California Regional Water Quality Control Board
North Coast Region
Resolution No. R1-2021-0017
Approving
The Elk River Restoration Project as an Exemption to the Enclosed Bays and Estuaries Policy Prohibiting Waste Discharges to Humboldt Bay
Humboldt County

WHEREAS the California Regional Water Quality Control Board, North Coast Region, (hereinafter "Regional Water Board") finds that:

1. The City of Eureka (Permittee) owns and operates the Elk River Wastewater Treatment Plant (Facility) that was commissioned in June of 1984. The Facility discharges secondary treated effluent via a 48-inch diameter pipe, 4,100 feet in length, and equipped with a multiple port diffuser to Humboldt Bay, an enclosed bay, and a water of the United States.

2. The State Water Resources Control Board adopted Resolution No. 74-43, the *Water Quality Control Policy for the Enclosed Bays and Estuaries of California* (Policy), on May 16, 1974. The Policy established, "that the discharge of municipal wastewaters and industrial process waters to enclosed bays and estuaries (other than the San Francisco Bay-Delta system) should only be allowed when a discharge enhances the quality of the receiving water above that which would occur in the absence of the discharge."

3. Per State Water Resources Control Board Resolution 79-20 (Relating to Humboldt Bay), "as specifically applied to Humboldt Bay, the Board interprets the enhancement provision of the Bays and Estuaries Policy to require: (1) full secondary treatment, with disinfection and dechlorination, of sewage discharges; (2) compliance with any additional MPDES permit requirements issued by the Regional Board to protect beneficial uses; and (3) the fuller realization of existing beneficial uses or the creation of new beneficial uses either by or in conjunction with a wastewater treatment project."

4. Historically, the Facility has discharged on the ebb tide to ensure that wastewater was conveyed to the Pacific Ocean. Regional Water Board Resolution No. 80-10 concluded that the discharge to Humboldt Bay during ebb tide effectively classifies the discharge as an ocean discharge, rather than a discharge to an enclosed bay. On November 20, 1980, The State Water Board adopted Resolution No. 80-87 approving the ebb tide discharge concept as consistent with the requirements of the Policy.

5. National Pollutant Discharge Elimination System (NPDES) Order No. R1-2009-0033 required the Permittee to perform an effluent discharge study to assess the transport and fate of pollutants discharged from the Facility as well as the potential impacts to beneficial uses associated with the ebb-tide discharge. In compliance with Order No. R1-2009-0033, on January 8, 2014, the Permittee submitted the Effluent Discharge Study for the Elk River Wastewater Treatment Plant (2014 Effluent Discharge Study). The study utilized two models to simulate effluent transport:

   Advanced circulation (ADCIRC) as the primary model to predict currents within the Humboldt Bay that are the dominant mechanism of conveying effluent out to the ocean; and

   Particle tracking model (PTM) as a secondary model to track particles of effluent released by the Facility (utilizing currents predicted by ADCIRC).

   For baseline simulations, discharges began at slack tide and continued through the designated discharge window. Simulations were then conducted to determine the fate of effluent discharged under various tidal and Facility flow conditions. The 2014 Effluent Discharge Study modeling analysis shows that under all simulations the effluent is never completely conveyed to the ocean, and under certain conditions up to 90% of the effluent remains in the Humboldt Bay.

   Thus, the findings of the original studies used to support Resolution No. 80-87 that concluded the Facility's discharge was effectively an ocean discharge are contradicted by the 2014 Effluent Discharge Study results. Based on the conclusions of the 2014 Effluent Discharge Study, the discharge is not consistent with the findings of Resolutions 80-10 and 80-87 since a significant portion of the Facility's effluent remains in the Humboldt Bay.

   Regional Water Board staff determined that the 2014 Effluent Discharge Study was representative of current conditions and more accurately describes the discharge as compared to the original studies. Consequently, the Regional Water Board determined that the discharge does not qualify as an ocean discharge subject to the Ocean Plan but rather a bay discharge subject to the Enclosed Bays and Estuaries Policy.

6. Cease and Desist Order No. R1-2016-0012 (CDO) was adopted by the North Coast Regional Water Board (Regional Water Board) on June 20, 2016. The CDO requires, in part, the Permittee to submit for Executive Officer review and approval a Feasibility Study that considers the Outfall Inspection Report, Updated Sewer Use Ordinance Evaluation Report, Climate Change Readiness Study Plan, and Biological Survey Report required in accordance with NPDES Order No. R1-2016-0001 (NPDES Permit), and evaluates and recommends alternatives to achieve compliance with the Enclosed Bays and Estuaries Discharge Prohibition.

   The NPDES Permit includes Discharge Prohibition III.A that states, "The discharge of waste to Humboldt Bay is prohibited unless it complies with the State Water Board, Water Quality Control Policy for the Enclosed Bays and Estuaries of California (1974, 1995)." When the NPDES Permit is renewed, Prohibition III.A. will be retained.

7. Task 2B of the CDO requires the Permittee to, "submit written verification and an electronic copy of preliminary design plans and specifications for construction of the Executive Officer approved Preferred Alternative(s)." The project presented as an attachment to this Order is the first step in completing Task 2B of the CDO.

8. Regional Water Board staff and Permittee staff have meet regularly since adoption of the CDO and NPDES Permit to collaborate on a plan to chart the best path forward. On August 12, 2019, Regional Water Board Staff (Staff) sent a letter to the Permittee laying out staff's interpretation of the Enclosed Bays and Estuaries Policy, summarizing the outcomes of various discussions between the Permittee and Staff, and outlining the criteria by which enhancement will be evaluated. The Permittee must meet the following minimum criteria to be considered of an exemption to the Enclosed Bays and Estuaries Policy:

8.1. Provide enhancement that would not occur in the absence of the discharge.

8.2. Create additional marshlands or wetlands or other enhancing features.

8.3. Provide full protection of beneficial uses which the receiving water is capable of in the absence of the discharge.

8.4. Demonstrate that the project will yield a positive water quality benefit.

8.5. Provide full secondary treatment, including disinfection and dechlorination to all discharge flows to Humboldt Bay.

8.6. Eliminate blending within the treatment facility.

8.7. Comply with applicable water quality objectives for ammonia.

9. On September 26, 2019, the Permittee submitted a letter to Staff that indicated the Permittee's interest in pursuing the Elk River Tidal Marsh Enhancement Project by providing a benefit that "enhances the quality of the receiving water above that which would occur in the absence of the discharge." As its preferred project, the Permittee proposes to provide funding to implement the Elk River Tidal Marsh Enhancement Project (Project). The Project when implemented would meet criteria 8.1, 8.2, 8.3 and 8.4. The Permittee is currently evaluating alternatives to comply with criteria 8.5, 8.6 and 8.7. Ammonia modeling is currently being performed to determine if a mixing zone is applicable. These criteria will be met through compliance with the new NPDES permit scheduled for adoption in Spring of 2022. The Project proposes to include:

9.1. Restoration and enhancement of 114 acres of estuarine and intertidal habitats on City-owned property on both sides of the Elk River and adjacent to the Elk River Wastewater Treatment Facility. Restoration and enhancement will include regrading to create low flow habitat areas, removal of invasive plant species, planting of native plants and grasses, and the removal of structural constraints such as tide gates to allow hydraulic conductivity. The Project includes two areas, referred to as Area 1 and Area 2. Attachment A includes the Permittee's Project Proposal and details the restoration and enhancement for Area's 1 and 2 specifically.

Area 1 is located North of the Elk River and South of the Facility. Area 1 is approximately 25 acres of degraded inter-tidal wetland that will be restored by removing the riverfront levee and tide gate infrastructure, and excavating slough channels, integrating salt marsh plains, and public access via extension of the City's Waterfront Trail. A map of Area 1 can be found in the Permittee's Project Proposal in Attachment A.

Area 2 is approximately 89 acres located south of the Elk River. It is comprised of agricultural ditches, pasture, and degraded seasonal wetlands. The area is separated from the Elk River on the north side by a natural windblown sand formation, parallel to Elk River Slough. Construction of a rock seawall and the railroad infrastructure on the west side has isolated Area 2 from Humboldt Bay. Most of Area 2 is drained by a network of linear agricultural ditches and there is no freshwater inflow. Area 2 will be converted to an inter-tidal wetland with a network of tidal slough channels. The channel area will be contained by tidal ridges (living shorelines) that will host riparian habitat as well as public access trails.

9.2. Creation of public access via land and water through the development of a 0.2-mile Coastal Access Trail on the western edge and a kayak launch on the northern side of Area 1.

9.3. Creation of an interpretive center that could support increased public access and provide information on protection and restoration of Humboldt Bay, information about native and restored habitats, and information about local aquatic and wildlife species.

9.4. Removal of the existing tide gates, excavation of tidal channels to increase the tidal prism and eelgrass habitat, removal of invasive Spartina, and enhancement of native salt and freshwater marsh and riparian habitat through active and passive revegetation.

9.5. Funding up to $3.3 million toward completion of project construction.

10. On November 2, 2020, Staff responded to the Permittee's project proposal with a Staff level concurrence letter (Letter). The Letter acknowledges that the proposed project is, "is in satisfactory compliance with the exception eligibility criteria for water quality enhancement projects set forth in Staff's August 12, 2019 letter to the Permittee" discussed in Finding 6 above. The project meets the criteria listed in 8.1 through 8.4 under item 8 identified above.

11. An additional requirement stipulated in the Letter is that the Permittee develop and implement a long-term plan to identify and address critical infrastructure and significant pollutant sources that are currently impacting Humboldt Bay, or at risk of impacting due to sea level rise. The Permittee shall develop this plan in coordination with and taking into consideration the input and advice from key stakeholder and partner agencies, such as the Coastal Commission, City of Arcata, the Harbor District, and environmental groups who will form part of a Technical Advisory Committee (TAC). The Permittee shall be required to conduct the following as it relates to the TAC:

11.1. Develop a Governance Structure/Memorandum of Understanding in coordination with the Regional Water Board for the oversight and management of the TAC and development of deliverables.

11.2. Hold and host regular meetings to make progress on the objective(s) of the project.

11.3. Develop and submit annual progress reports

11.4. Prepare assessment reports and maps of Permittee owned and operated critical infrastructure and significant pollutants sources.

