in trench alongside plantings. At least 5 ft. of log above grade to provide structure for catching material during high flows.

6. Backfill material shall be watered as it is deposited back into the trench to ensure compaction and adequate soil moisture.

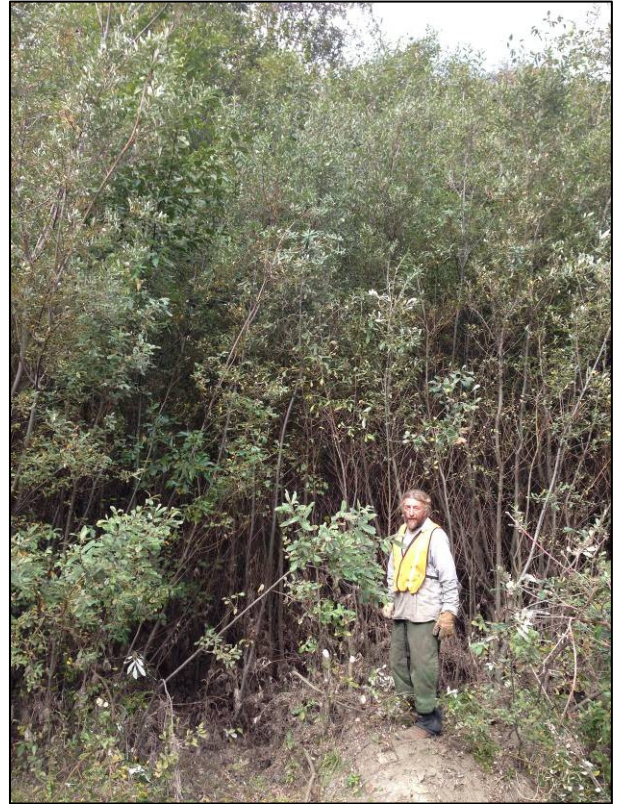
7. All areas disturbed from baffle construction shall be seeded with native seed mix consisting of 24 lbs. blue wildrye (*Elymus glaucus*), .5 lbs. coyote brush (*Baccharis pilularis*), and .5lbs red alder (*Alnus rubra*) at a rate of 25 lbs. per acre. Sites will be mulched with native grass straw at a rate of 50 bales per acre. Seeding and mulching shall take place in the fall prior to significant rainfall.

8. Tree protection is not required on large willow plantings.

9. Excavation of planting trenches and placement of conifer poles shall be sub-contracted to a local contractor.

**Photo 1. Example of willow source**

Willows will be sourced from dense stands of young straight willow, such as the one shown here, to minimize impact.



**Photo 2. Conifer logs installed vertically as framework for willow baffles**

When possible, conifer poles will be used to add additional support to the willow baffles



**Photo 3. Conifer logs installed horizontal as framework for willow baffles**

When possible, conifer poles will be used to add additional support to the willow baffles



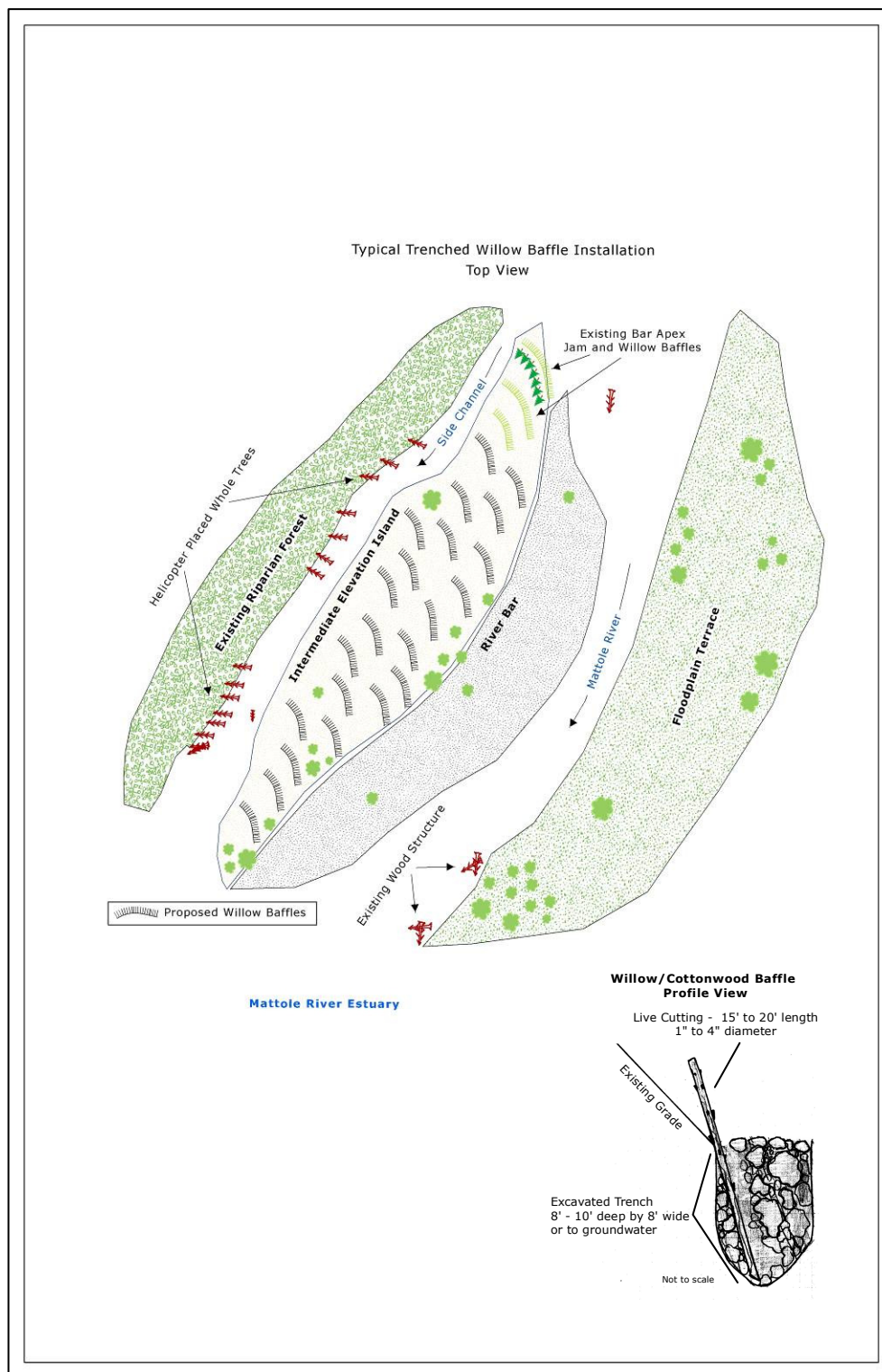


Figure 3. Trenched Willow Baffle Top and Profile View

## ***Element 2. Riparian Container Planting at Trenched Willow Sites Intermediate Elevation Islands, Floodplain Terrace, and Terrace Margins***

Container planting will take place at BLM02, BLM16 within trenched willow planting sites on both floodplain terraces and intermediate elevation islands. All container plants will be grown with seed collected in the Lower Mattole River at sites with similar characteristics to planting sites. Seed for each species will be collected from multiple individuals to ensure genetic diversity. Seed will be collected by hand and processed and stored at the MRC Native Plant Nursery until needed for plant propagation. Propagation will occur between November of 2017 and March 2020. All plants will be grown at the MRC native plant nursery.

Individual planting sites will be chosen by the MRC Riparian Restoration Project Manager. Planting locations will be chosen based on distribution of species on reference sites. Micro-site selection will be used to provide the most appropriate planting site for each individual species. The Project manager will flag planting sites prior to plant installation using color coded pin flags to differentiate between species. Tree species that will be installed include California black cottonwood (*Populus trichocarpa*), big-leaf maple (*Acer macrophyllum*), Oregon ash (*Fraxinus latifolia*), Douglas-fir (*Pseudotsuga menziesii*). Plant installation will take place between November 1 and March 1. Number of plants per species, container size for each, and flag color can be found in Table 1 below.

A total of 4,000 riparian trees will be installed at by hand with a planting shovel or hoedad depending on plant size. All vegetation will be cleared to bare ground within 2 ft. of planting hole prior to planting. After plant installation, a shallow basin measuring 2 ft. in diameter will be installed to aid in water collection from irrigation. Trees will be spaced at 2 ft. to 4 ft. When possible on-site materials will be used to construct shade structures and will be placed on the southwest side of plant. Plant installation will take place between November 1, 2017 and March 1, 2020.

Small patches of Scotch broom (*Cytisus scoparius*) will be removed from planting area prior to plant installation. Plants will be piled and left to compost. The MRC has been treating Scotch broom on these sites for 10 years and very small patches remain. Planting areas will be treated annually during the length of the contract.

### ***Container plant installation specifications:***

1. Plant installation shall take place after first significant rainfall in late fall or early winter when soil moisture is adequate for planting. The project manager shall visit planting sites after significant rainfall and prior to installation to determine if soil moisture is adequate for planting.
2. Plants shall be transported to site no more than 3 days prior to installation to ensure proper care at the nursery until time of planting.

3. Non-native invasive plants (mainly Scotch broom) shall be removed from site prior to plant installation.
4. Prior to planting, vegetation within 2 ft. of planting hole shall be cleared to bare soil.
5. Plants shall be installed by hand using a shovel or hoedad depending on plant container size.
6. Planting hole shall be no less than 1.5 times the size of container. For larger d-40 and tree pot size container plants, planting hole dimensions shall be at least 10" wide and 20" deep.
7. Plant shall be installed with soil level in container equal to soil level at grade.
8. A basin shall be installed at each planting location by creating a slight depression around planting hole and constructing a 3" berm 24" from center of plant
9. Trees shall be planted on 5 ft. to 10 ft. centers and shrubs on 3 ft. to 4 ft. centers depending on species. Shrubs shall be planted in clusters of 3-5 individuals.
10. Chipped conifer mulch shall be installed in each planting basin for tree species. Shrubs will not be mulched.
11. Above ground irrigation shall be installed for a period of 5 years.
12. Tree protection shall be 3 ft. in height and 4 inches in diameter Vexar Tree Protection. Tree protection should be installed with two (2) wood stakes that are 48 inches in length and 1 inch in diameter. Tree protection will be installed on *Fraxinus latifolia* and *Acer macrophyllum* at time of planting and as needed on other species during the monitoring and maintenance phase.

Table 1. Species and quantities of plants to be installed on project sites.

Common name	Scientific name	Type	Quantity	Container Size	Flag Color
big-leaf maple	<i>Acer macrophyllum</i>	Tree	250	D25	Yellow
red alder	<i>Alnus rubra</i>	Tree	1000	D25	Red
Oregon ash	<i>Fraxinus latifolia</i>	Tree	500	D25	Blue
California black cottonwood	<i>Populus trichocarpa</i>	Tree	2000	D40/TREEPOT	Orange
Douglas-fir	<i>Pseudotsuga menziesii</i>	Tree	250	D25	Green

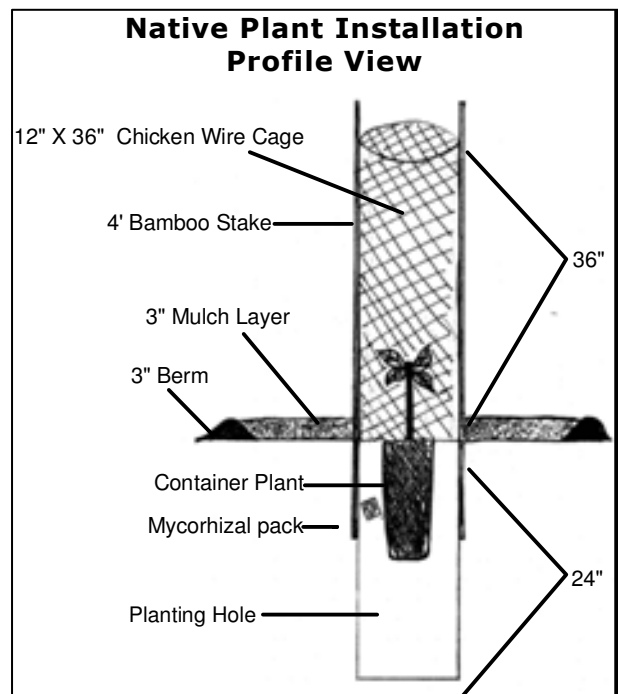


Figure 4. Native Plant Installation Profile View

## 6. Site Suitability Evaluation

Restoration sites were chosen by the MRC Riparian Restoration Project Manager with consultation from the Mattole Estuary TAC. These sites were chosen as high priority riparian restoration sites as a result of riparian assessments completed by the MRC staff from 2008-2016. These assessments took place to identify and prioritize possible riparian restoration sites throughout the Mattole Watershed.