11.5. Develop an Action Plan for all City owned, operated, or maintained sources, facilities, or infrastructure.

To comply with the California Environmental Quality Act (CEQA, Pub. Res. Code § 21000 et seq), the potential environmental effects associated with the project were analyzed in the Initial Study/Mitigated Negative Declaration (SCH#2017082048) prepared by the City of Eureka, the lead agency for the project. The Regional Water Board, as a responsible agency under CEQA, has reviewed and considered the environmental documentation prepared by the City of Eureka for those aspects of the project that are within the Regional Water Board's jurisdiction.

The Regional Water Board finds that none of the conditions described in California Code of Regulations, title 14, section 15162 have occurred such that preparation of additional environmental documents pursuant to CEQA is required.

RESOLUTION

THEREFORE it is hereby resolved that:

The Regional Water Board determines the Elk River Tidal Enhancement Project (Project), attached hereto as Attachment 1 as set forth in the above Resolution, is consistent with the exception to the Enclosed Bays and Estuaries Discharge Prohibition, and is available to the City of Eureka as a method for complying with Discharge Prohibition III.A. in NPDES permit Order No. R1-2016-0001.

CERTIFICATION

I, Matthias St. John, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, North Coast Region, on June 17, 2021.

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Matthias St. John

Executive Officer

21_0017_Eureka_Elk_River_Restoration Draft

ATTACHMENT A - ELK RIVER ESTUARY TIDAL ENHANCEMENT PROJECT PROPOSAL

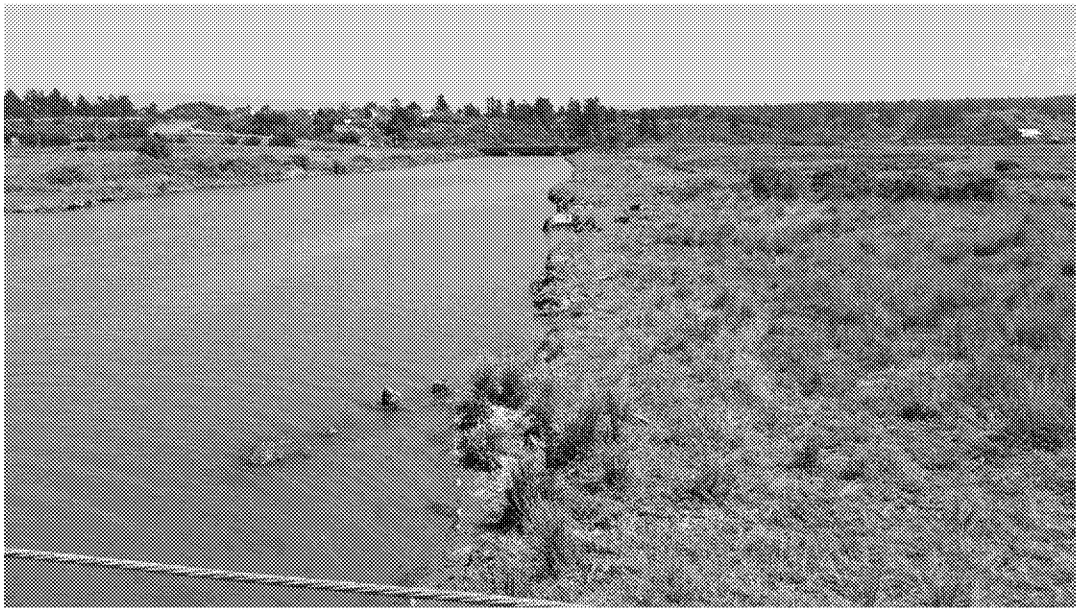
1. Introduction

The North Coast Regional Water Quality Control Board (Regional Water Board) has indicated that the City of Eureka may continue to pursue effluent discharge from the Elk River Wastewater Treatment Plant (ERWWTP) to the entrance of Humboldt Bay under an exception to the Enclosed Bays and Estuaries Policy (EBEP). The EBEP requires "A demonstration by the applicant that the discharge, through the creation of new beneficial area or a fuller realization, enhances water quality for those beneficial uses which could be made of the receiving water in the absence of all point source discharges." The definition of enhancement was further defined by the Regional Board in a letter dated August 12, 2019, which includes minimum performance criteria, project evaluation metrics, and other considerations.

The City of Eureka is proposing to develop and construct the Elk River Estuary Tidal Enhancement Project (the Project) to meet the enhancement requirements of the EBEP. The Project addresses minimum performance criteria, and also rates highly in the project metrics, including longevity, climate resilience, and water quality improvement, among other metrics.

The Elk River is the largest and most ecologically significant river entering Humboldt Bay. Ecological values of the Elk River include Old Growth Redwoods, Marbled Murrelet, Bald Eagle, Coho and Chinook Salmon, and Steelhead, all of which utilize estuarine habitat for rearing and foraging. This watershed is heavily impacted by upstream land use including grazing, farming, and timber harvesting, which have significantly impacted water quality, hydrology, and sediment transport. Figure 3 is included showing the scale of Elk River Watershed. Structures such as roadways, dikes and tide gates restrict natural hydrology and sediment accretion, create barriers to fish passage, and degrade wildlife habitat. The City of Eureka seeks to improve these issues through the development of the Elk River Tidal Enhancement Project.

Figure 1: South Bank of the Elk River Looking East from Existing Bridge

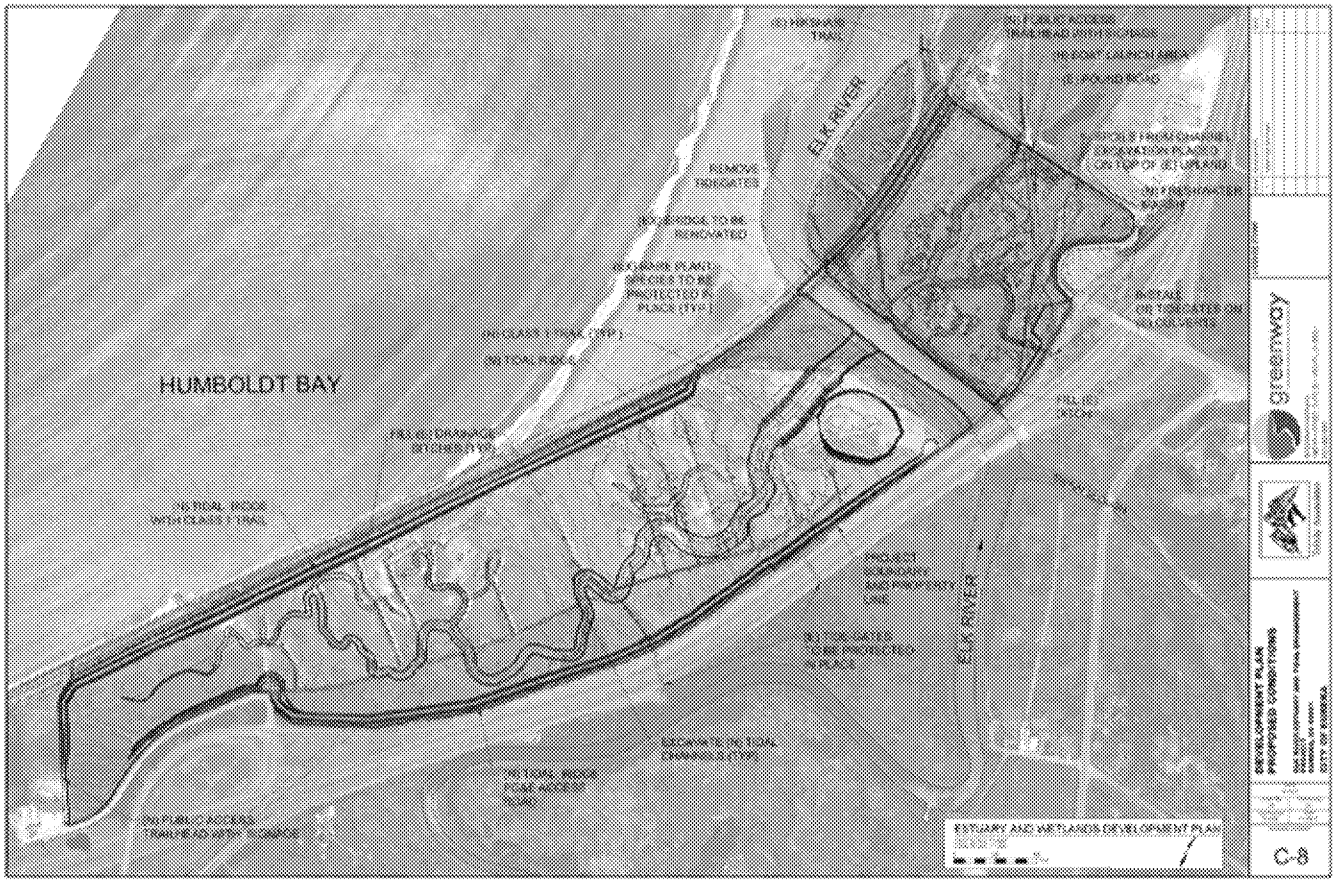


2. **Project Summary**

The Project will restore and enhance estuary and inter-tidal wetland habitats on approximately 114 acres adjacent to Elk River, create approximately 2.8 miles of navigable tidal slough channels connecting to the Elk River Estuary, as well as provide public access amenities to Elk River and Humboldt Bay with a one mile extension of Class 1 ADA-compliant Waterfront Trail , the construction of a non-motorized boat access point, a trailhead parking area off Tooby Road and, in a later phase, an Elk River Interpretive Center.

The Project area currently consists of pasture, coastal scrub, degraded seasonal wetlands dominated by pasture grasses, and salt marsh dominated by invasive Spartina (Spartina densiflora), lacking key ecosystem processes such as tidal exchange. The Project will restore a functioning tidal marsh complex with native vegetation and a network of tidal channels to allow for full tidal exchange with Elk River Slough. This will require the conversion of some degraded seasonal freshwater and brackish wetlands, currently used for livestock grazing, to inter-tidal wetlands (salt marsh) and tidal channels (open water, Eelgrass habitat, and mud flat).