### *Container Plant Installation Floodplain Terraces*

Analysis of historic aerial photos reveals that these sites have been relatively stable for over 25 years. These sites were chosen as high priority floodplain restoration sites due to their site stability, potential for revegetation success, lack of long-lived riparian trees, and proximity to ongoing large wood placement projects. These floodplain terrace sites are abundant in non-native grasses and shrubs but lack long-lived native riparian tree species that will provide shade, stability, and large wood inputs into the future. Soils on the site consist of loamy sands that are adequate for planting of native hardwoods and conifers such as Douglas-fir, California black cottonwood, big-leaf maple, Oregon ash, and California bay laurel. Coyote brush is abundant on site and will provide micro-sites for plants that are installed. because limited water is available on-site, plants will be installed at a higher density to account for mortality.

Previous riparian revegetation projects that have taken place over the past 4 years have occurred on similar sites within the project area. Since 2011, the MRC has been planting riparian floodplains in the lower seven miles of the Mattole River. During this time, over 30,000



container plants and cuttings of 10 riparian species have been planted on these sites and have had survival rates averaging around 70% after two years of growth. Maintenance of these sites included weeding in spring and summer and some hand watering during summer months.

#### *Trenched Willow Baffles on Intermediate Elevation Islands and Bar Apices*

Trenched willow planting sites will take place on bar apices, intermediate elevation islands, and terrace margins adjacent to where Mattole Salmon Group large wood installation projects have been completed and slough restoration projects are proposed. Several partially vegetated islands are present in the lower river and estuary area. Generally, the elevation of these islands is less than bank full stage in height, rising approximately 4 to 8 feet above the summer low-flow water surface. They are characterized by some areas that are partially vegetated with non-native forbs and grasses and some native shrubs and surfaces with broad patches of fine sediment suitable for plant colonization. Prior to historic flood events of 1955 and 1964, these islands appear to be relatively stable with some parts of the islands being re-shaped from winter flow events, and were vegetated with riparian trees species such as willow, California black cottonwood (*Populus trichocarpa*), and red alder (*alnus rubra*)

In the past few years, combination of wood structures and 7,000 ft. of trenched willow plantings were installed on these islands and at bar apices. The proposed project will a continuation of past projects with more trenched willow baffles being installed on bar apices and throughout the intermediate elevation island. These projects have proven to be successful at increasing riparian vegetation in the Lower River. Over past several years 7,000 ft. of trenched willow has been installed and over 90% of these sites have survived through winter flow events and have abundant growth. (See Photos 4 - 8 of previously implemented sites). Trenched willow baffles will be installed with large wood when it is available at the head of islands to promote deposition of finer-grained sediment for vegetation colonization, and contribute to instream habitat complexity. They will also be installed without large wood adjacent to, and downstream of, whole trees placed by MSG. Installation of trenched willow baffles has the following objectives:

- Promote riparian growth and colonization of un-vegetated islands
- Promote Island stability
- Increase deposition of fine-grained sediment on island surfaces.
- Promote development and connection of side-channel and alcove habitat.

BLM 02 and BLM16 were chosen as a high priority floodplain restoration sites due to its proximity to ongoing large wood installation and slough restoration projects in the lower river and estuary and the potential for the development of mid-channel willow islands. Planting of these sites are meant to compliment MSG large wood installation sites by creating long-lived willow islands that will provide more persistent riparian vegetative structure and enhance channel complexity.

Due to the dynamic nature of the lower river and the estuary, exact treatment locations on a given feature would be determined based on site conditions at the time of construction. Although line segments located on the project (See Map 1) represent the general area of trenched willow installation, the locations of planting sites may change due to changes in river conditions.

**Photo 4** (above left) shows a 750 ft. bank in the lower river prior to trenched willow treatment.



**Photo 5** (above right) shows the same bank post treatment after two high flow storm events. **Photo 6. (Left)** Show deposition of 2 -5ft. of fine sediments on bank after two high flow storm events.







Photo 7. 2016 NAIP air photo of completed trenched willow sites in 2014 and 2015.

2017 USFWS Imagery of Completed Trenched Willow Sites

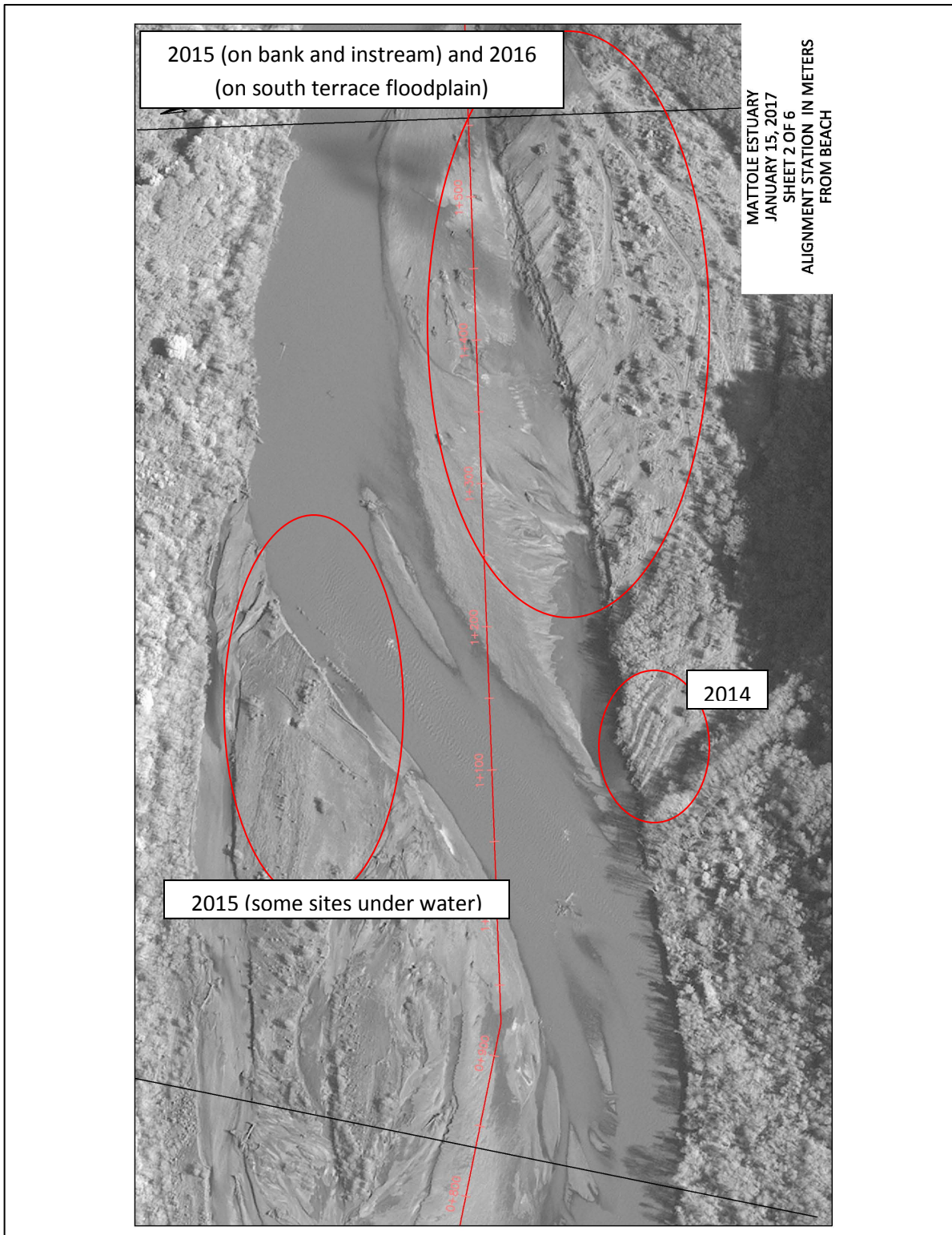


Photo 8. January 15, 2017 aerial imagery of trenched willow sites treated in 2014, 2015, 2016.

### *Reference Site Conditions and Species Selection*

Plant palette for this project were developed from site visits to nearby reference sites and analyzing monitoring data from previously planted sites to determine which species will have the highest survival rates. Species were chosen that will provide mature riparian forests and the highest survival rate for existing site conditions. Existing native vegetation at nearby reference sites consists of red alder (*Alnus rubra*), California black cottonwood (*Populus trichocarpa*), big-leaf maple (*Acer macrophyllum*), California bay laurel (*Umbellularia californica*), California buckeye (*Aesculus californica*), Oregon ash (*Fraxinus latifolia*), Douglas-fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*) Pacific willow (*Salix lucida*), arroyo willow (*Salix lasiolepis*), sandbar willow (*Salix exigua*), black capped raspberry (*Rubus leucodermis*), thimble berry (*Rubus parviflora*), ocean spray (*Holodiscus discolor*), red-flowering current (*Ribes sanguinum*) as well as other non-native and native forbs and grasses.

## **7. Maintenance and Monitoring Plan**

All container plants will be maintained for a period of 5 years or until Project Manager determines maintenance is no longer required. Maintenance activities are described below.

### *Plant Maintenance Specifications*

1. Competing vegetation shall be removed from within 2 ft. of all planting sites until plants are fully established. Weeding will take place once per month during this time.
2. Non-native invasive plant sites shall be re-treated once per year until target species ( is eradicated (mainly Scotch broom (*Cytisus scoparius*))
2. An above ground temporary irrigation system will be installed on planting site for hand watering of plants. Water source will come from a well located on site. A pump will be placed at well and will supply water to a 1.5 inch main line that will run through the entire length of the planting site. A hose bib will be located every 100 ft. Plants will be hand watered using a standard garden hose 10 ft. length.
3. Trees shall be irrigated with approximately 5 gallons of water per week from July through the first significant rainfall or whenever low soil moisture is detected.
4. Water line shall be checked and repaired on a monthly basis
4. Mulch and tree protection shall be re-installed at planting sites as needed

### *Success Criteria*

Success of project will be determined by plant survival per species at year 1, year 2, year 5 and year 10, canopy cover at year 10. Target survival rates per species and overall are Year 1: 70% survival; Year 2: 70% survival; Year 5: 70% survival; Year 10: 70% survival. Achieving 70%

survival at year 10 will ensure that canopy cover, root biomass, bank stability, and shade targets have been met. Once year 5 is reached, there is a high probability that most of the trees alive are well established and most will reach maturity.

### ***Monitoring Methods***

All project sites will be monitored for 10 years. Each individual tree will be monitored for survival in year 1, year 2, year 5, and year 10 and will be flagged with a color coded pin flag. At the time of monitoring, data will be recorded on plant health, stem diameter, tree height and any other pertinent information. Species with less than 60% survival after year two will be re-planted. Pre and post project photos will be taken for all sites.

## **7. Project Timeline**

<b>Project Task</b>	<b>Implementation Dates</b>
Seed collection	June 2017 - January 2019
Plant propagation	November 2017 - December 2020
Trenched willow baffle installation	June 2018 - October 2020
Containerized plant installation	November 2018 - March 2018
Broadcast seeding and mulching	September 2018- December 2018
Maintenance	September 2018- December 2020
Monitoring	September 2018- December 2020
Invasive Plant Removal	June 2018 - September 2022

**Lower Mattole River Restoration Projects**  
**Environmental Assessment (EA)/Initial Study (IS)**  
**EA # DOI-BLM-CA-N030-2018-0001**

**U.S. Department of the Interior**  
**Bureau of Land Management (BLM)**  
**Arcata Field Office**  
**Arcata, CA**

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# **1. Introduction**

## **Background and Setting**

The Mattole River drains an area of approximately 300 square miles and enters the Pacific Ocean west of the village of Petrolia, California (Figure 1). The Mattole River estuary is located at the northern end of the King Range National Conservation Area (NCA).

The Mattole River is home to populations of three Pacific salmonid species listed as “threatened” under the Endangered Species Act: Southern Oregon/Northern California Coasts (SONCC) coho salmon, California Coastal (CC) Chinook salmon, and Northern California (NC) steelhead. Of these three species, coho salmon are of most concern because this species is nearly extirpated in the Mattole River (MRRP 2011). Pacific salmonids are anadromous, and thus the estuary environment is critical to the survival of individuals transitioning from a freshwater environment to a seawater environment (Groot and Margolis 1991).

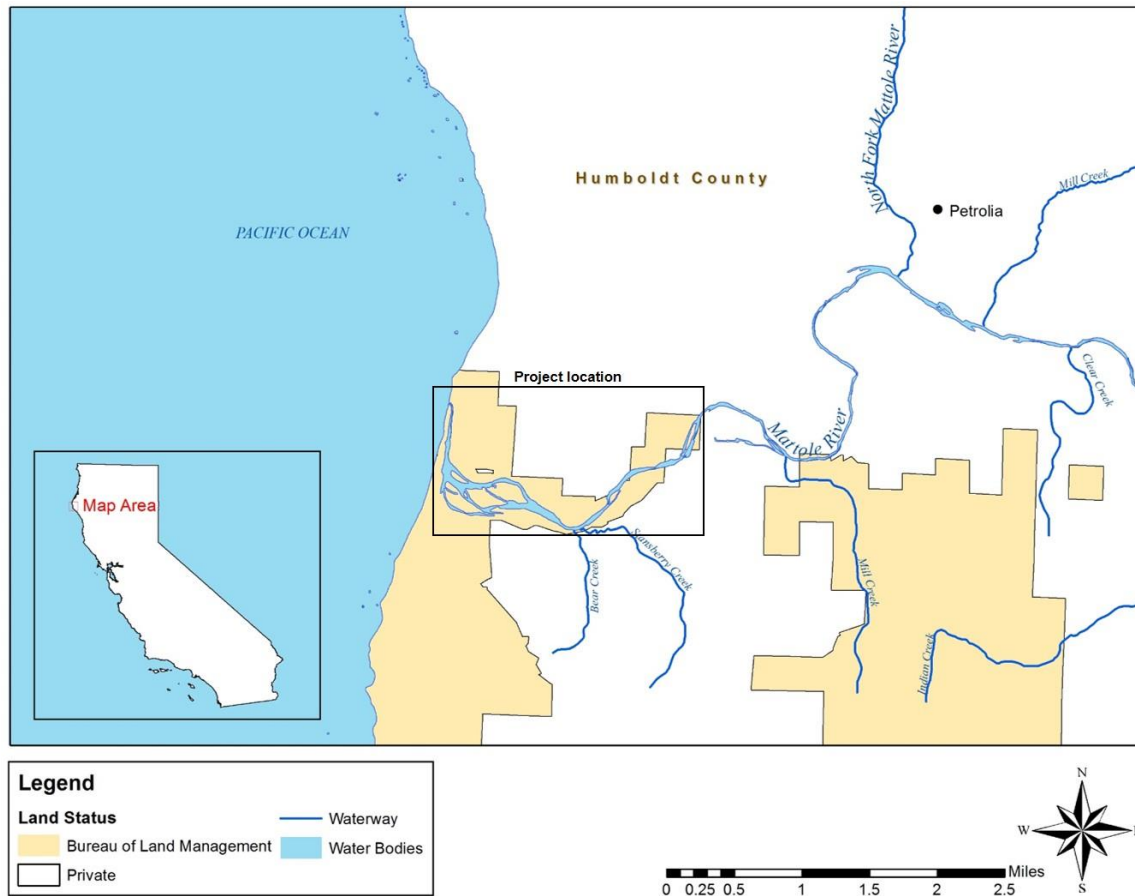
Floods in 1955 and 1964 altered the morphology of the lower river and estuary, and the effects of the floods persist today (Mattole Restoration Council 1995). Currently, summer habitat conditions in the lower river and estuary are generally poor for juvenile Pacific salmon (Downie et al. 2003, Mattole Restoration Council 1995). The area is broad, shallow, and lacks areas for fish to hide from predators. In addition, summer water temperatures in the lower river regularly exceed levels thought to be stressful, and even lethal, to Pacific salmonids (Downie et al. 2003).

In an effort to improve habitat conditions in the lower river and estuary, the BLM partnered with the U.S Fish and Wildlife Service, National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), Mattole Salmon Group, and Mattole Restoration Council to develop and implement a five-year restoration plan (2013-2017). All proposed projects were completed, and monitoring data indicates the restoration actions created high quality fish habitat (Mattole Salmon Group, unpublished data). Building on this success, the BLM proposes a new five-year restoration effort (2018-2023) that expands upon the collaborative work with partner organizations.

## **Purpose and Need for Action and Decision to be Made**

As part of a comprehensive effort to recover listed Pacific salmonid species in the Mattole River, a need exists to improve habitat conditions for these species in the lower river and estuary. The purpose of this project is to improve and create fish habitat by implementing a multi-year restoration effort that mimics natural physical processes.

The BLM will decide whether or not to implement this restoration project as described in the Proposed Action and Alternatives section of this Environmental Assessment (EA)/ Initial Study (IS).



**Figure 1.** Vicinity map of lower Mattole River and estuary, west of Petrolia, California.

## Conformance with Land Use Plan

This project would be in conformance with the King Range NCA Resource Management Plan (RMP) (2005). Objective 1.4 states: “Maintain and restore the physical integrity of aquatic systems, including shorelines, banks, and bottom configurations.” More specifically, the King Range NCA RMP (2005) states in Aquatic Ecosystems and Fisheries section 2.1.1.2: “Implementation of enhancement projects in the Mattole Estuary will be considered if;

- Project implementation will provide beneficial habitat for salmon, steelhead, or other desired native species.
- Analysis has shown that the project will address habitat conditions limiting survival of target species at a particular life stage.
- The project will not create a hazard for KRNCA visitors or other recreationists.”

## Relationship to Statutes, Regulations or Other Plans

The proposed action is in conformance with the:

- Endangered Species Act
- Clean Water Act

- Northwest Forest Plan (USDA/USDI 1994)
- Wild and Scenic Rivers Act

The BLM will complete Endangered Species Act Section 7 consultation with NMFS on. The BLM's preliminary determination is that the proposed action may affect but is not likely to adversely affect listed Pacific salmonid species.

The BLM is submitting a Pre-Construction Notification to the U.S. Army Corps of Engineers under the Clean Water Act Nationwide Permit Number 27.

The BLM is pursuing a Water Quality Certification from the North Coast Regional Water Quality Control Board.

BLM is pursuing a general negative determination from the Federal Consistency Division of the California Coastal Commission.

The project will likely receive state grant funds; therefore, this document is written to conform to regulations of both the Federal National Environmental Policy Act (NEPA) and the State California Environmental Quality Act (CEQA). A CEQA environmental checklist was completed during project scoping to determine that this project would be considered a negative declaration (Appendix A). Article 14 of the CEQA handbook (Association of Environmental Professionals 2016) provides guidance regarding development of joint NEPA/CEQA documents.

The proposed action is consistent with the King Range NCA RMP (2005) and the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA-USDI 2001), as modified by the 2011 Settlement Agreement.

The BLM is required to evaluate wilderness character of all areas subject to project-related activities. Pursuant the Northern California Coastal Wild Heritage Wilderness Act dated October 17, 2006, the project area was released from Wilderness Study Area designation.

## **Scoping and Issues**

In January, May, and July 2017, this project was scoped with nearby landowners, restoration organizations, and state and federal agencies involved in the management of the Mattole River and Pacific salmonids. Scoping input unanimously supported continuation of the lower Mattole River restoration effort. No issues were identified.

The project was scoped among the resources staff of the BLM Arcata Field Office in October 2017. The resources that may be affected include: invasive species, vegetation, climate change, terrestrial wildlife, threatened and endangered species, aquatic species, essential fish habitat, riparian, water quality, recreation, visual resources, wild and scenic rivers, the coastal zone, soils, and floodplains.

## **2. Proposed Action and Alternatives**

### **Proposed Action**

Restoration of fish habitat in the lower Mattole River and estuary requires a comprehensive multi-year approach. The proposed approach is driven by a set of biological objectives, which, in turn, are influenced by various physical processes at work in the lower Mattole River and estuary.

The biological objectives of this effort are to:

- Improve juvenile salmonid survival during summer, low-flow periods.
- Increase availability of suitable winter habitat, with emphasis on juvenile coho salmon winter refuge habitat.

To accomplish these objectives, this five-year project seeks to integrate our understanding of the dynamic lower river by identifying a suite of physical river features for treatment.

The intent of these treatments has several physical objectives:

- Increase channel stability in the lower Mattole River.
- Increase instream habitat complexity.
- Promote riparian vegetation colonization and growth.
- Create a mosaic of varying streambed sediment sizes.
- Promote topographic diversity.
- Increase connectivity to existing sloughs, alcoves, and other off-channel habitat.
- Increase food resources available to native species.

Finally, recognizing the dynamic setting of the lower Mattole River and the ever-improving understanding of riverine processes, the proposed action must be adaptive. The adaptive elements of the project are described in detail at the end of the proposed action section.

To achieve the above objectives, four specific types of treatments are proposed: installing structures on islands; installing structures at the apex of river bars; treating the margins of river terraces; and expanding a network of slough channels.

### **Treatment Locations in the Project Reach**

Construction activities would take place in the channel bed and along the banks of the lower Mattole River and estuary. General project locations and examples of features that would be treated are discussed in following sections and displayed in Figure 2. These include intermediate-elevation islands, bar apices, terrace margins, and the “middle slough” channel. Due to the dynamic nature of the lower river and estuary, exact treatment locations on a given feature would be determined based on site conditions at the time of construction. For example, many of the intermediate-elevation islands in the project reach are relatively transitory features; accreting and eroding as flows fluctuate

and the channel migrates across the valley floor. Thus, the exact locations of islands will likely vary over time, but the overall objectives remain: increase the stability of these features, promote increased vegetation colonization and growth and contribute to habitat complexity in the reach.

Access to construction areas would be from Lighthouse Road and, to the extent possible, existing roads along the bank (Figure 2). Some locations would require temporary access routes. Any perennial vegetation removed for temporary access routes would be replanted. In-river access would be required to place wood structures (described below). Specific access routes would be selected at the time of construction and would be located in areas that minimize water crossings or the need for flow routing. Staging areas for equipment and materials would be located on previously disturbed areas near each site.

In addition to ground access, a portion of the large wood pieces may be placed in the channel using a large helicopter. Ground equipment access to these sites may be necessary and sites would be chosen to minimize water crossings or the need for flow routing.

In summary, the action area for the project is the channel bed, alluvial terraces, and riparian forests along the entire reach of the Mattole River within the BLM's King Range National Conservation Area (approximately 2.5 river miles).

Below is a list of specific physical features in the lower river and estuary proposed for treatment.

#### Intermediate-elevation Islands

Several islands are present in the project reach (Figure 2). Generally, the elevation of these islands is less than bankfull stage in height, rising approximately four to eight feet above the summer low-flow water surface. They are characterized by partially vegetated surfaces with broad patches of fine sediment suitable for plant colonization. Historically, these islands appear as quasi-stable features in the lower river; whereas today they are being continually reshaped or obliterated during high winter flows.

A combination of large wood structures and plantings (see descriptions below) would be installed on these islands. Specific designs and placement for a given year would be developed during on-site meetings among project collaborators. Structures would typically be located at the upstream end of the island or along the margins to increase stability of the feature, promote deposition of finer-grained sediment for vegetation colonization, and contribute to instream habitat complexity. Structure placement would be guided by the following objectives:

- Promote stability of the island.
- Increase deposition of fine-grained sediment on island surfaces.
- Increase in-stream habitat complexity in adjacent low-flow channel.
- Promote development and connection of side-channel and alcove habitat.

Construction would consist of trench excavation and placement of rock and woody materials. Construction footprints would vary but generally be less than 80 feet width and 150 feet in length. Over the entire project reach, the extent of structures installed over the

five-year period of the proposed action will depend on funding constraints and the distribution of islands present in any given year. Using current conditions as a guide, approximately 12 intermediate-elevation surfaces are present in the reach. Up to four islands would be treated in a single year if funding allows. Specific treatments would include a combination of the structures described above. Over the five year period, no more than 12 surfaces would be treated.

### Bar Apices

The upstream extents of alternate and mid-channel bars are proposed for various treatments. Through the project reach, these surfaces slope gradually from near bankfull elevations to the channel thalweg. Treatments would occur near the heads of bars to promote bar stability and increase habitat complexity at low flows (Figure 2). Specific treatments would include bar apex wood jams and vegetated baffles similar to that described above for islands. On-site pre-project meetings would develop site-specific designs for each bar. In some instances, the objective of the structure may be to create instream habitat features such as scour and cover around an individual log. In other cases, a combination of larger log and vegetated baffle installations would be used to create a more persistent topographic feature in the channel.