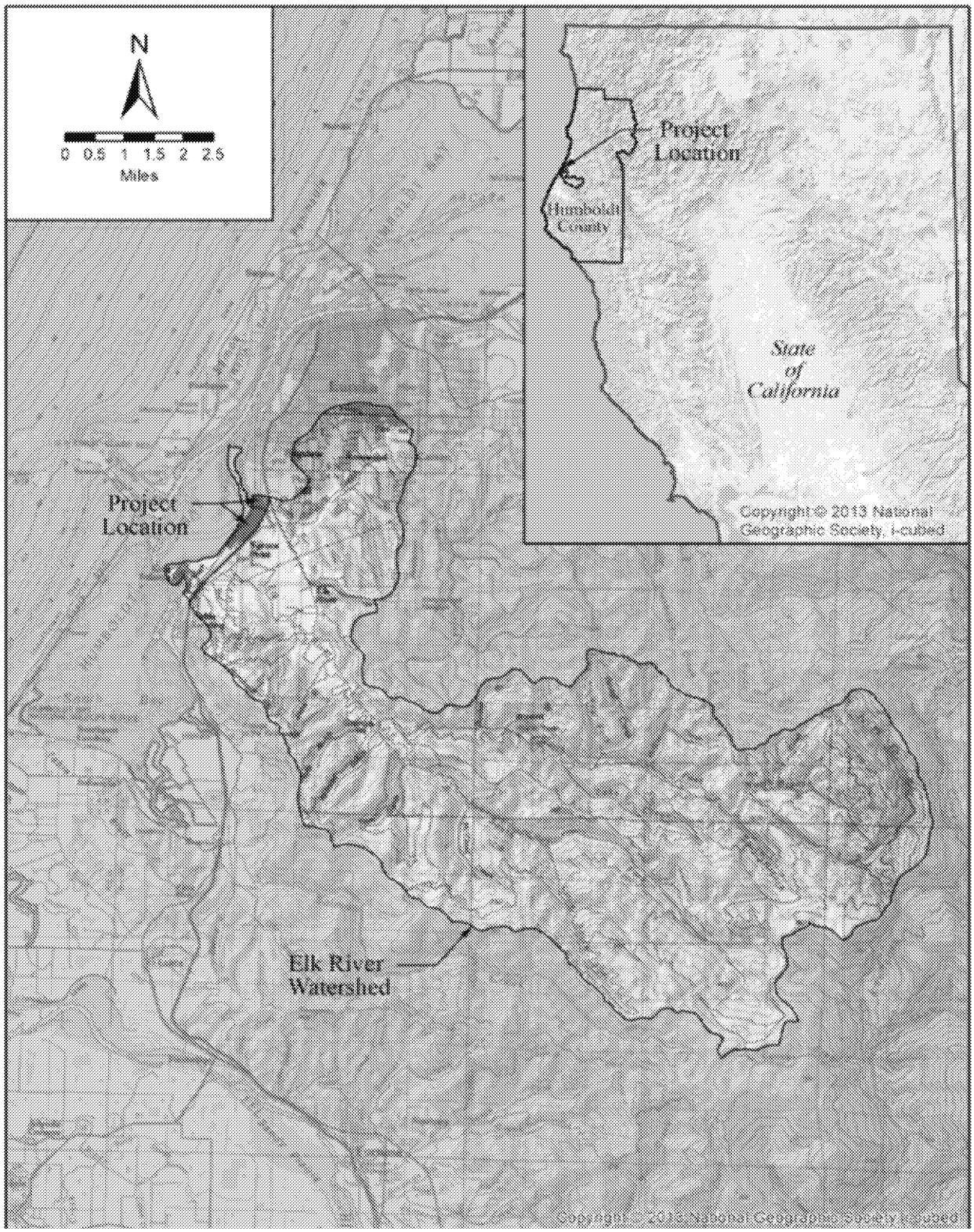
Figure 2: Proposed Site Plan of the Elk River Tidal Enhancement Project



2.1. Location

The Project is bound by U.S. Highway 101 and Humboldt County's Tooby Road on the east and the North Coast Railroad Authority (NCRA) right of way on the west. The City's Waterfront Trail, wastewater treatment facility, and private properties border the project on the north. The southern project boundary is bordered by private property. The entire site is owned by the City of Eureka.

Figure 3: Map of the Elk River Watershed



2.2. Estuary Function

The Elk River Estuary provides a critical opportunity to rebuild a portion of the lost tidal marsh systems around Humboldt Bay. Between the years 1870 and 1910, Humboldt Bay lost an estimated 90% of its salt marsh and wetland habitat due to diking and draining for agricultural and railroad purposes (Shapiro and Associates, 1980). The estuary is currently very limited in area and habitat diversity. It has generally become a three-mile long, linear, diked slough channel with very few tidal marsh areas.

Healthy tidal marsh systems provide invaluable nutrients within an estuary ecosystem. An estuary is an enclosed body of brackish water formed by part saline water from ocean tides, along with freshwater flows from steams or rivers. The combination of seawater and freshwater produce high level of nutrients in the water column. A tidal marsh is a unique feature within an estuary where the area floods and drains based upon the tidal influence. The proposed project will create a functioning tidal marsh system across more than 100 acres to provide these unique habitat and water quality benefits.

2.3. Exception Criteria

The project was specifically selected as it poses the ability to restore these coastal landscape processes to both former tidelands and historic floodplain, and fulfill the minimum exception criteria identified by the Regional Water Board (exception criteria). Project outcomes include restoring lost hydrologic function, establishing estuary habitat, creating habitat for special status species, improving water quality, and providing public access. Four of the exception criteria are addressed with the Project, and described in greater detail in this document. Those are:

- Provide enhancement that would not occur in the absence of the discharge.
- Create additional marshlands or wetlands or other enhancing features.
- Provide full protection of beneficial uses which the receiving water is capable of in the absence of the discharge.
- Demonstrate that the project will yield a positive water quality benefit.

The project has been evaluated based upon a series of metrics (evaluation metrics). These include:

- Longevity of Enhancement: The components of the Project are enduring and provide intended benefits for a minimum time frame equivalent to the infrastructure life of 30 years.
- Adaptive Capacity/ Natural Resilience: The project has the ability to adapt to changing conditions in the natural environment over time, as well as the

opportunity to restore and enhance habitat by planting native plants and improving biological diversity.

- Climate Change Resilience: The project has the ability to continue to provide benefits to address climate change over time for at minimum the life of the infrastructure.

- Consistent with Regional Planning Efforts: The project supports existing regional planning efforts to support Humboldt Bay.

- City Amenability to Long-Term Maintenance: The project components can be maintained for their useful life and the City can address long term maintenance costs and responsibilities.

3. **Summary of Proposed Actions**

The Project site is organized as Area 1 to the north of Elk River and Area 2 to the south of Elk River. Area 1 is approximately 25 acres of degraded inter-tidal wetland that will be restored by removing the riverfront levee and tide gate infrastructure, and excavating slough channels, integrating salt marsh plains, and public access via extension of the City's Waterfront Trail. A simplified list of the proposed actions and sequence for Area 1:

- Re-contour the entire site and expand existing channel: Excavate and enlarge (widen and deepen) inter-tidal channels. Excavate approximately 3,385 ft of existing and 2,394 ft of new inter-tidal channels and excavate and intersperse tidal ponds or depressions in channels.

- Repurpose the excavated soil material to create sloped channel edges and marsh plains. Fill artificial depressions and levee borrow ditches, and create tidal mounds/hummocks (islands). Provide cover for wildlife and create habitat diversity by placing wood debris on site.

- Remove non-native vegetation, specifically eradicate 20 acres of invasive Spartina, and revegetate the site over multiple years.

- Excavate and remove interior, exterior dikes and Elk River tide gates allowing river currents and tidal slough currents to travel into the project Area.

- Construct public access amenities: Install non-motorized boat access near the terminus of Pound Road. Extend the Waterfront Trail 1,000 feet from its existing terminus at Pound Road, southward parallel to the railroad grade to Elk River. Design and construct the future Interpretive Center facility north of Pound Road.

Figure 4: Elk River Estuary Tidal Enhancement Project, Areas 1 and 2

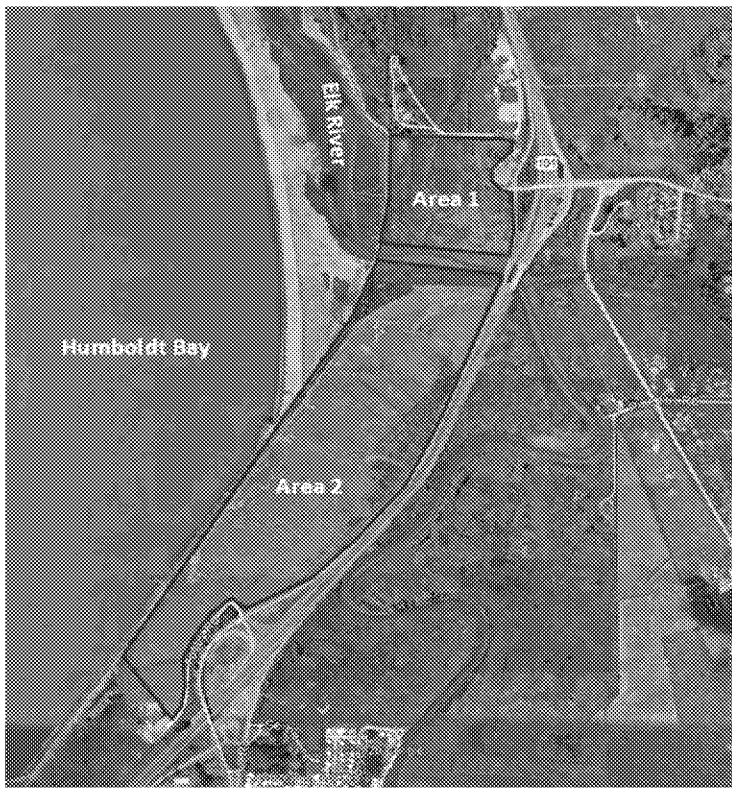


Figure 5: Looking West at High Tide in Area 1 at Spartina Dominated Salt Marsh.

Area 2 is approximately 89 acres located south of the Elk River. It is comprised of agricultural ditches, pasture, and degraded seasonal wetlands. The area is separated from the Elk River on the north side by a natural windblown sand formation, parallel to Elk River Slough. Construction of a rock seawall and the railroad infrastructure on the west side has isolated Area 2 from Humboldt Bay.

Most of Area 2 is drained by a network of linear agricultural ditches and there is no freshwater inflow. Area 2 will be converted to an inter-tidal wetland with a network of tidal slough channels. The channel area will be contained by tidal ridges (living shorelines) that will host riparian habitat as well as public access trails.

Generalized list of proposed actions and sequence for Area 2:

- Re-contour the area by excavating approximately 125,200 cubic yards to create a network of new inter-tidal channels. Use excavated material to fill agricultural ditches, and construct the design features such as sloped tidal ridge(s), marsh plains, and create depressions and mounds (tidal islands).
- Remove invasive vegetation, including Spartina, and install a variety of native vegetation types and create habitat features by placing woody debris.
- Construct public access amenities including new gravel parking area at the southern end of Tooby Road, and the Waterfront Trail Extension trail from the new parking lot northward to the Elk River.