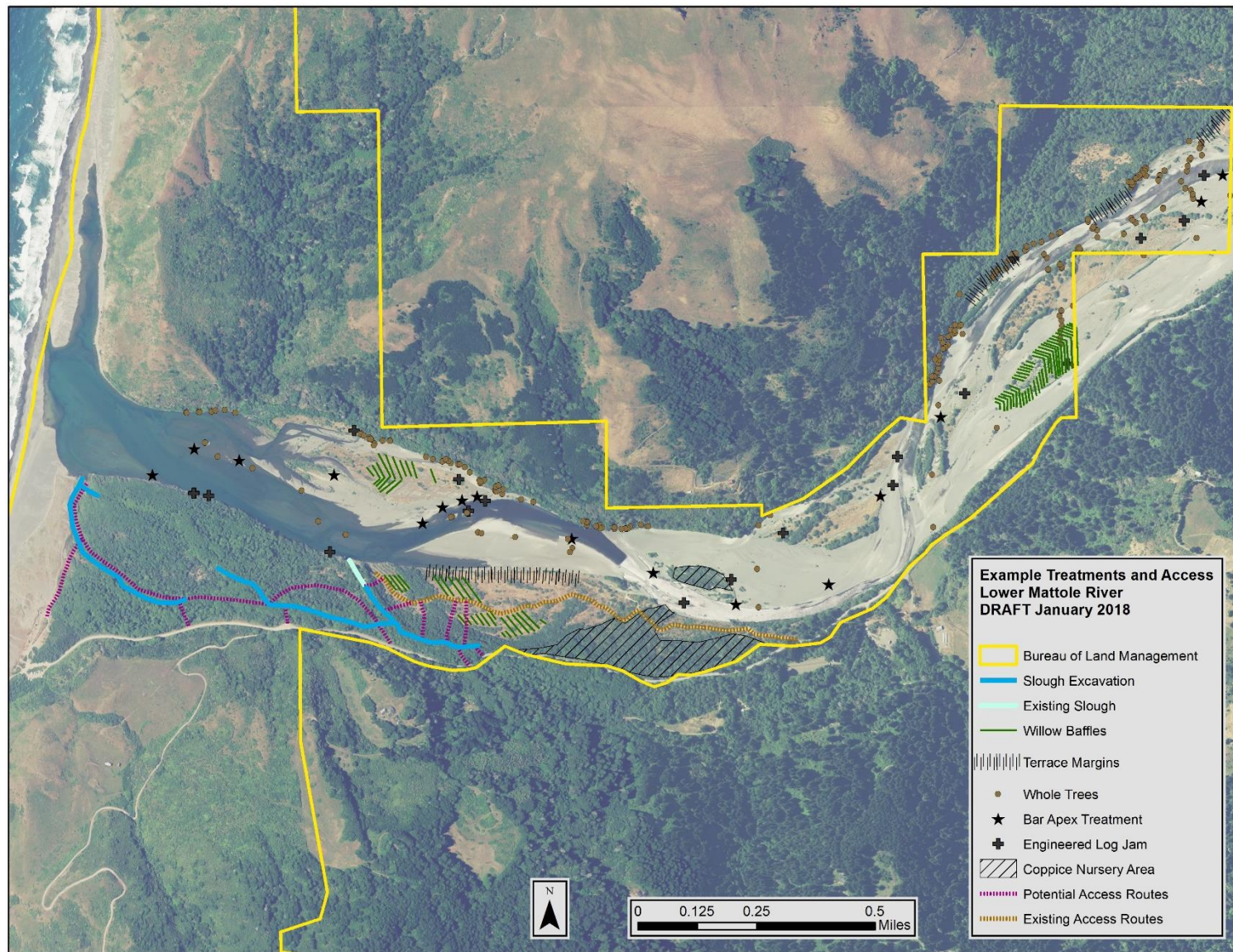
### Terrace Margins

Alluvial terraces above bankfull stage are present through the reach. Most notable is the large terrace in the lower half of the reach along the south bank. Where vegetation is present on these surfaces, gradual river migration can erode terrace margins and allow for beneficial debris to recruit to the wetted channel. However, where channel migration rates are high, as is the case in the project reach, adjacent vegetation does not have time to reach favorable sizes. Also, high flow channels on terrace surfaces provide access to slower water habitat on the interior of the terrace. In more extreme cases, a new channel cutting through an existing terrace could provide beneficial habitat as a narrow swath of riparian vegetation is eroded into the new channel. Therefore, the objectives of terrace margin treatments are diverse:

- Slow bank erosion associated with channel migration or widening.
- Provide instream habitat complexity.
- Promote peak flow dispersal onto adjacent terrace.

Terrace margin treatments would be extensive, consisting of wood structures and large arrays of vegetated baffles. Treatments along terrace margins would not encompass the entire length of the terrace. Rather, treatments would be focused over specific segments to achieve the objectives above. Specific designs would be based on physical conditions found at the site in the year of treatment. Over five years, up to five terrace margins would be treated.





**Figure 2.** Lower Mattole River example treatment types, treatment areas, and access routes.

## Slough Channels

Michael Love & Associates (2017) recently completed an extensive study of the lower Mattole River slough networks. The study and subsequent construction design work would guide the precise locations of slough channel expansion and excavation. Figure 2 shows the approximate locations of sloughs proposed for expansion and excavation.

The recently excavated (2014) slough channel referred to as “middle slough” on the south side of the river would be excavated and expanded upstream by approximately 1,200 linear feet, and a new 1,600 feet slough channel to its west would be excavated and connected to middle slough. In addition, the remnant slough channel in the lower-most portion of the river, referred to as “south slough,” would be excavated upstream by approximately 2,000 linear feet.

## **Treatment Types**

### Large Wood Structures

Structures comprised of large pieces of wood and, when possible, whole trees, would be constructed in areas identified in Figure 2. The large wood structures would be constructed in a manner that mimics naturally-formed wood jams in lower rivers and estuaries. A portion of these structures would be “Engineered Log Jams” (ELJ) and others would be configured in other arrangements. The type and design of the large wood structures would be dependent on the location of the structure and types of large wood materials available.

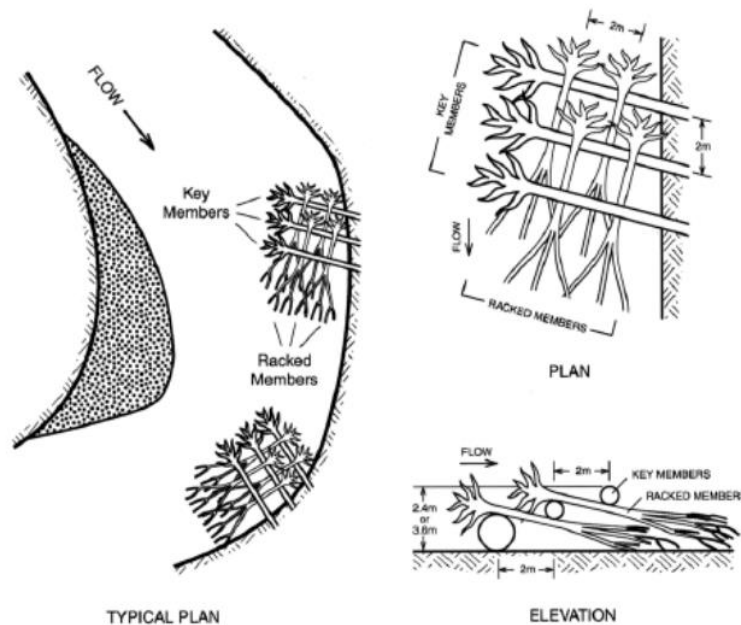
The term “Engineered Log Jam” (ELJ) was developed by Abbe et al. (1997) and refers to in-stream structure built by stacking whole trees and logs in crisscross arrangements to emulate natural log jam formation. Figure 3 shows a typical schematic. The ELJ and other wood structures create diverse physical conditions such as deep scour holes along the edge and traps additional debris. Flow stagnation is created in the shadow. The intent of ELJs and other large wood structures is to create areas of localized stability, while recognizing that extreme flood events will likely erode part or all of any installed structures.

ELJs and other wood structures may be anchored into banks and ballasted with large rocks as needed. Key pieces of wood may be pinned or cabled to large rock, as necessary, to offset buoyancy and forces during high flow events. The amount of cabling would be minimized to the maximum extent practicable. Cables and pins would be placed in locations where they would be permanently submerged or hidden from view.

Over the five year period up to 40 large wood structures may be constructed at locations described above and shown in Figure 2. In addition, pieces of large wood may be added to existing structures in order to improve the function of the structures, and whole trees may be placed individually or in clusters in strategic locations (e.g., stream margins) to provide habitat benefits.

Large wood would be sourced from trees obtained from nearby land-owners. Sand and gravel would be obtained from local sources. Large rock, when necessary, would be obtained from inland quarries.





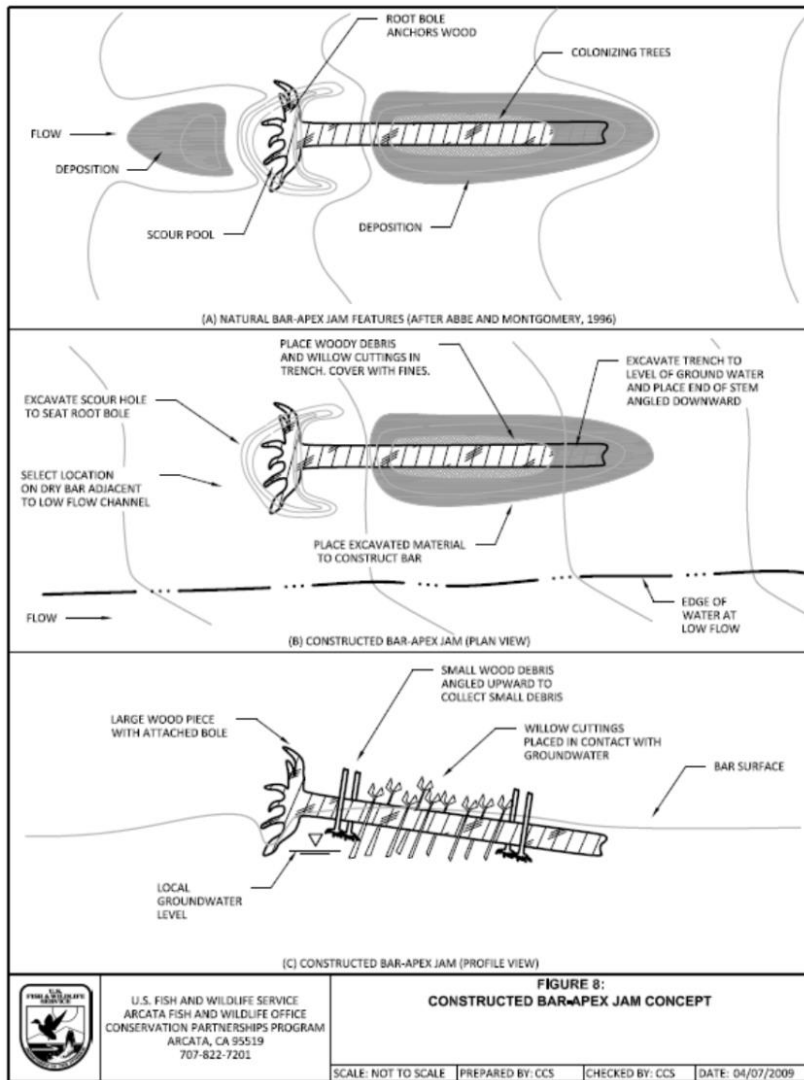
**Figure 3.** Engineered log jam schematic. Adapted from Shields (2001).

These structures may require the use of a large excavator for excavations and placement of wood, as well as a dump truck for transport of wood and rock to the sites.

### Constructed Bar Apex Jams

Bar-apex jams would be constructed on islands and at the upstream extent of active river bars (Figure 2). An example of a bar-apex jam is depicted in Figure 4. Trenches would be excavated at the head of bars. Then one to six large trees and boles would be placed in the trench along with other organic material and/or willow and/or cottonwood cuttings. The woody material would be partially buried with the excavation spoil. The root boles or tops would be left protruding above ground level depending on site conditions. The woody material would extend a short distance above the bed, but would be sufficiently anchored by the fill to prevent removal during high flow events. The angle of the protruding trees would vary from nearly horizontal to nearly vertical depending on site conditions. Trees would be obtained from local land-owners.

These structures would require the use of a large excavator for excavations and placement of wood, as well as a dump truck for transport of wood to the sites.



**Figure 4.** Bar apex jam schematic. Individual pieces may also be oriented vertically to promote accumulation of additional debris.

### Trenched Baffles

Up to 15,000 linear feet (on up to 20 acres) of trenched baffles would be constructed on islands and along terrace margins where topography permits excavation to the water table. Baffles would also be installed on lower elevation surfaces where they would be associated with bar apex jams or other isolated topographic features on the gravel bar. Trenches would be excavated to below the depth of the water surface. Large rocks, wood, and organic matter would be placed along the bottom of each trench. Cottonwood and/or willow cuttings would be placed into the trench and buried with the excavated material. Large rock would be obtained from local quarries. Tree cuttings would be obtained from local sources. In addition, locally propagated native container plants would be planted on terraces during the wet season.

Willows would be obtained from local coppice nurseries in the project area (Figure 2). Cuttings may require use of chainsaws. The extent of cutting on individual trees would be limited to avoid damaging the health of the tree.