Figure 6: Area 2 Existing Pastureland

3.1. Reclaim Historic Tidelands and Restore Elk River Floodplain

The lower portion of the Elk River watershed, has been impacted by urban development and human activities that encroach upon the floodplains and have affected the distribution and timing of drainage during rainfall and storm events.

The lower Elk River drains through fragmented floodplains, diked from floodplain overflow which means that the rain fall, and storm water is restricted and constrained between the dikes, roadways, culverts, pasture, degraded marsh, and man-made levees. Highway 101 bisects the Elk River floodplains controlling the drainage along its length. During extreme storm events the highway acts as a weir with water traveling through under-sized culverts and remaining water sheet-flowing across paved surfaces, pasture, and surrounding areas. Water on the east side of Highway 101 becomes trapped in upslope drainage ponds and contributes to localized flooding.

The Project area contains historical tidal wetlands that were diked off from the Elk River for agricultural and railroad purposes in the early 1900's. The Project site is situated between the railroad levee to the west and Highway 101 infrastructure to the east. These man-made structures trap storm water from draining. Additionally, the dikes, levees, and resulting sand deposits create a barrier to tidal activity within the project. As part of an effort to not increase flood levels on adjacent properties and critical infrastructure (Highway 101) this Project has gone through an iterative design process with design alteration based on hydraulic analysis. This led to the proposed project design that not only avoids increasing flood levels, it reduces them.

The Project will remove the riverfront dikes along the Elk River frontage to allow high-flowing turbid stormwater in the river channel to enter a newly constructed tidal channel flowing into and onto marsh plain surfaces. Stormwater will flow from the Elk River into project wetlands that serve as tidal marshes and stormwater flood basins. The proposed design allows for drainage into the Elk River though the newly constructed tidal channel mouth when river levels recede downstream as tides drop and when upstream floodwaters cease.

Not only will the Project result in a reduction of flooding for various adjacent areas, it will also reduce flooding in distant areas. During a large storm event, river flows will move down river, enter the Project site, and then be captured and detained within the Project. When the river levels then recede or the tide levels recede through a natural tidal cycle, water will naturally exit the Project area through the mouth of the channel and back into Elk River Estuary.

Figure 7:In Area 2 the Existing Degraded Pasture

The project team has analyzed the extreme (estimated 100-year recurrence interval) coastal and fluvial events in the Lower Elk River. The project has been designed to either pose no adverse impacts, or to lower adverse impacts to infrastructure such as Highway 101 and adjacent properties.

The design of elements to restore the floodplain directly addresses the exception criteria and evaluation metrics. As climate change causes larger and more extreme storm events, the new Project areas will provide capacity for stormwater, reduce localized flooding to adjacent properties, as well as reduce flooding upstream. As noted above, current stormwater often travels across paved surfaces, through man-made culverts and other infrastructure, carrying pollutants directly into the Elk River and Humboldt Bay. The Project provides a new mechanism to direct stormwater into a natural biologic system to filter pollutants and sediments before water is returned to the Elk River Slough, thereby improving water quality in Humboldt Bay.

Similarly, the Project will restore historic tidelands and provide an enhancement that is adaptive to Sea Level Rise (SLR). The hydrological design will provide longevity of the enhancement for a minimum of 30 years, is adaptable to SLR, is consistent with regional planning efforts toward SLR, and will ensure that the City can maintain the enhancement for its' useful life of 30 years.

Without these improvements to the historic tideland and floodplain, the storm flows and high tide events will continue to carry pollutants into Humboldt Bay. Without the Project, the beneficial uses of Humboldt Bay as well as water quality benefits cannot be achieved.

This demonstrates that the enhancement Project will create benefits that would not be present in the absence of the discharge, and the Project is a creation of unique benefits and enhancement to the receiving waters of Humboldt Bay. By approving the Project as an exception to the discharge permit, the Regional Water Board plays a role in protecting protect beneficial uses and yielding significant water quality improvements.

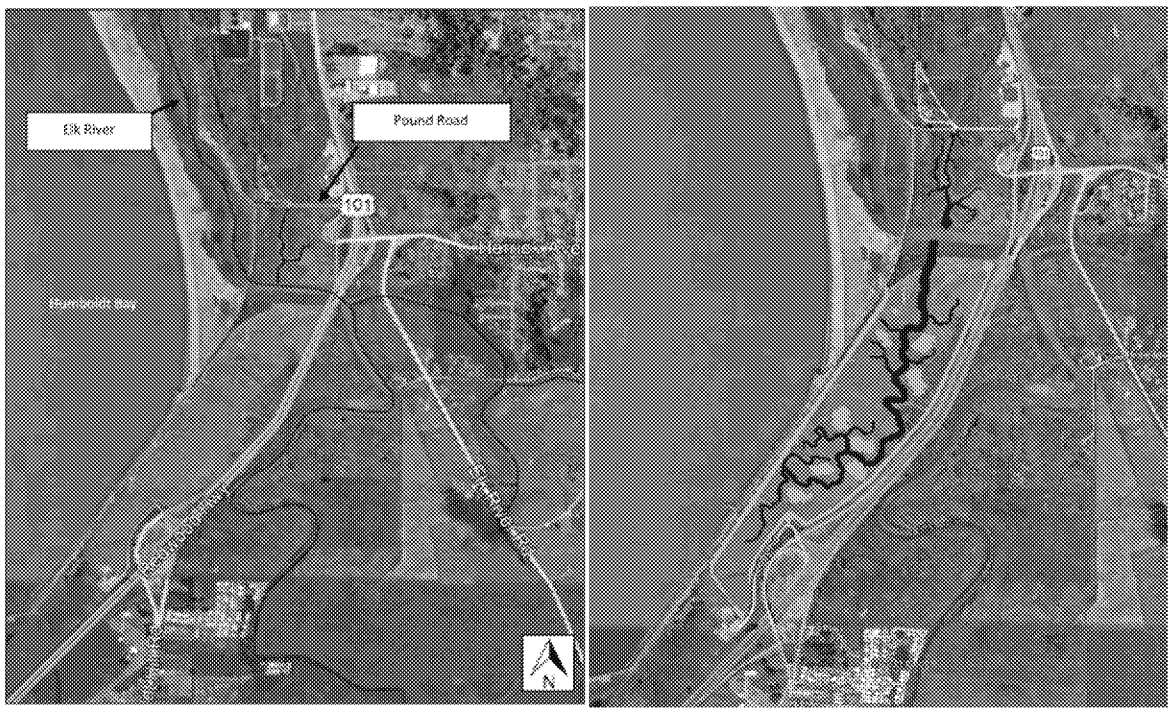
3.2. Create Tidal Marsh Systems and Improve Water Quality

Use of design features: Channels, Marsh Plains, Tidal Ridge

While an estuary may be viewed as one large flat space when filled with water, it should be viewed as a unique set of elevations that are under water. Each elevation has a function to perform within the wetland system. The project design features result in various elevations including deep channels, shallow channels, sloped edges, marsh plains, wetland depressions and hummocks, riparian upland areas, as well as higher sloped tidal ridges. These features integrated across the 114 acre site provide a vast system to perform water quality enhancement through settling of solids and sediments, filtration of pollutants in the water column, and chemical detoxification by adding oxygen and biologic elements into the water through wetland vegetation.

The restoration components of the Project include re-connecting the historic floodplain property to the lower Elk River. The Lower Elk River is listed as an impaired water body under Section 303(d) of the Clean Water Act due to the sedimentation and siltation as well as indicator bacteria. By connecting the river's lower floodplains through a series of new tidal channels the fine sediments will be metered and stored. The proposed network of tidal slough channels will capture and receive the twice-daily tidal cycle as well as receive stormwater making the entire project perform as a tidal marsh system with deep channels, low wet-lands, and upper marsh plains. Vegetating the marsh plains with native tidal, brackish, and freshwater marsh plant species will filter and trap sediment on the marsh plains, while improving the richness of the habitat and building soils. By reducing the accumulation of fine sediments within the water column, and providing for natural sediment deposits along marsh plains, the project will improve water quality.

Figure 8: Site Images Showing Existing Channel North of the Elk River in 25 Acres of Area 1, and Existing Pasture South of Elk River in 89 acres of Area 2. Proposed Channel Network in Blue and Tidal Ridge in Yellow.



The proposed tidal slough channel shape and geometry is designed to transport a full tidal regime into the restoration areas, during each tide cycle. The proposed marsh plains are designed at target elevations to accommodate existing high-tide events as well as predicted sea level rise to promote a natural colonization of native salt marsh species and sedimentation to enhance water quality. As a result, rising tide levels will naturally deposit native seed material as well as sediment onto the marsh plains and thereby establish grasses and native plant species so the site can evolve and perform related water quality enhancement that is enduring and longstanding after the project.

The Project will create a tidal ridge on the west, south, and east edge of the project to establish a high-point around the lower channel and marsh systems. A tidal ridge is often called a living shoreline, and includes constructing a gradually sloping berm with vegetation along its slopes. Living shorelines often have water travel through a berm or levee structure creating water filtration. While the proposed tidal ridge is permeable and provides some filtration, the design is intended to hold water within the project and support the hydrologic connection between the River and the project features. For the purpose of this project a tidal ridge is defined as a berm rising from the intertidal zone to an elevation above the tidal zone. This elongated linear berm feature will provide immense water quality benefits due to the exchange of water with tides and storm events.

The gradual slope design allows the project to establish native vegetation at the site, and the tidal influence will carry sediment to the tidal ridge. When sediment is deposited this is called sediment accretion. This helps the biologic diversity at the site and encourages native plant establishment.

Wetlands function as natural water cleansing systems by spreading low velocity, shallow water through densely vegetated surfaces filtering pollution from the water column. Stormwater and tidal water will drain into and from the project site through tidal channel networks and flow into connected side-channels and marsh systems. During storm events the channel network will provide detention area and hold water until storm flows and tide levels recede. This constant movement of water in-and-out of the channel network, reaching across the site, provides an expansive marsh filtration system with tremendous enhancement to water quality. As water enters the site, caring pollutants and bacteria in the water column, the water will spread through the channels and across the marsh plains, filtering pollutants, and depositing sediments, before the tides pull water back through the site returning to the Elk River and into Humboldt Bay.