Organic material may be obtained by chipping nearby woody material. A motorized chipper would be used and chipped materials may be stored on river terraces for use later.

Construction of these structures would require the use of a large excavator for excavations and placement of wood as well as a dump truck for transport of wood and rock to the sites. See Figure 5 below for typical example of willow baffle construction.



**Figure 5.** Example of willow baffle construction.

### Slough Channel Excavation

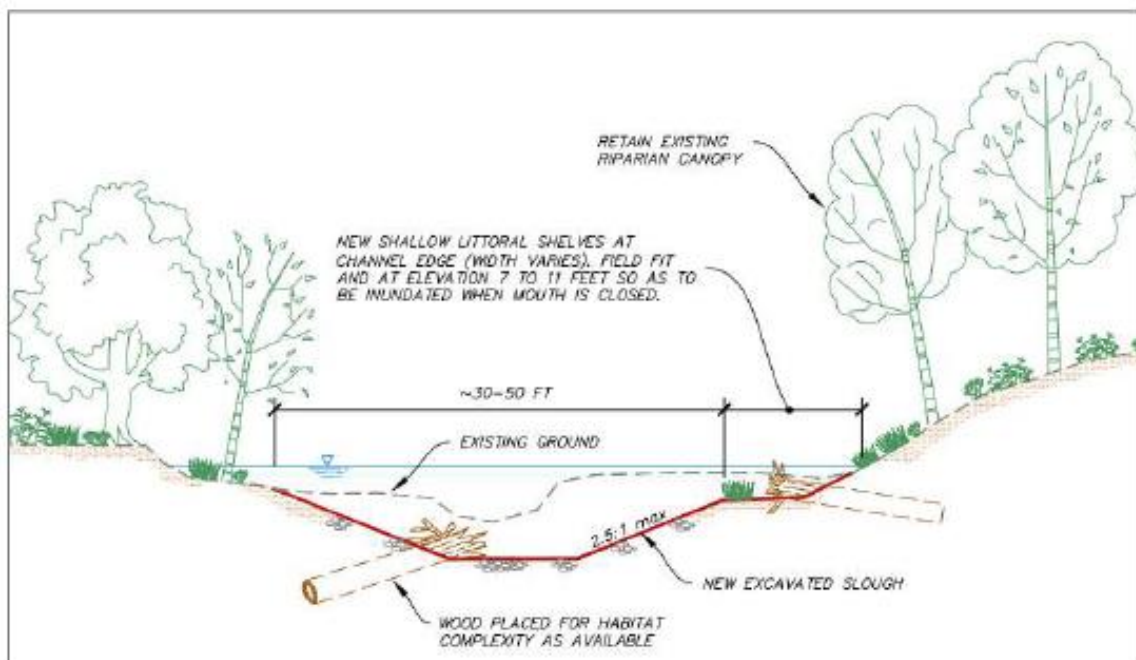
The recently excavated (2014) slough channel known as “middle slough” located on the south side of the river (Figure 2) would be extended approximately 1,200-ft upstream, and a 1,600-ft long channel would be excavated and connected to it to the west. The channel would be backwatered by the river when the mouth is open as well as during the lagoon phase, thereby providing year-round high-flow and thermal refugia habitat. Based on groundwater monitoring data, the groundwater gradient would ensure a positive drainage towards the river, providing cool water suitable for salmonids during the summer. The channel would be up to ten feet deep, up to 50 feet wide, and would include benches for emergent vegetation and in-channel large wood for habitat complexity (Figure 6). Small alcoves would be excavated off the main slough channel to provide habitat diversity.

The remnant slough channel in the lower-most portion of the river, referred to as “south slough,” would be excavated upstream by approximately 2,000 linear feet. The channel would have similar dimensions and habitat features as the middle slough channel.

Based on the recent survey completed by Michael Love & Associates (2017), approximately 4,700 cubic yards of material would need to be excavated to achieve the desired channel configuration for the middle slough extension, 8,100 cubic yards for the slough channel connecting to the west-side of middle slough, and 9,600 cubic yards for the south slough. Excavated materials are expected to consist mostly of sand, silt, and

organic matter in the upper strata, and gravel and cobble below. Materials from the middle slough area would be used within days as soil for tree and willow baffle planting, and materials from the south slough would be spread over the adjacent forested floodplain and mulched to prevent erosion. Any excess soil would be stockpiled outside of ordinary high water and would be mulched to prevent erosion.

Excavation of the slough channels would require the use of an excavator and a dump truck for transport of materials to terrace locations, as well as multiple access routes from the terrace and Lighthouse Rd. (Figure 2). All practical measures would be taken to route access around mature vegetation and trees; however, it is anticipated that access routes would require the removal of approximately 100 willows and 100 alders. All trees removed would be replanted nearby or used as a component of a restoration treatment. For middle slough, excavation would begin at the upstream extent of the existing slough and continue upslope. For south slough, excavation would begin near the confluence with the Mattole River and continue upslope. Excavation would occur in a single phase or multiple phases dependent on funding. To prevent impacts to water quality in the existing slough and the Mattole River, new slough channels would remain disconnected from the existing wetted channels until completion of each season's construction effort.



**Figure 6.** Example of typical slough excavation construction (from Michael Love & Associates 2017).

### Combined Treatments

The previous list of treatment types and locations are intended to work collectively to achieve the desired physical objectives. One example of treatment combinations would be installation of large wood structures, trenched baffles and apex jams along the intermediate elevation island on the lower north bank island to promote increased flow into the north slough. Additional structures and vegetated baffles along the island margin would promote stability of the island feature and continued scour in the adjacent overflow channel. The desired result would be a secondary channel connected to the low-

flow channel at its downstream terminus, accumulating cold water emanating from the valley wall, with the adjacent island accumulating fine sediment and providing substrate for colonizing riparian vegetation.

### **Coppice Nursery and Willow Harvest**

The above treatments would require willow and cottonwood plantings. The demand for willow and cottonwood plantings would be met by developing specific trees into a coppice nursery and harvesting shoots and branches from other trees. The terrace areas adjacent to the estuary consist of dense stands of willows that are suited for these efforts.

Approximately 50 willow plants throughout the proposed 15 acres of nursery area (Figure 2) would be thinned to develop a source of young willow shoots called a coppice nursery. These cutting sources would provide plant material for willow baffle, apex jam, and large wood structure projects. In sum, less than one acre of area would be impacted by harvesting and coppicing activities. In some instances, harvesting of larger cuttings for use in restoration project sites will serve as the creation of coppice nursery. The willow and cottonwood coppice nursery would be in production through the proposed five year restoration period. Cottonwood cutting materials are in short supply and some cottonwood cuttings would be taken from nearby sources and planted in this 15 acre area to create the opportunity for future cottonwood cuttings to be taken from this newly planted coppice source. Upon project completion, the coppice nursery would not be maintained, and would return to natural growing conditions.

### Methods

Coppicing activities would require the use of a chainsaw, hand loppers, and hand saws depending on size of cutting. Larger, older, branches would be cut at intersection of main branches and/or trunk to promote growth of younger shoots. Thinned material would be lopped and scattered. No more than 35 percent of live plant would be removed from individual trees. Coppicing activities would be spread throughout the 15 acre area to minimize impacts to stand aesthetics and wildlife. No willow or cottonwood plant mortality would occur as a result of coppicing activities.

Willow and cottonwood harvesting activities would require the use of a chainsaw, hand loppers, and hand saws depending on size of cutting. Young, 2–8 year old poles ranging in size from 0.25–8 inches and 3–20 feet in length would be harvested for baffle, apex jam, and large wood structure projects. Size of cutting would depend on planting site and depth to summertime groundwater. Cuttings would be taken from live, healthy branches with smooth bark and with no sign of disease or insect damage. When possible, lateral branches, leaves, and apical bud would be removed from pole to promote root growth. Cuttings may be directly planted into trenches or soaked in water at a nearby staging area. When cuttings are staged for planting on future dates, cuttings would be stored in shade when possible and with at least 50 percent of pole in standing water. Harvesting activities would be spread throughout the stand to minimize impacts to stand aesthetics and wildlife. No willow or cottonwood plant mortality would occur as a result of harvesting activities.

### Timing

Thinning for coppice nursery development would take place in the winter when plants are dormant. Harvest of larger willow and cottonwood poles would take place during the late summer in coordination with baffle installation, apex jam, and large wood structure projects. Harvest of smaller cuttings would take place in the fall in coordination with hand planting projects.

### Access to Cutting Sites

Willow and cottonwood harvest sites would be accessed by vehicle (flatbed truck with trailer or similar vehicle) on the existing access route in the estuary area, as well as gravel bars during the summer months. Access to cutting and coppice sites in winter would be by foot. Frequency of vehicle travel to and from site would depend on the size of baffle or structure, but would not require more than ten trips per day during construction period.

## **Impact Minimization Measures**

### Schedule

Construction activities would take place during the lowest river discharge possible prior to lagoon formation. In general, the in-channel construction period would be between June 15 and October 15 although environmental conditions (e.g., drought causes early lagoon formation) may necessitate flexibility on either end of the schedule. Site preparation work (e.g., equipment access routes) and upslope restoration work (e.g., terrace willow baffles installation) would occur as early as May 15.

### Turbidity Impacts

Excavation in and near the channel could create turbidity impacts. Turbidity would be avoided to the maximum extent practicable by isolating the work areas from the river. The specific turbidity avoidance measure would depend on the configuration of bars and low flow channels at the time of construction. Conditions and turbidity control measures may vary as follows:

*Dry Conditions:* Under the best circumstances, the areas of excavation would be dry due to shifts in the low flow channels. Under these conditions, no measures would be necessary.

*Isolated Low Flow Channel:* In some circumstances, work areas may be within an isolated low flow channel. Under these conditions, the work areas would be isolated by placing sandbags or waterbags upstream of the work area. Relief channels would be excavated through the intervening gravel bar to route flow around the work area. After first excluding fish, a downstream flow routing setup would be constructed using sandbags or waterbags. The water within the work area would be pumped out and discharged into upland areas. Pumps would also be used to remove seepage flows.

*Fully Flooded Conditions:* If the work areas are fully flooded by a broad channel, then turbidity curtains would be employed.

Turbidity curtains are impermeable barriers constructed of a flexible reinforced thermoplastic material. The curtains are suspended from the surface by floats and are anchored to the bed by ballast material. They are commonly used to control turbidity



impacts from dredging or excavation. Turbidity curtains are the preferred method because they are the least complicated to implement, maintain, and least disruptive to the river bed. If turbidity curtains are used, fish can be easily prevented from entering the work area. Additionally, turbidity curtains can be relocated so that the work area can be subdivided into small subareas for each project element. Turbidity curtains deployed for similar projects under similar conditions in the lower river and estuary in recent years were successful in preventing sediment plumes from entering the river.

#### Sediment control

Erosion from work areas would be controlled using sediment control best management practices. Following construction activities, all exposed soil would be mulched and straw bales or wattles would be installed near potential erosion sites to prevent mobilized soil from entering the water.

#### Release of Toxic Materials

Use of heavy equipment, pumps, and other motorized equipment near and in a stream channel allows for the possibility that toxic materials such as fuel, lubricants, and hydraulic fluids could leak into a watercourse and degrade water quality. All equipment used would be checked for leaks daily prior to the start of work and would not be used until any leaks are repaired or the leaking equipment is replaced. Absorbent pads would be on site and would be deployed in case any toxic materials are spilled near water. All fuel would be stored outside of riparian areas and all re-fueling would be conducted outside of riparian areas. Employing these measures for past projects near and in stream channels has proven to be effective and minimizing the potential for introduction of toxic material into water.

#### Fish

Prior to isolating any sections of the river for excavation, trained biologists would exclude fish from the work areas by walking turbidity curtains out from the water's edge and staking them into the stream bottom. No fish would be removed from the water, and the barriers would prevent fish from re-entering work areas. Work areas would be re-inspected at the start of each workday and exclusion procedures repeated as needed. Fish-exclusion turbidity curtains deployed for similar projects under similar conditions in the lower river and estuary in recent years were successful in isolating work areas. Daily inspections revealed no fish in the work areas following exclusion.

#### Vehicle and Equipment Crossings

Access to several treatment sites would likely require crossing the wetted channel. The type of crossing installed would depend on the width of the wetted channel, the frequency of crossings and types of vehicles.

*Wet crossing.* Where materials (logs, boulders, and any anchoring hardware) are able to be transported by helicopter and only an excavator or similar equipment is needed, a suitable crossing site would be delineated and no structure would be installed. Equipment would be limited to five crossings, where one crossing includes ingress and egress from the site. These multiple crossings would allow for equipment refueling outside of the active stream channel. All contaminant and spill prevention guidelines described previously would be adhered to. Prior to equipment crossing, one or more persons would

walk ahead of the equipment to ensure fish are not present within the wheel track footprint.