The noted Project design features along with the hydrologic modeling and use of varied elevations create a true enhancement project to meet the exception criteria. Similarly, the Project features explicitly create marshlands, wetlands, and other enhancing features. The tidal channels provide open waters, and navigational waters, for both human uses and aquatic species providing beneficial uses noted for Humboldt Bay. (Beneficial uses are explored further and later in this document). The design elements will self-perform and adapt over time, as well as provide climate resilience and adaptation to Sea Level Rise providing longevity.

Figure 9: Area 1 Proposed Elevations Based Upon Hydrologic Modeling.

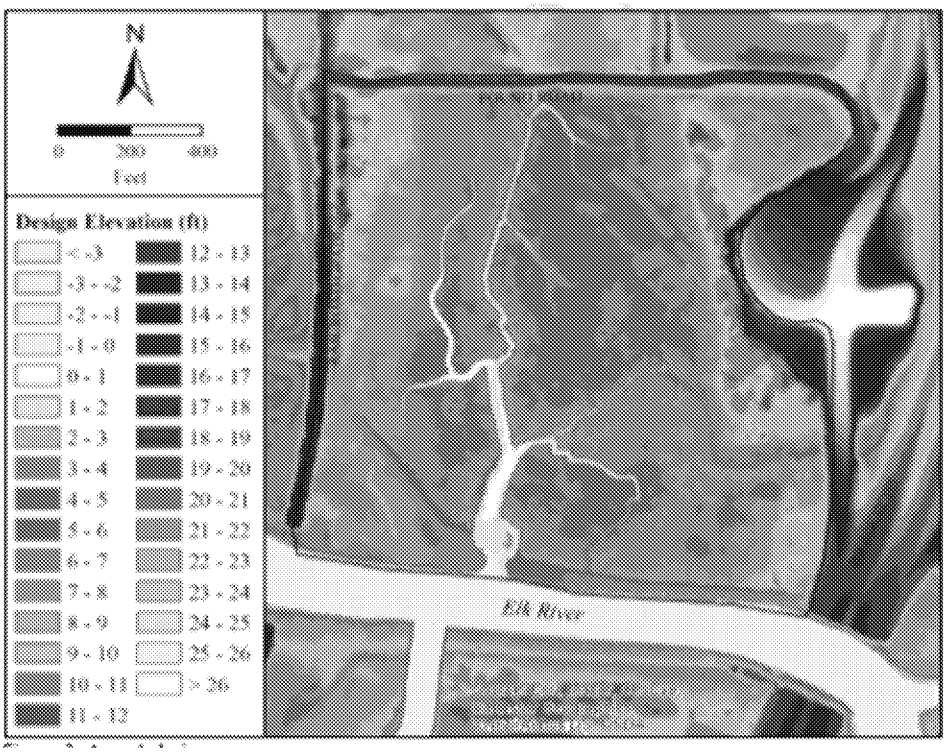
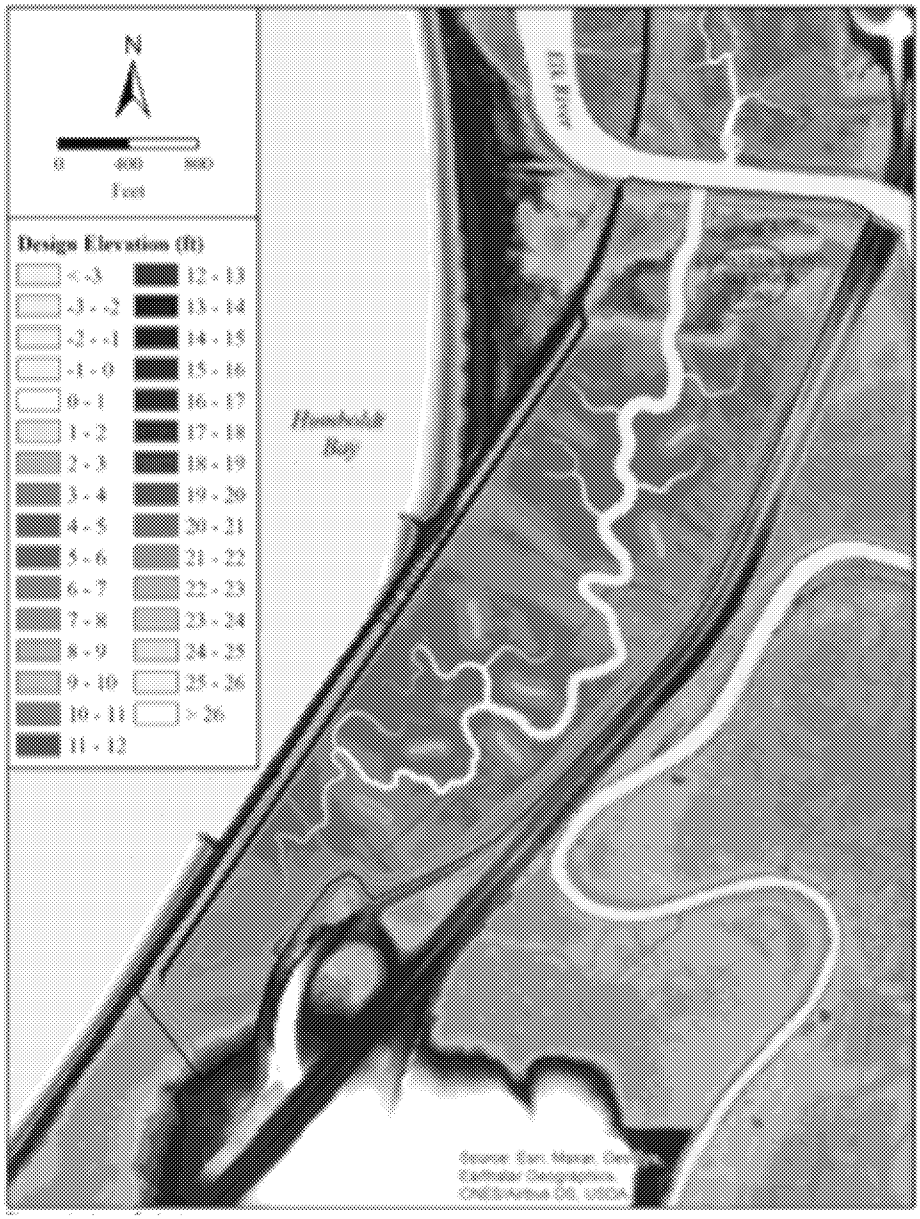


Figure 10: Area 2 Proposed Elevations Based Upon Hydrologic Modeling.



3.3. Establish Habitat

Tidal marshes filter out pollutants; buffer adjacent lands from flood tides and storms; contribute invaluable nutrients to the estuarine ecosystem; and provide important habitat for fish, invertebrates, many shorebirds, and other waterfowl. The project will establish habitat over 114 acres with the development of salt marsh, freshwater wetlands, brackish marsh, open waters, riparian areas, and upland areas. The Project will provide much needed habitat types for a variety of endangered, threatened, and special status species along with migratory birds.

- By removing dikes and tides gates the Project will create new fish habitat and fish refuge to support listed salmonid species including Chinook Salmon (Oncorhynchus tshawytscha), Coho Salmon (Oncorhynchus kisutch), and Steelhead Trout (Oncorhynchus mykiss).

- The new channel network and marsh plains will increase inter-tidal, brackish, and freshwater habitats for important aquatic species including but not limited to Eelgrass, Olympia Oyster (Ostrea lurida), Dungeness Crab (Metacarcinus magister), Longfin Smelt (Spirinus thaleichthys), Tidewater Goby (Eucyclogbius newberryi), Humboldt Bay owl's clover (Castilleja ambigua ssp. humboldtiensis), Lyngbye's sedge (Carex lyngbyei), and Point Reyes bird's-beak (Chloropyron maritimum ssp. palustre).

- Removal of invasive dense-flowered cordgrass (Spartina densiflora) vegetation from the site, and creation of healthy salt marsh with a range of surface elevations to support low and high salt marsh vegetation, including protection and re-introduction of special status plant species Lyngbye's sedge and Humboldt Bay Owl's Clover.

- By re-establishing riparian and upland habitat with native vegetation, this will provide needed shelter and vegetation for resident and migratory bird species.

Table 1: Existing and Projected Acreages of Habitats, Agricultural lands, Roads and Trails Area 1 and 2 Combined.

Land Type	Existing Acreage[1]	Proposed Acreage	Net Change in Acreage
Eelgrass (on mudflats within tidal channels)	0	6.0	+ 6.0
Open Waters	1.2	3.0	+ 1.8
Brackish Marsh 1	1.3	0	-1.3
Agricultural Wetlands (Pastureland)	68.9	0	- 68.9
Agricultural Uplands (Pastureland)	13.8	0	- 13.8
Freshwater (Vegetated Drainage Ditches)	0.7	0	- 0.7
Freshwater Marsh	0	0.7	+ 0.7
Salt Marsh	20.8	77.8	+ 57
Riparian	0.2	11.3	+ 11.1
Uplands	5.8	0	- 5.8
Road/Trail	1.2	9.3	+ 8.1

[1] All acreages are approximate

The Project will provide necessary habitat types for a variety of species, which touches on the integration of the Project to address regional planning efforts. The Project design functions to support fish habitat are consistent with the goals of the California Department of Fish and Game Recovery Strategy for California Coho Salmon, as well as the US Fish and Wildlife Service Recovery Plan for the Tidewater Goby.

While the rearing habitat and refuge in the estuary is currently scarce, Coho and other anadromous fish are still spawning in the upper reaches of Elk River. With climate change, the lower reaches of the river could warm and become too shallow to support fish during the drier months. Similar barrier removal projects have been completed in other estuaries on Humboldt Bay and report success in providing critical rearing habitat and estuarine refuge.

Figure 11:One of the Main Restoration Components in Area 1 is the Removal of Existing Tides Gates to Allow Tidal Inundation of the New Channel System. Removal of Barriers Such as this Will Increase Habitat for Fish and Aquatic Species

Restoration of vegetation types at the Project includes the removal of more than 20 acres of dense-flowered cordgrass (Spartina densiflora). Spartina can grow year-round in varied salt-marsh environments and naturally out-competes the native vegetation which will generally go dormant in the winter. Spartina is so invasive it can actually reshape the landscape by the physical structure, large stem, and root density, and impacts to sediment retention.

The Project will remove Spartina over multiple years, to encourage native vegetation. These efforts are consistent with the Humboldt Bay Regional Spartina Eradication Plan.

Existing plants species documented at the project site, and listed as threatened or endangered include Lyngbye's Sedge and Humboldt Bay Owl's Clover. Both of these plants will be protected as they exist in small quantities, and re-introduced throughout the project site. The US Fish and Wildlife Service facilitates a monitoring program for the Owl's Clover at the Humboldt Bay Wildlife Refuge.

Establishment of tidal marsh vegetation along with the tidal marsh plains will provide direct benefits to many resident and migratory bird species. Humboldt Bay is located within the Pacific Flyway, which is the north-south travel route for migratory birds extending from Alaska to Patagonia. The Project will provide a location to rest and forage. Numerous species utilize coastal landscapes and marsh plains including small species; swallow, wrens, and sparrows, as well as waterfowl; ducks and geese. Larger bird families are also present including heron, egret and even raptors, like red-tailed and red-shouldered hawks. But the bay is most famous for the vast species of shorebirds such as plovers, sandpipers, and godwits. The number of shorebirds utilizing the bay and surrounding seasonally wet pasture and wetlands are higher than any other bay or estuary in California, except San Francisco Bay. Eighteen State-listed bird species ("endangered" of "species of concern") utilize similar habitats along Humboldt Bay.

The exception criteria stress that the Project must provide full protection of beneficial uses which the receiving water is capable of in the absence of the discharge. The Project has been analyzed against the beneficial uses attributed to Humboldt Bay in the North Coast Region Basin Plan. The creation of habitat touches on a minimum of six of the beneficial uses; Estuarine Habitat, Marine Habitat, Wildlife Habitat, Preservation of Rare, Threatened or Endangered Species, Migration of Aquatic Organisms, and Spawning, Reproduction, and Early Development.

Many of the noted endangered, threatened, and concern-status species are vulnerable to the impacts of climate change. The project provides climate adaptation and resilience for wildlife in the form of habitat connectivity, improvement of habitat quality for climate vulnerable species, sea level rise adaptability, and invasive species removal. The project will decrease the climate change vulnerability of ecosystems and species important to Humboldt Bay by providing marsh habitat types and their related benefits.

Incorporating passive public use with trails, non-motorized boat launch, signage and the future Elk River Interpretive Center also creates a method to reach and teach the public about the importance of habitat. The public access amenities provide a way to engage with the surroundings and develop an appreciation and respect for these impressive habitat systems.

The trails and site features are designed to encourage passive use, while also creating a wide buffer to protect vegetation and waterways from being trampled or negative impacts of human uses.

3.4. Provide Public Access Amenities

Design Features: trail, parking, boat launch, future Interpretive Center

The Project includes an approximately one-mile-long Class I, ADA-accessible, non-motorized multiuse trail along Humboldt Bay that will serve as part of the California Coastal Trail. As designed to meet Caltrans Class I multi-use trail design standards (Caltrans Highway Design Manual, Chapter 1000) and Americans with Disabilities Act (ADA) design standards, the proposed trail will expand shoreline access for a variety of users including bicyclists, walkers, hikers, runners, skaters, wildlife viewers, nature educators, persons in wheelchairs, and other non-motorized outdoor users. The trail will promote access to the Bay, the Elk River estuary, and surrounding marshlands for wildlife viewing and recreation. As part of the California Coastal Trail, it will attract users regionally and state-wide.

The one mile-long trail extension, which terminates at the southern boundary of Eureka, will essentially complete the California Coastal Trail through the length of the City's waterfront, approximately six miles of which the City has constructed over the past seven years. In addition, the City's trail system is being developed as part of a collaborative regional trail effort with the County of Humboldt, the City of Arcata, the Humboldt County Association of Governments, the State Coastal Conservancy, the North Coast Railroad Authority, and other partners to develop a continuous coastal trail network along the eastern shoreline of Humboldt Bay for a total length of over 13 miles.

Not only does the trail provide an access point to nature and a larger trail network, it has been designed as a regional transportation facility. This has multiple benefits for health and wellness, reduction of emissions by encouraging bike and walk options, as well as improved safety for bike and pedestrians. The south trail entrance at Tooby Road provides a critical access point for bike and pedestrian travel approaching Eureka from the south, specifically from the isolated residential area of Humboldt Hill. There are no sidewalks, access trails, or other non-motorized facilities available between Humboldt Hill and Eureka City limits. As a result, bikes and pedestrians utilize the narrow shoulder of Highway 101, increasing conflicts between vehicles and non-motorized vehicles and resulting in fatalities. The trail will provide an off-highway alternative for users traveling between Humboldt Hill and Eureka proper.

The City will provide a coastal access parking area in an existing upland adjacent to Tooby Road at the south end of the Project. The parking area will be graveled and will support approximately 10 vehicles. In addition, parking at the north end of Area 1 is available along Pound Road.

Preliminary signage concepts include installing access welcome signs at Pound Road (north end) and Tooby Road (south end).

The new non-motorized boat launch will be installed on the north side of the project, with access from Pound Road where an existing park and ride parking lot provides parking. This boating amenity will offer the ideal setting for a kayak, canoe, or stand-up paddle board, to access the new channel network on the north side of Elk River. At high-tide users can paddle through the channel and continue upriver into the Elk River watershed, or down river into the Elk River Slough, and then into Humboldt Bay.

Adjacent to the location of the new boat-launch, the City has identified a property for the future Elk River Interpretive Center. The planning for this facility is still in the early stages, but the current property owner is interested in selling to the City. The parcel is approximately three acres and is positioned between the Project and the City's Elk River Wastewater Treatment Plant. The property will accommodate the future Interpretive Center facility to include a building with gathering areas both interior and exterior, restrooms, and interpretive displays. Adjacent to the Interpretive Center, the Project may be further expanded to provide for nature viewing opportunities on trails in and adjacent to the Center and the neighboring Elk River Wastewater Treatment Plant.

The amenities provide for protection of beneficial uses of Humboldt Bay including:

- Improvements to navigation with new non-motorized boat launch and a new expanded navigable channel extending 2.8 miles;
- Improvement in water contact recreation, for boating, paddling, and fishing;
- Improvement in water quality related to non-contact water recreation for activities such as nature viewing and bird watching, with the project attracting resident and migratory bird species; and
- Improvements in the recreational and sport fishery by helping to enhance fish health and diversity of species.

Figure 12:Existing Waterfront Trail Connection on Pound Road Looking West Near Boat Launch Location

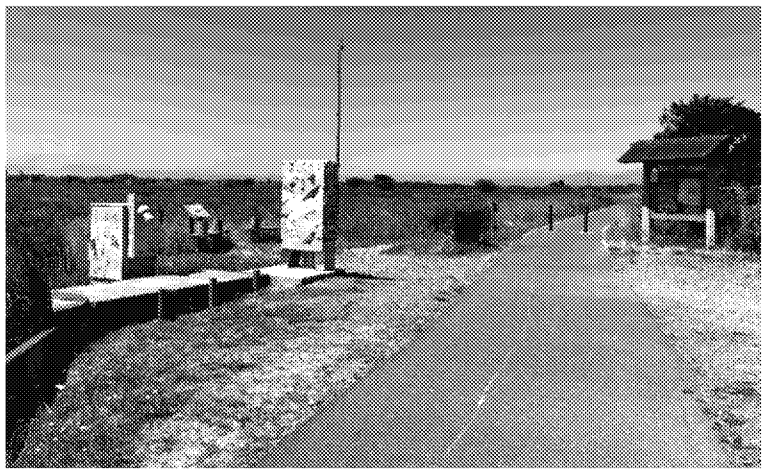


Figure 13:Existing Waterfront Trail Along Pound Road, Looking South at Boat Launch Location

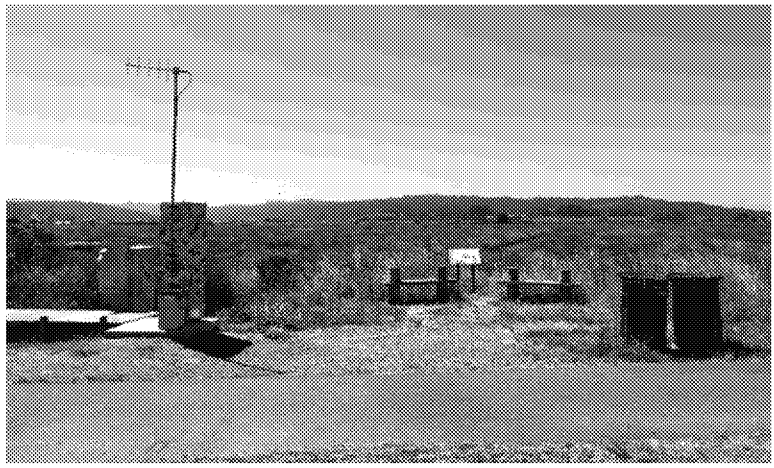


Figure 14:Looking South from Proposed Boat Launch Location at Low Tide. Viewing the Existing Slough Channel in Area 1 that will be Widened and Deepened Through the Enhancement Project.

3.5. **Project Longevity**

The project will be self-sustaining over the long-term and adaptable to Sea Level Rise (SLR). The fully functioning tidal marsh complex includes various channel depths, variable marsh plains, wetland depressions, upland riparian areas, and sloped tidal ridges. The high projections for sea level rise on Humboldt Bay are: 2030 at 0.9 feet, 2050 at 1.9 feet, 2070 at 3.2 feet, and 2100 at 5.4 feet. The design of the salt marsh plains range in elevation from 5.8 to 8.8. Mean high water (MHW) currently is 5.8 feet NAVD 88 as measured at the North Spit tide gage. By 2050, MHW may be as high as 7.7 feet and by 2070 at 9.0 feet. With increasing high tides, the project elevations will shift over time. The gradually sloping marsh plains and tidal ridges will allow wetlands to migrate upslope and remain viable for a longer period. Using an average accretion rate of 2.5mm/year and a projected rate of sea level rise, along with the project design, it is estimated the tidal marsh will be supported through at least 2050, with the upland riparian areas and tidal ridges are expected to support marsh habitat long past 2100 since they will be construction at elevations ranging from 9 to 12 feet. Habitat distribution for eelgrass and mudflat will also expand through 2100.

The new trail extension and similar public access amenities will become part of the City's larger trail network and will be scheduled for routine maintenance and upgrades as the system ages. Similarly, parking areas, the non-motorized boat access point, and signage or other amenities within the Project will be part of a scheduled assessment for upgrades or replacement as they age through the City's Capital Improvement Program (CIP). The City will be actively managing and maintaining this facility to provide for long-term planning and upgrades as necessary.