*Culvert crossing.* Where multiple vehicles and multiple crossings are anticipated, one or more culverts would be installed to contain streamflow. The number and size of culverts installed would be sufficient to allow for fish passage. Multiple culverts may be used to minimize the amount of fill placed in the channel and achieve desired culvert velocities for fish passage. Fill would be contained with silt curtains or similar barricades to reduce downstream turbidity effects. Curtains would be maintained over the duration of the project. At project completion, fill and culverts would be removed from the wetted channel and approaches and the area returned to pre-crossing conditions to the extent feasible

*Flat car bridge crossing.* Where multiple treatments are proposed using a single crossing, a flat car bridge would be installed to provide for vehicle and equipment access. Bridge abutments would be contained using a combination of concrete blocks and/or silt fencing. Two wet crossings by equipment would be needed for the bridge installation and removal. At project completion, the site would be restored to original topography to the extent feasible.

#### Wildlife

Prior to removing vegetation for access route and slough construction, wildlife biologists would survey trees to ensure the project avoids all known bird nest sites. An overall net gain in nesting habitat is anticipated from the project in the long-term due to the extensive planting of native trees and willows.

#### Cultural Resources

The physical remains of the Mattole Lumber Company railroad are limited, and would be avoided by the proposed work, and other known cultural resources near Collins Gulch are no longer visible. Should any cultural materials that might be associated with the pre-contact or historic use of this area be encountered, the BLM staff archaeologist will be contacted to evaluate and record the find, or the area with such artifacts would be avoided and no disturbance would take place at that location.

#### Recreation

Boaters and swimmers would be informed that some of the proposed structures could be a safety hazard and should be avoided. A sign would be placed on the graveled access road to the estuary and on the campground kiosk to explain the values of these structures and why visitors should stay away from them.

The use of cable would be minimized to the extent feasible as it is among the most dangerous foreign material in any river or stream. Cable would be pinned in such a manner that minimizes the potential for boaters and swimmers to become entrapped.

Log jams would not be placed across the entire channel width. To the extent feasible, the main part of the active channel, where boaters are most likely to travel, would be kept free of log jams. Root wads and branches would also not extend into this active channel, in areas where boating occurs.

#### Visual Resources

The use of cable and other man-made materials would be hidden from view to the maximum extent feasible. Engineered log jams would be designed to minimize their unnatural appearance, particularly during the summer when these structures may be exposed to view. Arrangement of all fish enhancement structures would consider naturally common patterns in order to minimize visual impacts.

### **Annual Review and Project Design Process**

Detailed restoration treatments would be developed prior to each work season. The nature of treatments would be driven by funding, river conditions, and information gained from past treatments. An annual on-site meeting would occur following winter peak flows and prior to any equipment operations. Representatives from the BLM, Mattole Salmon Group, and Mattole Restoration Council would be present during the pre-project meeting. Agencies providing technical assistance, including NMFS, U.S. Fish and Wildlife Service, North Coast Water Board, and California Department of Fish and Wildlife would be notified prior to the proposed meeting time for their optional attendance.

The purpose of the meeting would be to review past structures and performance, respond to current conditions, look for opportunities to improve upon performance of existing structures, and plan for future treatments. At least 30 days prior to project implementation reviewing agencies would be provided with an annual work plan with the opportunity to comment.

The specific treatment locations would likely change over the course of the five-year project term due to channel changes. Furthermore, continued monitoring and assessment of treatments would likely result in modifications. Therefore, specific locations and treatment types illustrated in Figure 2 are subject to change.

The types of modifications expected over the five-year period are:

1. Locations of physical features. The physical features depicted in Figure 2 would likely change due to stream flows and ongoing river processes. For example, the location of intermediate islands may be “reshuffled” following a larger flood, and changes to the shapes of existing features are expected during more normal winter flows. Therefore, the treatment areas shown in Figure 2 are intended to be conceptual. Similarly, proposed access routes would change if shifts in river position are substantial. In all cases, access routes would be determined prior to project implementation but following the winter high flow period
2. Size of individual treatments. As existing structures are monitored and their effectiveness evaluated, changes and configurations of the size of individual structures may be modified. Additional wood or anchoring material could be added to structures in subsequent years in order to improve or alter the effects of the structure. Bar apex jams shown in Figure 4 could be modified by varying the depth or method of anchoring, orientation, and size of individual pieces used.

### **Alternative 1 (No Action)**

Under the no action alternative no restoration efforts would occur in the Lower Mattole River. Existing structures would remain and no further treatments would occur.

### **3. Affected Environment**

#### **Water Quality**

The estuary of the Mattole River is a dynamic system which mixes freshwater and seawater. The distribution and concentration of seawater varies with tides, river discharge, weather conditions, and water temperature. The U.S. Fish and Wildlife Service collected water quality data during the summer through fall of 2006 and found temperature levels to exceed the known stress threshold for salmonids — particularly in the upstream portion of the estuary (Zedonis et al. 2007). Summer water temperature data have been collected on a regular basis for several years at various locations in the estuary. These data show that maximum water temperature during summer months regularly exceeds 75°F, which is stressful to salmonids (Mattole Restoration Council 1995). High levels of sediment transported from the upper watershed through periodic flooding has reduced the volume and altered fluvial geomorphic processes (Downie et al. 2003).

Although there are no data available for current concentration of fine sediments, data from Downie et al. (2003) show high concentrations of fine sediment in the substrate. In addition, the Mattole Integrated Coastal Watershed Management Plan (2009) reported high turbidity and numerous sources of natural and anthropogenic sediment in the basin. Increased sediment delivery has filled pools, widened channels, and simplified stream habitat throughout the basin including the estuary (NMFS 2014).

#### **Threatened and Endangered Fish Species and Essential Fish Habitat**

The Mattole River supports populations of the California Coast Chinook salmon Evolutionarily Significant Unit (ESU), the Southern Oregon/Northern California Coasts coho salmon ESU, and the Northern California steelhead Distinct Population Segment (DPS). All three Pacific salmonids in the Mattole River are listed as “threatened” under the federal Endangered Species Act. Studies of the historical population structure of Pacific salmonids in this region have identified the Mattole River populations as “Functionally Independent” and thus important components for recovery efforts within the ESUs (Bjorkstedt et al. 2005, Williams et al. 2006).

The Mattole estuary/lagoon provides important rearing habitat for juvenile steelhead, Chinook salmon, and coho salmon, and is designated critical habitat for all three species and essential fish habitat (EFH) for Chinook and coho salmon. All three species are present in the estuary during the high flow months of winter and spring (MSG unpublished data). Summer water temperatures are generally too high for coho salmon, which have been observed only very rarely in the estuary/lagoon during the summer months (MRRP 2011). Steelhead juveniles are present in large numbers every summer, while the abundance of over-summering Chinook appears to be dictated primarily by the timing of river mouth closure (N. Queener, pers. comm.). In years when the mouth stays open through early July or later, most Chinook appear to outmigrate prior to mid-summer (N. Queener, pers. comm.).

## **Riparian/Wetlands**

The riparian zones within the project area are dominated by hardwood species. Conifer species are present but limited in number. High levels of sediment transported from the upper watershed have reduced the Mattole estuary volume and altered the physical and biologic function of the estuarine ecosystem and adjacent wetlands (Mattole Restoration Council 1995). The dynamic nature of the estuary causes annual changes to the riparian zones after high flow events.

Alluvial terraces above bankfull stage are present through the project reach. Where riparian vegetation is present on these surfaces, gradual river migration can erode terrace margins and allow for beneficial debris to recruit to the wetted channel. However, where channel migration rates are high, as is the case in the project reach, adjacent vegetation does not have time to reach favorable sizes. The high rates of channel migration, combined with annual high flows and historical floods, have created negative stream characteristics and continuous displacement of riparian vegetation. The active floodplain has not allowed riparian plant species to stabilize and has led to deteriorating conditions for riparian canopy and recruitment for large woody debris.

## **Terrestrial Wildlife including Threatened and Endangered Species**

The project area is within the range of three threatened species: marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis*), and western snowy plover (*Charadrius alexandrinus*). Only the western snowy plover may be found using the habitat within the project area.

Snowy plovers have been known to nest on gravel bars along the Eel River in Humboldt County approximately 24 miles north of the project area. It is possible that snowy plovers could be found nesting on the gravel bars of the project area. During implementation of a similar project in the same area during June 2007 daily surveys for plovers were conducted and none were detected. Gravel bars in the project area have been surveyed at least once per year from 2009-2017 during the breeding season with no plover detections. The sand spit at the mouth of the Mattole River is also surveyed at least once per year. One snowy plover was observed on the sand spit during the summer of 2017. Due to the infrequency of plovers occurrence and lack of perspective mates, sightings in the area are considered incidental dispersal. Winter storms early in 2017 washed away much of the dune vegetation and hummocks creating a large suitable breeding site. The BLM increased the survey effort during the 2017 breeding season and will continue to monitor as needed.

Notable wildlife occurring in the vicinity of the project area include river otters (*Lontra canadensis*), black-tailed deer (*Odocoileus hemionus*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), and black bear (*Ursus americanus*). Harbor seals (*Phoca vitulina*) frequently haul out on the sand spit west of the project area and are sometimes observed in the estuary. Birds observed in the project area include great egret (*Ardea alba*), blue heron (*Ardea herodias*), semipalmated plover (*Charadrius semipalmatus*), belted kingfisher (*Ceryle alcyon*), common merganser (*Mergus merganser*), western gull

(*Larus occidentalis*), and California quail (*Callipepla californica*). Song birds are abundant in the wooded thickets, brush, and riparian vegetation in the project area.

### **Vegetation/T&E Vegetation**

The floodplain south of the river would be traversed with heavy equipment accessing river bars. This area is predominately vegetated with willow, coyote brush (*Baccharis pilularis*), and annual grasses.

Mattole Beach, in the vicinity of the project site, contains several rare plants including endangered beach layia (*Layia carnosa*), CNPS 1B plants; dark-eyed gilia (*Gilia millefoliata*), marsh milk vetch (*Astragalus pycnostachys* var. *pycnostachys*), and maple leaved sidalcea (*Sidalcea malachroides*). However, because Mattole Beach is not proposed as an access route to the river area south of Collins Gulch, this area would not be affected at all and will not be discussed further in this document.

### **Invasive, non-native species**

The site through which the heavy equipment is proposed to access the river bar (1/8 mile upriver from Bear Creek culvert) has been heavily infested with the invasive, non-native French broom (*Genista monspessulana*). BLM, in cooperation with the Mattole Restoration Council, has been repeatedly eradicating this weed for the past six years, and will have already re-treated the project area by the date of project implementation. However, there will still be French broom seed in the soil and floodplain areas should be treated as potentially contaminated. Fresh soil disturbance would lead to germination in contaminated areas. Also, there are known populations of Japanese knotweed (*Polygonum cuspidatum*) starting about a mile and a half upstream.

### **Recreation**

A variety of water-oriented recreational activities occur in the lower Mattole River and estuary. These include beachcombing, hiking along the river and beach, swimming, non-motorized boating, vehicle access using the existing access road, and camping at the developed campground and nearby vicinity. Annual use in the immediate vicinity of the project site (gravel bar and adjacent road) is estimated to be 500 visits, most of which occurs during the summer.

### **Cultural Resources & Tribal Concerns**

A pre-field cultural literature review was conducted for this EA. The review revealed that the APE contains cultural resources that no longer demonstrate physical integrity, likely as a result of being buried by huge mud slides during particularly large storm events. The north shore of the Mattole River was the location of railroad track for the Mattole Lumber Company. The physical remains are limited to a few rails. According to historic accounts and records, along the north shore of the Mattole River, at Collins Gulch, there was once a 40-acre Indian allotment owned by the Duncans, as well as parts of a tan-bark camp, and engine house. Cultural materials are no longer present at this location.



Government-to-government consultation was initiated with the Bear River Band of Rohnerville Rancheria (BRBRR) on January 9, 2018. To date, no concerns or questions have been raised by the tribe about this project.

### **Visual Resources**

The project site is managed as Visual Resource Management (VRM) Class 2. Under this classification, the objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities and uses can be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture in the predominant natural features of the characteristic landscape.

### **Wild and Scenic Rivers**

The project site would occur within and adjacent to the Mattole River, which is designated “suitable” for inclusion into the National Wild and Scenic Rivers System. The river segment is classified as “scenic.” The outstandingly remarkable values include exceptional recreational opportunities, and spawning and rearing habitat for federally threatened steelhead, coho salmon, and Chinook salmon. Because of this designation, any activity must protect and enhance these values, the free-flowing characteristics of the river, water quality, and maintain its classification.

### **Floodplains**

The project site encompasses portions of the floodplain along the lowermost section of the Mattole River. Along the lower reaches, the floodplain is a dynamic environment continually reshaped by winter storm flows. A useful concept for understanding floodplain dynamics is “floodplain turnover,” the frequency with which the floodplain is completely eroded (O’Connor et al. 2003). Analysis of sequential air photos suggests that the turnover rate along the lowermost Mattole River is approximately 20 years. With this rate, riparian vegetation has limited time to establish on floodplain surfaces and contribute to aquatic habitat functions.

The high floodplain turnover rate seen along the Mattole River likely has several causes. High sediment loads deposited in the lower reaches promote increased channel migration and lead to higher rates of floodplain turnover. A paucity of large wood jams results in more transient, less stable bar forms. Taken together, these two processes and the resulting channel migration rates preclude growth of larger riparian vegetation which could help mitigate the high turnover rates.

As a result, the floodplains along the lower Mattole River lack large, mature riparian vegetation. This lack of mature riparian forest limits several important aquatic habitat functions including pool development, cover, nutrient inputs and velocity refugia (Naiman et al. 2010).

### **Soils and Geology**

In general, most floodplains quickly develop fertile soils capable of supporting highly productive forests. Furthermore, soil-nutrient processes in floodplains influences water quality (Naiman et al. 2010). As discussed previously, high floodplain turnover rates

preclude prolonged accumulation of floodplain sediment. Floodplain soils in the project area tend to be more transient with little opportunity for development of fertile soil profiles with succession of riparian vegetation.

## **4. Environmental Effects – Direct, Indirect and Cumulative**

### **Proposed Action**

#### **Direct and Indirect Effects**

##### **Water Quality**

###### Water Temperature

Very little removal or modification of vegetation near the water edge of the Mattole River is anticipated during this project. Access to the river-related construction areas would primarily be from the existing roads along the south bank. No vegetation in this area would be removed that provides stream shade to the Mattole River. Therefore, no changes to water temperature are expected.

Access to the sloughs would require temporary access routes off the existing roads. The temporary access routes would require removal of a small amount of existing vegetation. Vegetation within this area consists of alders, brush, and small willows. The existing vegetation would provide shade to the slough channels and measures would be taken to minimize vegetation removal adjacent to the channels. Areas of vegetation removal would be replanted following construction of the slough channel. Given these measures, shade losses to the newly excavated sloughs are expected to be short-term and any changes to water temperature are expected to be negligible.

The instream wood structures, trenched baffles, and slough channel excavations would include planting of native riparian tree species that will start providing shade to localized areas within five years of planting. In the long term, these structures are expected to result in a small and localized decrease in summer water temperature.

###### Sediment/Turbidity

Construction activities would take place during the lowest river discharge but prior to lagoon formation. The construction period is intended to coincide with the minimum amount of water in the estuary and the slough. Excavation would be in or near the channel at each of the treatment locations and could create turbidity impacts. Turbidity would be avoided by isolating the work areas from the river. The specific type of preventative measures would depend on conditions at the time of construction.

Slough excavation would occur in an area disconnected from surface water. However, the final step of excavation would be the connection of the new slough channel to the wetted

channel downstream. Prior to connection, a silt fence would be positioned at the upstream extent of the existing wetted channel to reduce the amount of turbidity leaving the project site and entering the wetted channel. The silt fence is expected to prevent introduction of suspended sediment into the water column upon connection; therefore, changes to water quality from suspended sediment are expected to be negligible.

Depending on the morphology of the gravel bar at the time of access, the excavator may need to fortify abutments by moving material on the gravel bar near the water edge. Additionally, it may be necessary for the excavator to move into the wetted channel to accomplish this task. During this process it is possible that a small amount of fine sediment which had settled in the interstices of the bed load would be mobilized into the water column and cause a brief, temporary plume of turbidity. This impact is would be localized, short in duration, and therefore insignificant.

#### Toxic Materials

Use of heavy equipment and helicopters near and in stream channels allows for the possibility that toxic materials such as fuel, lubricants, and hydraulic fluids could leak into a watercourse and degrade water quality. All power equipment would be checked for leaks daily prior to the start of work and would not be used until any leaks are repaired or the leaking equipment is replaced. Absorbent pads would be on site and would be deployed in case any toxic materials are spilled near water. All equipment to be used near streams would be required to have a chemical spill emergency kit to reduce the potential for contamination from accidental spills. The measures described in the proposed action and above are expected to reduce the probability of introduction of chemical contaminants to the point where the probability is negligible. Employing these measures for past projects near and in stream channels has proven to be effective and minimizing the potential for introduction of toxic material into water.

#### **Threatened and Endangered Fish Species and Essential Fish Habitat**

The proposed action would take place during a time of low river discharge, prior to seasonal water temperature warming, and prior to lagoon formation. The habitat conditions in the lower river and estuary are of low value for salmonids which is the reason for implementing the proposed action. Because of this, the density of fish in the estuary is generally quite low. Sites identified for treatment generally lack cover and habitat complexity and thus tend not to be occupied by fish. If fish are present, measures would be taken to exclude fish from the work area. The proposed action would take place during a time that is outside of the spawning and egg/alevin incubation period of listed anadromous salmonids. Therefore, the only possible direct effect would be injury or mortality to listed anadromous salmonids through contact with heavy equipment or placement of structure materials.

An excavator may need to enter the water to place a crossing structure (such as a bridge) or during the construction of the instream structures when materials are placed in the wetted channel. The behavioral tendency of salmonids is to avoid noise and movement from above the water surface, so the noise and movement from heavy machinery should cause fish to leave and avoid the areas where equipment is located (Popper and Carlson

1998). The relatively large surface areas of the lower river and estuary provide abundant space of similar habitat quality as the affected area for fish to escape from equipment. If any sections of the river need to be isolated for excavation, fish would be excluded from the work area by installing block nets comprised of turbidity curtain material anchored on each end. No fish would be removed from the water. Comparable habitat improvement projects from the previous five year restoration effort were monitored for fish presence and disturbance and no injury or mortality to fish was observed. Given these preventative measures, the probability that any listed salmonids would be disturbed from placement of materials is negligible.

The project is expected to increase the frequency and depth of pools in the estuary, increase availability of off-channel habitat, and increase the amount of instream cover for juvenile salmonids. These habitat improvements may result in increased survival and growth of these species.

The Mattole Beach Area of Critical Environmental Concern (ACEC) was established, in part, because of the area's outstanding fisheries habitat. The project would enhance the values for which the ACEC was designated.

In summary, the project is not likely to adversely affect listed salmonids or their critical habitats, and would have minor and short-term adverse effects and long-term positive effects on EFH.

### **Riparian/Wetlands**

To the extent possible, construction sites would be accessed using existing routes in order to minimize disturbance to riparian vegetation.

Excavation of the slough channels would require the construction of several new access routes (Figure 2). Construction of these routes would require the removal of young willows and brush. This would result in a localized moderate impact to the riparian vegetation that may persist for up to five years until vegetation grows back to its current size.

The project would benefit riparian species by slowing bank erosion associated with channel migration and promoting bank/island stability. In the long term, the overall habitat quality would improve as the result of a more stable flood plain. The instream wood structures, trenched baffles, and slough channels would include planting of native riparian tree species that would increase shade within five years of planting. Over the long term, these plantings would improve riparian conditions. Overall, effects to riparian vegetation would be minor.

### **Terrestrial Wildlife Including Threatened and Endangered Species**

Wildlife in the project area would likely move away from the area due to the presence of workers and noise generated by the heavy equipment. Most wildlife species would quickly return to the area after the project is completed. There would be a short-term decrease in potential migratory bird breeding habitat when the existing trees are removed

for access routes and slough excavation. However, when the new willows and planted trees become established birds would be able to use them as nesting structures. Extensive areas of riparian forest would not be disturbed by the project and would remain available for nesting and foraging.

When the project is completed the increase in fish production would benefit many species of terrestrial wildlife. River otters, bald eagles, osprey, egrets, and herons, and common mergansers would potentially have more prey items available, while scavengers such as bears, raccoon, striped skunks, and opossums would benefit from increased frequency of fish carcasses.

Deer browse heavily on young willows and the coppice nursery would likely receive heavy browsing pressure for the first year or two post-harvest. Establishing willows in the project area would provide a valuable long-term food source for deer. Foraging warblers, wrens, vireos, flycatchers, and other insectivorous birds often use dense stands of young willows and mature trees. Permanently increasing the availability of willows would provide long-term benefits to deer and songbirds.

### **Floodplains**

The proposed action would promote increased stability of floodplain surfaces. As a result, riparian vegetation would likely become more established in the project reach. In some instances, installation of bar apex jams or wood structures might locally erode floodplain deposits. Overall, however, floodplains are expected to become more persistent and diverse in the project reach.

Vehicle and equipment traffic associated with structure installations and coppicing efforts is not expected to affect the function of floodplains in the reach.

### **Soils and Geology**

As floodplain stability increases in the project reach, soil deposition and formation is expected to increase. Localized deposits would occur at individual apex jams, planting sites, and wood structures. Treatment of the intermediate elevation islands would increase the longevity of these surfaces and the extent of soil development would also increase. Vehicle and equipment use on various surfaces in the project area would have small, localized impacts on soils, but the effects would not persist given the frequent overtopping by flood events. Overall, the project would have a beneficial effect on the presence and functions of soils.

### **Recreation**

The proposed activities, once completed, could potentially result in unsafe changing conditions for boaters and swimmers unless they are informed beforehand to avoid these structures. Cables, root wads, and branches have the potential of entrapment and subsequent drowning. Impact minimization measures incorporated into the proposed action include (1) placing information signs at popular river access points, and (2) placing structures and limiting cabling in a manner to minimize potential safety hazards.

Impacts on visitors during the implementation phase are expected to be negligible as overall use is low in the project area.

## **Wild and Scenic Rivers**

Free-flowing values would not be affected, and the outstandingly remarkable values (spawning and rearing habitat for salmon and steelhead) would be improved. The river segment's classification as "scenic" would not be altered by implementing this project.

## **Visual Resources**

There are currently approximately 20 human-made log structures in the project area, some of them appearing relatively unnatural particularly during the summer when the water level is low. Impact minimization measures incorporated into the project include: (1) using natural materials as much as possible, (2) placing the structures in naturally occurring patterns, and (3) concealing cable and pins as much as possible. The use of entire trees is more natural-appearing than sawn logs. Few of the proposed structures (bar-apex jams) would be visible from the sand spit just north of the Mattole Campground and none of the structures would be seen from the campground itself where over 90% of all the visitor use occurs in the general area.

A visual contrast rating was completed to determine if the project would be compatible with the area's VRM Class 2 rating. The key observation point used for the contrast rating was the sand spit just north of the Mattole Campground. An estimated 20 visitors hike along this spit on a daily basis during the use season (June – September) and some of them would see the three bar-apex jams.

Bar-apex jams would appear natural as they consist of whole logs. Native vegetation would be planted adjacent to these structures to provide some visual screening, and natural debris flowing down the river during high flows would build up around them to provide additional screening over the long-term. Given these conditions, the proposed project would create low visual contrast and would meet the VRM Class 2 objective. The existing character of the landscape as viewed from the sand spit would not change to any appreciable degree and would not be expected to draw attention to the casual observer.

## **Cumulative Effects**

### **Water Quality**

Assessment Area: Mattole River Watershed

Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Project

Direct impacts to water quality have occurred from past historical uses of the watershed. Heavy loadings of sediment have severely impaired water quality. Increased sediment delivery has filled pools, widened channels, and simplified stream habitat throughout the basin including the estuary (NMFS 2014). The U.S. Fish and Wildlife Service in Arcata, California collected water quality data during the summer through fall of 2006 and found temperature levels exceeded known stress threshold for salmonids — particularly in the upstream portion of the estuary (Zedonis et al. 2007). Summer water temperature data have been collected on a regular basis for several years at various locations in the estuary. Maximum water temperature during the summer months regularly exceeds 75°F, which is stressful to salmonids (Mattole Restoration Council 1995).



The proposed action would cumulatively aid in improving sediment transport regime, reducing turbidity and decreasing summer water temperatures.

### **Threatened and Endangered Fish Species and Essential Fish Habitat**

Assessment Area: Mattole River Watershed

#### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Project

Historic land use has contributed to the demise of aquatic habitat and the listing of California Coast Chinook salmon ESU, Southern Oregon/Northern California Coast coho salmon ESU, and the Northern California steelhead DPS. Prior to major land disturbances, the Mattole estuary/lagoon was notable for its depth and numerous functioning slough channels on both the north and south banks of the river (Mattole Restoration Council 1995). Currently, lack of available rearing habitat for juveniles and smolts, as well as poor water quality in the estuary, may be a stressor for the population. Lack of hiding cover may result in fish being more susceptible to predation (National Marine Fisheries Service 2012).