Per the evaluation metrics, the Project will be enduring and provide intended benefits for a minimum time frame equivalent to the infrastructure life of 30 years. The design will adapt to changing conditions in the natural environment over time. The project will continue to provide benefits that address climate change over time. The project components can be maintained for their useful life and the City can address long term maintenance costs and responsibilities.

4. **Water Quality Benefit from Enhancement Project**

The City of Eureka has worked closely with Regional Water Board staff over the past two years regarding the viability of the Project as an enhancement component of the continued discharge permit. There were 16 pollutants identified as of concern by the Regional Water Board: TCDD Equivalents (i.e., dioxins), PCBs, Total Suspended Solids, Arsenic, Chromium, Copper, Lead, Nickel, Zinc, BOD, Ammonia, Nitrogen, Phosphorus, Bacteria, Trace Organics, and Hydrocarbons (e.g., Creosote). The City identified potential constituents and metrics to be used in the analysis, and then completed a review of research and literature. The analysis showed that projects similar to the proposed Elk River Estuary project can reduce pollutants of concern entering the Bay.

The analysis looked at multiple project options for comparison, and this Project scored the highest in reducing pollutants in the water column and providing water quality benefits. Table 2 shows a comparison across eight unique projects that were considered, with Option 1 representing the Project. Table 3 explains the categories.

Table 2: From Analysis of Eight Unique Projects: The Water Quality Improvement Potential for each Option

Pollutant	ERWWTP Average 5-year load (lb/ year)	Option 1 Tidal Marsh*	Option 2 Horizontal Levee*	Option 3 Drainage	Option 4 Storm-water	Option 5 Impervious Surfaces	Option 6 Piling Removal	Option 7 Parcel 4	Option 8 Dune & Spartina
TCDD Equivalents (i.e., dioxins)[1]	Non-Detect	★★	★★	★★	★★	○○	○○	★★	○○
PCBs[1]	-	★★	★★	★★	★★	○○	○○	★★	○○
TSS [1]	151,780	★★	★★	○○	★★	▢▢	○○	▢▢	○○
Arsenic	33	▢	▢	○	★	▢	○	▢	○
Chromium	23	★	★	○	▢	▢	○	▢	○
Copper	399	★	★	○	★	▢	○	★	○
Lead	Non-Detect	★	★	○	▢	▢	○	▢	○
Nickel	72	★	★	○	▢	▢	○	▢	○
Zinc	689	★	★	○	★	▢	○	★	○
BOD	158,160	★	★	○	★	▢	○	▢	○
Ammonia (total as N)	55,860	★	★	○	▢	▢	○	▢	○
Nitrogen	-	★	★	○	★	▢	▢	★	○

Pollutant	ERWWTP Average 5-year load (lb/ year)	Option 1 Tidal Marsh*	Option 2 Horizontal Levee*	Option 3 Drainage	Option 4 Storm-water	Option 5 Impervious Surfaces	Option 6 Piling Removal	Option 7 Parcel 4	Option 8 Dune & Spartina
Phosphorus	-	★	★	○	★	▢	○	★	○
Bacteria	-	★	★	○	★	▢	○	★	○
Trace Organics (TrOCs)	-	★	★	○	▢	▢	○	★	○
Hydrocarbons (e.g, Creosote)	Non-Detect	▢	▢	○	▢	★	★	★	○
Nexus between the WWTP impacts & Enhancement Option	-	★	★	★	★	★	▢	★	▢
TOTAL WATER QUALITY ENHANCEMENTS		★ = 18 ▢ = 2 ○ = 0	★ = 18 ▢ = 2 ○ = 0	★ = 5 ▢ = 0 ○ = 15	★ = 13 ▢ = 7 ○ = 0	★ = 2 ▢ = 14 ○ = 4	★ = 1 ▢ = 2 ○ = 17	★ = 12 ▢ = 8 ○ = 0	★ = 0 ▢ = 1 ○ = 19

Each of the eight different enhancement options were evaluated to determine potential water quality improvements that may result from the project by removing pollutants from the water column. For each enhancement option, a set of contaminants were considered and were placed into one of three categories:

★ Pollutants likely reduced by enhancement option: Reduction of pollutant is possible based on (1) it has been documented in the literature and/or (2) it is a pollutant that is present in the vicinity of the proposed project.

▒ Pollutants potentially reduced by enhancement option: Reduction of pollutant is possible, as similar project concepts often result in reduction of these types of pollutants, but without further project specifics it is only a possibility.

○ Pollutants unlikely to be reduced by enhancement option: Reduction not likely or no literature found to support the removal of the pollutant by similar projects.

Similar projects have demonstrated improvements to water quality through the removal of hydrologic barriers. This enhancement project includes the removal of man-made dikes, tide-gates, agricultural ditches, as well as removal of more than 20 acres of Spartina (Spartina densiflora). These measures alone will contribute to the ability of the tidal slough channel systems to increase sediment loads to the marsh plains, increase nutrient load throughout the Project site, and provide contaminant filtration.

While the water quality analysis reviewed similar projects, it is important to note the specific attributes of an estuary environment that contribute improvements to water quality with factors such as nutrients and dissolved oxygen. Nutrients can be limited in a freshwater river, such as Elk River. However, the estuary environment brings together the freshwater and tidal saline water delivering carbon, nitrogen, and phosphates and creating a nutrient rich environment. As the tidal cycle carries water and vegetation particles through the slough channel network, the organic matter settles with sediments, adding to nutrient values for vegetation but also adding to water quality. Micro-organisms depend upon these smaller particles as their food source. Those micro-organisms feed fish and other aquatic species, that in-turn feed larger species building the vast estuary food-web.

Similarly, the success of various species involved in an estuary food-web hinge on the presence of dissolved oxygen in the water. Dissolved oxygen (DO) is the measured or saturation content of oxygen in the water column. Oxygen is carried from the surface, through currents, or wave wind and turbulence into the water column. Vegetation can also deliver oxygen to the water column. The ability of the water to hold oxygen is an indicator of water quality.

Without the Project, the river currents will travel past the project location, continue toward the Elk River Estuary and into Humboldt Bay, providing no improvement to

water quality. However, with the implementation of the project design features, the new channel network, and marsh system, tidal waters and river currents will travel into the Project area during the twice-daily tide cycle. Through this the Project will provide water quality enhancement through settling of solids and sediments, filtration of pollutants in the water column, and chemical detoxification by adding oxygen and biologic elements into the water.

4.1. **Bay Enhancement: Project will Provide Full Protection of Beneficial Uses**

The exception criteria clearly indicate that the proposed project must provide full protection of existing beneficial uses of Humboldt Bay. An analysis of beneficial uses showed that the Project features will continue to support and protect beneficial uses, either enhancing or having no effect on Humboldt Bay designated uses. These have been evaluated and listed here:

- Navigation (NAV): The enhancement will result in improvements to navigation. The project includes a new non-motorized boat launch and a new expanded navigable channel extending 2.8 miles throughout.

- Water Contact Recreation (REC-1): Project will result in an enhancement to water quality and thus an improvement in water quality related to water contact recreation, for boating, paddling, and fishing.

- Non-Contact Water Recreation (REC-2): Project will result in an enhancement to water quality and thus an improvement in water quality related to non-contact water recreation for activities such as nature viewing and bird watching, with the project attracting resident and migratory bird species.

- Commercial and Sport Fishing (COMM): Anticipated improvements in water quality would result in improvements in the recreational and sport fishery by helping to enhance fish health and diversity of species.

- Estuarine Habitat (EST): Project will create new estuarine habitat or improve existing estuarine habitat. The expansion of estuarine habitat will benefit anadromous salmonids, Longfin Smelt, and other marine species. Restored tidal channels will result in new habitat for Eelgrass.

- Marine Habitat (MAR): Project will create new marine habitat or improve existing estuarine habitat. Seabirds, marine mammals, migratory waterfowl, and other marine species utilize habitats in and near the Elk River estuary. Enhanced and created wetlands will also be important nursery habitat for marine fishes.

- Wildlife Habitat (WILD): Project will enhance or create new wildlife habitat or uses of water that would support wildlife habitat beyond existing conditions. In providing higher marsh habitat the Project will specifically support expanded bird habitat.

- Preservation of Rare, Threatened, or Endangered Species (RARE): As noted for Estuarine Habitat (EST), the Project would result in direct habitat and water quality improvements for special status anadromous species and Longfin Smelt. Within the Project, habitat benefits for Tidewater Goby area are also expected in Area 1. Special status migratory waterfowl would also benefit from enhancements resulting from these habitats.

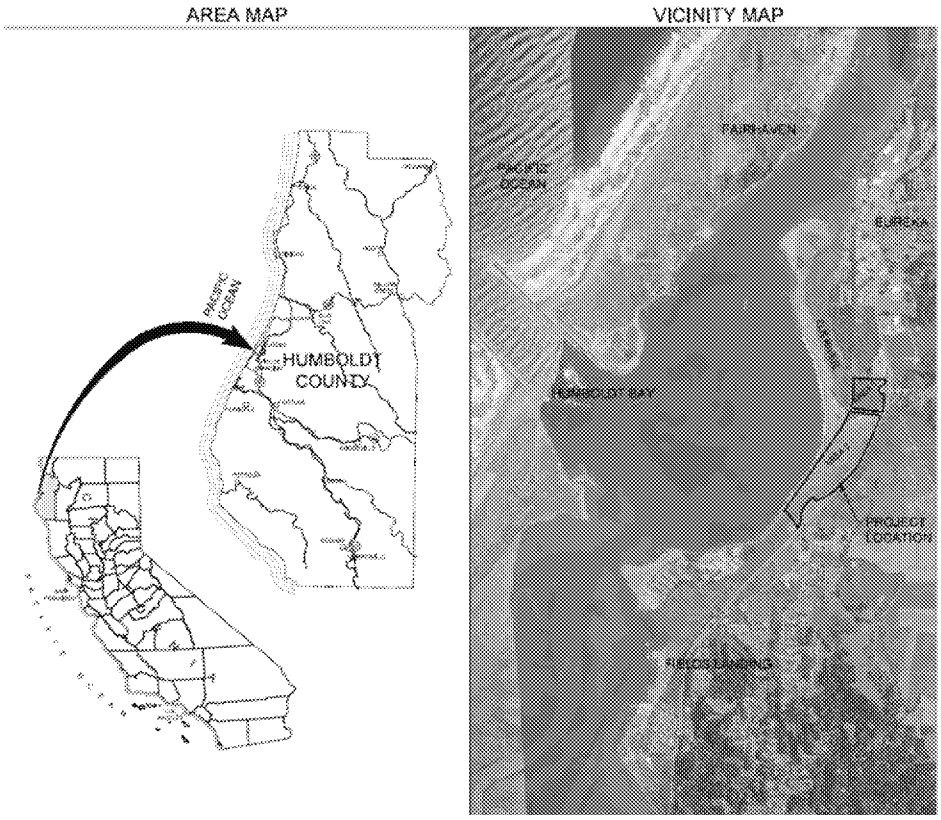
- Migration of Aquatic Organisms (MIGR): Within the Project, removal of the large tide gate along the Elk River would result in removal of a fish passage barrier and allow passage of fish into restored aquatic habitats throughout.

- Spawning, Reproduction, and/or Early Development (SPWN): Adult Longfin Smelt migrate into low salinity or freshwater reaches of coastal rivers and tributary streams to spawn. These types of habitats will be provided with the Project.

- Shellfish Harvesting (SHELL): The project will provide improvements in water quality would result in improvements in shellfish harvesting by helping to enhance water quality throughout Humboldt Bay as a whole.

- Aquaculture (AQUA): As with shellfish harvesting, the Project will provide improvements in water quality which will result in improvements in aquaculture by helping to enhance water quality throughout Humboldt Bay as a whole.

Figure 15: Project Vicinity Map and Relationship of the Project to the Entrance of Humboldt Bay. The Project Area Position Within Humboldt Bay is Significant as it Relates to Tidal Inundation and Sea Level Rise.



5. **Natural Resilience & Climate Change Resilience**

Through the restoration Project, the Elk River Estuary will have greater natural resilience and adaptability to climate change. The riparian areas and tidal ridges are expected to support restored habitat into 2100 due to their design elevations and the gradual upslopes that will allow wetland transgression. Persistence of the Project's wetland habitats through time will ensure the continued reduction of Sea Level Rise impacts to adjacent property, and related infrastructure such as Highway 101, protecting them from climate change coastal hazards. Similarly, with new connection to historic floodplain, the Project will protect adjacent property, as well as upstream areas, from large storms events resulting from climate change.

The restored wetlands will also sequester carbon, reducing the magnitude of climate change. The Project will sequester carbon at rates that are higher than existing marsh and pasture habitat, which emits methane at higher rates than salt marsh. The transition of land back to tidally influenced wetlands will sequester much more carbon than the existing dryland.

Without the Project, the lower reaches of the river could warm and become too shallow to support fish during the drier months. The Project will increase the adaptive capacity of Elk River to support fish by removing tide gates and berms and creating multiple acres of fish habitat, including climate refugia. These features will add to the climate change adaptation by providing refuge as temperatures rise.

6. **Consistent with Regional Planning Efforts**

The project builds on restoration efforts already identified or underway in the Elk River Watershed and around Humboldt Bay, including the Martin Slough Restoration upstream of the estuary, White Slough Restoration, South Jacoby Creek Restoration, the Wood Creek Restoration Project, and the Ryan Creek Wetlands Acquisition Project. These projects work at a landscape scale toward protecting threatened salmonids, restoring tidal marshes and watershed processes such as sediment transport, and protecting water quality and supply.

The Project is located in the Lower Elk River, a recognized part of the Eureka Area Watersheds Storm Water Resource Plan (EAWSWRP, GHD, 2018). The Elk River is one of two main surface waters within the EAWSWRP watershed that flow into Humboldt Bay. It is listed as a Clean Water Act 303(d) impaired water body due to sedimentation, siltation, and indicator bacteria. According to the EAWSWRP this is due to historic and current harvesting practices, road construction, and non-point source runoff. The Upper Elk River has a completed TMDL implementation plan; Total Maximum Daily Load. The Project design features provide natural watershed processes as part of the integrated approach to improve water quality.

The project design is also consistent with a number of regional planning efforts, including by not limited to:

- Support regional trail planning, and connectivity, by coordination with regional and state offices such as Cal Trans, North Coast Railroad Authority, County of Humboldt and others.

- Restore floodplain to reduce localized flooding, and integrate regional efforts toward adaptation to climate change, and large storm events.

- Support regional Sea Level Rise goals by implementing a project that includes science-based hydrologic modeling, and addresses increase in tide-levels over multiple decades.

- Include design features such as tidal channel and marsh features that are consistent with the goals of the CDFG Recovery Strategy for California Coho Salmon.

- Create habitat via design of channel systems and marsh to support the US Fish and Wildlife Service Recovery Plan for the Tidewater Goby.

- Implement removal of invasive Spartina consistent with the Humboldt Bay Regional Spartina Eradication Plan.

7. **Maintenance**

The project will be maintained as estuary tidal marsh with public access in perpetuity. A Monitoring and Reporting Plan (MRP) has been developed and will be used to measure the Project's success. The City will be responsible for implementing the MRP and employing adaptive management strategies, as necessary, for five years following construction. In this effort, the City will retain specialized professional services to implement the MRP and the integrated framework of the Wetland and Riparian Monitoring Program (WRAMP), namely, to provide inventories and assessments, report data using California Rapid Assessment Method (CRAM) and data collection and sampling of vegetation coverage.

The initial five years of monitoring are largely funded by grant sources and will involve professional services and support to the City in these efforts. Multiple years of Spartina eradication as well as seasonal planting and revegetation will occur during the five-year monitoring period.

The project will be managed and maintained by the City. Because the restoration will restore ecosystem processes such as tidal exchange and sediment transport, and will restore conditions that support tidal marsh, eelgrass, and riparian habitats, the site is expected to be largely self-maintaining. Maintenance activities necessary to sustain beneficial outcomes will include the ongoing maintenance of Spartina throughout the two project areas. After primary removal and follow-up treatment, ongoing maintenance treatments will be necessary.

Funding for ongoing maintenance will be available via the City's Community Services and Public Works budgets and staff from those departments will oversee the daily and seasonal maintenance activities, including staffing of the future Elk River Interpretive Center (for educational and programming purposes). The City may also contract with or develop partnerships with work programs, or specialized professionals for maintenance services.

8. **Project Status – Permits/Timeline**

The City of Eureka began working through the project design concepts and project planning in 2016. Portions of the project received early planning grants toward advancing the design and environmental documents. Following concept planning and environmental, the City pursued the necessary permits. The table below includes permits that have been applied-to or secured for the Enhancement Project (these permits do not include the future Interpretive Center). While the City was successful through the planning and design stages, there has been a challenge to assemble funding and move the project forward to final design and construction.

8.1. **Permits**

Table 3: Permit Agency and Status of Application

Name of permit	Permit Title/Description	Permit Status
City of Eureka	CEQA Lead Agency – IS/MND-Conditional Use Permit SCH#2017082048	Complete
Humboldt Bay Harbor Recreation Conservation District	Development Permit	Complete
California Coastal Commission	Coastal Development Permit	Complete
California Department of Fish and Wildlife	Streambed Alteration Agreement Incidental Take Permit - Consistency Determination	Complete
North Coast Regional Water Quality Control Board	Section 401 Water Quality Certification	Complete
United States Army Corps of Engineers	Section 10 RHA Permit Section 404 CWA Permit	Complete
National Marine Fisheries Service	Section 7 ESA Biological Opinion Incidental Take Statement	Complete
United States Fish and Wildlife Service	No Effect Determination	Complete

Figure 16: Looking East from Existing Bridge Crossing Elk River at Low Tide.

8.2. Implementation Timeline

Construction for estuary enhancement features must occur during the dry-season (July 1 – Oct 15) due to the conditions at the site. Construction could begin as early as the summer of 2021 if funding is approved. The construction will likely occur over two seasons, 2021 and 2022, with ongoing adaptive management, and monitoring for an additional five years through 2027.

The City is working with a design team to finalize the construction documents and prepare for bidding and award. The bidding process will likely be underway by May 2021, then award, then construction over two years, with revegetation, adaptive management, and monitoring continuing for multiple years.

For the development and implementation of the Elk River Interpretive Center, the City has engaged architectural services and initiated property negotiations. The larger work plan for the future Elk River Interpretive Center includes acquisition of property, property remediation as necessary, site design, professional services toward construction documents, permitting, and construction. This process would occur over a five-year period beginning in 2021 and continuing into 2026.

9. Project Status – Funding

While the City began early planning phases in 2016, and was successful is securing grants, there is a large funding gap and work that still remains. By planning this project in tandem with the Enclosed Bays and Estuaries Policy as an exception project, the City can reach the next stage of design and construction for the Project.

9.1. Source of Funds

Total grant funds available to the Project toward construction and monitoring of the estuary enhancement and trail is $4.25 million. Grant sources are State Coastal Conservancy, US Fish and Wildlife Service National Coastal Wetlands Conservation, National Fish and Wildlife Foundation Coastal Resilience, and CA Resources Agency Ocean Protection Council.

Construction estimates for the estuary enhancement and trail are six million dollars. A funding gap remains in the amount of $1.75 million and the City is proposing to fund this portion with existing Wastewater Enterprise funds toward the estuary enhancement. The future Elk River Interpretive Center is estimated at $4.2 million, which the City proposes to fund, as well. With approval from Regional Water Board, the City will secure budget authority from Eureka City Council for the use of funds from the Wastewater Enterprise to allocate toward the enhancement components so those features may be constructed beginning as early as 2021.

9.2. Funding Constraints

The existing grant funding toward the Project will not allow a phased project, and instead requires the City to have 100% of project dollars identified and "in-hand" before construction or phases of construction may commence. Similarly, the funding and grant awards that were secured to the project have grant performance - expiration dates, meaning that those dollars will not be available after the summer of 2021. Therefore, it is critical that the City is able to advance the approvals for the exception project and meet target dates to implement the project in phases.

10. Closing

This multi-benefit project balances human and ecological needs by reconnecting historic floodplains and historic tidelands, to create wetlands and the natural services they provide including filtering out pollutants, providing critical habitat, and buffering adjacent lands from flood tides and storms. The Project contributes to the overall health of the Elk River watershed and the people and wildlife that depend on it. The Project directly addresses the exception criteria and the performance metrics to deliver an enhancement project that creates new wetland, provides protection of beneficial uses in Humboldt Bay, and delivers a positive water quality benefit, that would not occur in the absence of the discharge.