The proposed action would promote recovery of threatened fish species. The proposed action, in combination with other restoration actions within the Mattole River watershed, would improve in-stream habitat conditions for listed fish species.

### **Riparian/Wetlands**

Assessment Area: Mattole River Watershed

#### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Project

High levels of sediment transported from the upper watershed through periodic flooding has reduced the Mattole estuary volume and altered the physical and biologic function of the estuarine ecosystem and adjacent wetlands (Mattole Restoration Council 1995). The dynamic nature of the estuary causes annual changes to the riparian zones after high flow events. The high rate of channel migration combined with annual high flows and historical floods have created poor habitat conditions and continuous displacement of riparian vegetation. The active flood plain limits riparian stability, leading to deteriorating conditions for riparian canopy and recruitment for large woody debris.

No cumulative effects are expected for riparian/wetlands because the project effects are expected to be limited to the project area and the project's small size in context of the larger lower river and estuary.

### **Terrestrial Wildlife including Threatened and Endangered Species**

Assessment Area: Mattole River Watershed.

#### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Projects

Wildlife that rely on fish in the assessment area would benefit from increased fish populations. Other effects to wildlife would be limited to the project area and a minimal and short-term net loss of riparian forest is expected following slough construction.

## **Recreation**

Assessment Area: King Range National Conservation Area

### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Projects

The cumulative effects on recreation use numbers, activities, and experiences are expected to be negligible.

## **Wild and Scenic Rivers**

Assessment Area: King Range National Conservation Area

### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Projects

The cumulative effects on wild and scenic river values are expected to be negligible.

## **Visual Resources**

Assessment Area: Southern Humboldt County Coastal Zone

### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Projects

The coastal zone of southern Humboldt County contains several naturally-appearing river estuaries of high scenic quality. Facility developments and resource projects adjacent to the coastline and within the coastal zone are carefully evaluated in order that visual resources are protected. Scenic quality is highly vulnerable to incremental effects from development of all sorts.

The project area's scenic quality would not be affected from the key observation point (sand spit north of Mattole Campground) but could be impacted from other viewpoints such as along the gravel bar or along sections of Prosper Ridge Road. From these two locations, a few log jams of various types could appear unnatural. No other estuaries within the assessment area have undergone such an intensive fisheries enhancement project, nor are any planned in the future.

## **Alternative 1 (No Action)**

### **Water Quality**

Under the No Action alternative, current poor water quality conditions and trends would continue.

### **Threatened and Endangered Fish Species and Essential Fish Habitat**

Under the No Action alternative, no habitat restoration would occur and therefore habitat for listed salmonids would not change. The lower river and estuary would continue to have marginal habitat conditions for listed salmonids.

### **Riparian/Wetlands**

Under the No Action alternative, high channel migration rates would continue, and adjacent vegetation would not have time to reach favorable sizes. The flood plain would remain active annually and not allow riparian plant species time to stabilize. The Mattole River estuary would continue to have deteriorating conditions for riparian canopy and recruitment of large woody debris.

### **Terrestrial Wildlife Including Threatened and Endangered Wildlife**

Under the No Action alternative, temporary displacement of wildlife would not occur due to construction of the proposed structures. Wildlife would not benefit from any increases in the fish population or riparian vegetation resulting from the proposed action.

### **Floodplains**

Under the No Action alternative, no restoration efforts would occur and floodplain turnover rates would remain high, characterized by frequent channel migration and lack of mature riparian forests.

### **Soils and Geology**

A lack of channel-influencing actions would perpetuate the limited soil development in the action area. Intermediate elevation islands and other sites of sediment deposition and potential soil formation would remain more transient in nature with few areas available for prolonged accumulation and soil development.

### **Recreation**

No impacts on recreation activities, experiences, or use numbers are expected under this alternative.

### **Wild and Scenic Rivers**

Impacts on an outstandingly remarkable value (spawning and rearing habitat for federally listed threatened steelhead, coho salmon, and Chinook salmon) would be negatively impacted by not implementing the proposed project. Implementation of the proposed action would enhance this wild and scenic river value.

### **Visual Resources**

Scenic quality would be unaffected under this alternative.

## **Cumulative Effects**

### **Water Quality**

Assessment Area: Mattole River Watershed

Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Project

Direct impacts to water quality have occurred from past historical uses of the watershed. Heavy loadings of sediment have severely impaired water quality. Increased sediment delivery has filled pools, widened channels, and simplified stream habitat throughout the

basin including the estuary (National Marine Fisheries Service 2012). The US Fish and Wildlife Service in Arcata, California collected water quality data during the summer through fall of 2006 and found temperature levels to exceed the known stress threshold for salmonids — particularly in the upstream portion of the estuary (Zedonis et al. 2007). Summer water temperature data have been collected on a regular basis for several years at various locations in the estuary. Maximum water temperature during summer months regularly exceeds 75°F which has been showed to be stressful to salmonids (Mattole Restoration Council 1995).

Under the No Action alternative, it is likely that current trends in turbidity, water temperatures, and summer stream flows would continue.

### **Threatened and Endangered Fish Species and Essential Fish Habitat**

Assessment Area: Mattole River Watershed

#### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Project

Historic land use has contributed to the demise of aquatic habitat and the listing of the California Coast Chinook salmon ESU, the Southern Oregon/Northern California Coast coho salmon ESU, and the Northern California steelhead DPS. Prior to major land disturbances, the Mattole estuary/lagoon was notable for its depth and numerous functioning slough channels on both the north and south banks of the river (Mattole Restoration Council 1995). The lack of available habitat for juveniles and smolts for rearing and holding, as well as poor water quality in the estuary may be a stressor for the population as they may be more susceptible to predation without adequate cover habitat (NMFS 2014).

Under the No Action alternative current habitat conditions would continue to impede recovery of listed fish species.

### **Riparian/Wetlands**

Assessment Area: Mattole River Watershed

#### Cumulative Effects of Past, Present, or Reasonably Foreseeable Future Project

High levels of sediment transported from the upper watershed through periodic flooding has reduced the Mattole estuary volume and altered the physical and biologic function of the estuarine ecosystem and adjacent wetlands (MRC 1995). The dynamic nature of the estuary causes annual changes to the riparian zones after high flow events. The high rate of channel migration combined with annual high flows and historical floods have created poor habitat conditions and continuous displacement of riparian vegetation. The active flood plain has not allowed riparian plant species to stabilize and has led to deteriorating conditions for riparian canopy and recruitment of large woody debris.

Under the No Action alternative, channel migration rates would continue to be high, and adjacent vegetation would not have time to reach favorable sizes. The floodplain would remain active annually and not allow riparian plant species time to stabilize. The Mattole River estuary would continue to have deteriorating conditions for riparian canopy and recruitment of large woody debris. Cumulatively these effects would contribute to poor habitat conditions for listed fish species.

## 5. Tribes, Individuals, Organizations and Agencies Consulted

The following persons, organizations, and agencies were consulted during preparation of this analysis. Inclusion of an organization or individual's name below should not be interpreted as their endorsement of the analysis or conclusions.

Bear River Band of Rohnerville Rancheria  
California Coastal Commission  
California Department of Fish and Wildlife  
Mattole Restoration Council  
Mattole Salmon Group  
National Marine Fisheries Service  
North Coast Regional Water Quality Control Board  
U.S. Army Corps of Engineers  
U.S. Fish and Wildlife Service  
Gary Peterson, local resident and fish biologist, Petrolia  
Michael Evenson, neighboring landowner, Petrolia

List of Preparers	
Name/Position	Date
_____	_____
Zane Ruddy, Fish Biologist, BLM	
_____	_____
Sam Flanagan, Geologist, BLM	
_____	_____
Dave Fuller, Planning and Environmental Coordinator, BLM	

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## Appendix A. CEQA Environmental Checklist

### CEQA Environmental Checklist

#### PROJECT DESCRIPTION AND BACKGROUND

Project Title:	Lower Mattole River Restoration Projects
Lead agency name and address:	Bureau of Land Management 1695 Heindon Road Arcata, CA 95521
Contact person and phone number:	Zane Ruddy (707) 825-2321
Project Location:	Lower Mattole River near Petrolia, Humboldt County, CA
Project sponsor's name and address:	Bureau of Land Management 1695 Heindon Road Arcata, CA 95521
General plan description:	N/A – Federal land
Zoning:	N/A – Federal land
Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation.)	The project proposes to improve and create fish habitat by implementing a multi-year restoration effort that mimics natural physical processes. Specific project components include large wood structures, bar apex jams, willow baffles, and slough excavation.
Surrounding land uses and setting; briefly describe the project's surroundings:	The proposed project falls within the King Range National Conservation Area. BLM manages the lower three miles of the Mattole River. A BLM campground is located at the southwest extent of the project area. Private residences, ranch land, and timberlands surround the project area.
Other public agencies whose approval is required (e.g., permits, financial approval, or participation agreements):	California Department of Fish and Wildlife, North Coast Regional Water Quality Control Board, California Coastal Commission, U.S. Army Corps of Engineers, NOAA National Marine Fisheries Service.
Tribal Consultation	The project is located within the ancestral territory of the Bear River Band of the Rohnerville Rancheria. The tribe is being consulted on a government-to-government basis in the planning process. The consulted tribe has not expressed no concerns about the proposed plan amendment.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, but none of these affects are considered to be Potentially Significant Impacts as indicated by the checklist on the following pages.

<input checked="" type="checkbox"/> Aesthetics	<input type="checkbox"/> Agriculture and Forestry Resources	<input type="checkbox"/> Air Quality
<input checked="" type="checkbox"/> Biological Resources	<input checked="" type="checkbox"/> Cultural Resources	<input checked="" type="checkbox"/> Geology / Soils
<input type="checkbox"/> Greenhouse Gas Emissions	<input type="checkbox"/> Hazards & Hazardous Materials	<input checked="" type="checkbox"/> Hydrology / Water Quality
<input type="checkbox"/> Land Use / Planning	<input type="checkbox"/> Mineral Resources	<input type="checkbox"/> Noise
<input type="checkbox"/> Population / Housing	<input type="checkbox"/> Public Services	<input checked="" type="checkbox"/> Recreation
<input type="checkbox"/> Transportation / Traffic	<input checked="" type="checkbox"/> Tribal Cultural Resources	<input type="checkbox"/> Utilities / Service Systems
<input type="checkbox"/> Mandatory Findings of Significance		

DETERMINATION: (To be completed by the Lead Agency)

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.

☐ 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.

Molly Brown  
Signature

2/7/18  
Date

Molly Brown, Arcata Field Manager, BLM

Printed Name

For

A

## CEQA Environmental Checklist

This checklist identifies physical, biological, social and economic factors that might be affected by the proposed project. In many cases, background studies performed in connection with the projects indicate no impacts. A NO IMPACT answer in the last column reflects this determination. Where there is a need for clarifying discussion, the discussion is included either following the applicable section of the checklist or is within the body of the environmental document itself. The words "significant" and "significance" used throughout the following checklist are related to CEQA, not NEPA, impacts. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
<b>I. AESTHETICS:</b> Would the project:				
a) Have a substantial adverse effect on a scenic vista	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>II. AGRICULTURE AND FOREST RESOURCES:</b> 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 Forest Protocols adopted by the California Air Resources Board. Would the project:				
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**III. 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:

a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create objectionable odors affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**IV. BIOLOGICAL RESOURCES:** Would the project:

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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>V. CULTURAL RESOURCES:</b> Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
See description above under item a.				
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>VI. GEOLOGY AND SOILS:</b> Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>VII. GREENHOUSE GAS EMISSIONS:</b> Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>VIII. HAZARDS AND HAZARDOUS MATERIALS:</b> Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>IX. HYDROLOGY AND WATER QUALITY:</b> Would the project:				
a) Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Inundation by seiche, tsunami, or mudflow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>X. LAND USE AND PLANNING:</b> Would the project:				
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XI. MINERAL RESOURCES:</b> Would the project:				
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XII. NOISE:</b> Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XIII. POPULATION AND HOUSING:</b> Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XIV. PUBLIC SERVICES:</b>				
a) 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:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
<b>XV. RECREATION:</b>				
a) Would the project 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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XVI. TRANSPORTATION/TRAFFIC:</b> Would the project:				
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
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#### XVII. TRIBAL CULTURAL RESOURCES

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

- |   |                          |                          |                          |                                     |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|
| a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

#### XVIII. UTILITIES AND SERVICE SYSTEMS: Would the project:

- |   |                          |                          |                          |                                     |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|
| a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 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?                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 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?                                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| g) Comply with federal, state, and local statutes and regulations related to solid waste?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |



	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
<b>XVIII. MANDATORY FINDINGS OF SIGNIFICANCE</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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, substantially 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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>