CITY OF EUREKA
DEVELOPMENT SERVICES DEPARTMENT
Rob Holmlund, AICP, Director

531 K Street • Eureka, California 95501-1146
Ph (707) 441-4160 • *Fx* (707) 441-4202
planning@ci.eureka.ca.gov • www.ci.eureka.ca.gov

PUBLIC HEARING NOTICE
EUREKA CITY PLANNING COMMISSION

NOTICE IS HEREBY GIVEN that the Eureka City Planning Commission will hold a public hearing on Monday, November 13, 2017, at 5:30 p.m., or as soon thereafter as the matter can be heard, in the Council Chamber, Eureka City Hall, 531 "K" Street, Eureka, California, to consider the following for Project numbers: C-17-0009/ED-17-0011:

A Resolution of the Planning Commission of the City of Eureka conditionally approving a Use Permit to allow the 114 acre Elk River Estuary/Inter-Tidal Wetlands Restoration and Enhancement and Coastal Access Project including a one mile extension of the Class 1 ADA Waterfront Trail; construction of a non-motorized boat launch, several causeways and viewing platforms, and trail head parking area off Tooby Road; and adopting the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program

APNs and Location: 302-181-031 and -002, 302-181-040, 305-181-005, and 302-181-039; east of U.S. Highway 101; west of North Coast Railroad Authority/Northwestern Pacific railroad (NCRA); south of Waterfront Trail and Waste Water Treatment facility.

All interested persons are invited to comment on the project either in person at the scheduled public hearing, or in writing. Written comments on the project may be submitted at the hearing or prior to the hearing by mailing or delivering them to the Community Development Department, address above. The staff report is available for review at
http://www.ci.eureka.ca.gov/depts/development_services/public_hearing_notices.asp
and the project file is available for review at the Community Development Division, Third Floor, City Hall. If you have questions regarding the project or this notice, please contact Kristen M. Goetz, Senior Planner, phone: (707) 441-4166; fax: (707) 441-4202; e-mail: kgoetz@ci.eureka.ca.gov

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EUREKA CITY PLANNING COMMISSION

STAFF REPORT

November 13, 2017

Project Title: Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project

Project Applicant: **City of Eureka** **Case No.**: C-17-0009/ED-17-0011

APNs: 302-181-031 and -002, 302-181-040, 305-181-005, and 302-181-039

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/Northwestern Pacific railroad (NCRA) on the west. The City's Waterfront Trail, waste water treatment facility, and private properties border the project on the north. The southern project boundary is bordered by private property.

This project contains two distinct areas located on the north bank (Area 1 approximately 25 acres) and south bank (Area 2 approximately 89 acres) of the Elk River. Nearly all the property within the project area is owned by the City of Eureka and NCRA, with the exception of a small (1.3 acre) private parcel parallel to the south bank of Elk River that the City is attempting to acquire. The entire project encompasses approximately 114 acres. The project area is within the United States Geological Survey (USGS) Eureka quadrangle in Township 4 north, Range 1 west, Section 04 (coordinates are provided for the center point of Area 1).

Project Description: The City of Eureka proposes to restore and enhance estuary and inter-tidal wetland habitats on approximately 114 acres adjacent to Elk River, create approximately 2.8 miles of navigable channels connected to Elk River Slough, as well as enhance public access to Elk River and Humboldt Bay with an approximately 1 mile extension of its Class 1 ADA Waterfront Trail, and the construction of a non-motorized boat launch, several causeways and viewing platforms, and a trail head parking area off Tooby Road.

Wetland restoration and enhancement is a conditionally permitted use in the zone districts where the project is located, and a Use Permit is required. A Coastal Development Permit will be processed in the future by the California Coastal Commission.

Staff Contact Person: Kristen M. Goetz, Senior Planner, City of Eureka, Community Development Department; 531 "K" Street, Eureka, CA 95501-1165; phone: (707) 441-4166, fax: (707) 441-4202, email: kgoetz@ci.eureka.ca.gov

Environmental: Approval of the proposed project is a discretionary action subject to environmental review in accordance with the California Environmental Quality Act (CEQA). A draft Initial Study (IS) and Mitigated Negative Declaration (MND) was prepared and circulated for review as required by CEQA (SCH #2017082048). The IS/MND concludes that with mitigation, no substantial adverse environmental impacts will result from the proposed project.

The City submitted the draft IS/MND to the State Clearinghouse for a 30-day comment period which ended September 15, 2017. A notice of the 30-day local comment period, and a Notice of Intent to Adopt a Negative Declaration were published in the Times-Standard; the local comment period ended September 21, 2017. The City received no comments on the IS/MND.

Prior to approving a project, CEQA requires the Planning Commission consider the proposed MND, together with any comments received during the public review process, and then adopt the MND if the Commission finds, on the basis of the whole record before it, including the Initial Study and any comments received, there is no substantial evidence the project will have a significant effect on the environment and the MND reflects the City's independent judgment and analysis. Based on the Initial Study and the fact no comments were received during the public comment period, Staff has determined this finding can be made.

The California Enviornmental Quality Act requires the adoption of feasible mitigation measures to reduce the severity and magnitude of potentially significant environmental impacts associate with project development, and Staff recommends adoption of the Mitigation Monitoring and Reporting Program.

Staff Recommendation:
Hold a public hearing; and
Adopt a Resolution of the Planning Commission approving with conditions the Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project Use Permit, and adopting the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program.

Suggested Motion:

> *I move the Planning Commission adopt a Resolution of the Planning Commission, conditionally approving the Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project Use Permit, and adopting the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program.*

Discussion and Analysis:

The City of Eureka proposes to restore and enhance estuary and inter-tidal wetland habitats on approximately 114 acres adjacent to Elk River. The project would enhance and restore approximately: 78 acres of salt marsh, 13 acres of riparian habitat, and 13 acres of inter-tidal channels, which may provide nearly ten acres of valuable Eelgrass (*Zostera marina)* habitat).

The City also proposes to enhance public access to Elk River and Humboldt Bay with an approximately 1 mile extension of its Class 1 ADA Waterfront Trail, and the construction of a non-motorized boat launch, several causeways and viewing platforms, and a trail head parking area off Tooby Road. The project may also create approximately 2.8 miles of navigable channels connected to Elk River Slough.

Project Goals and Objectives

The goals of the proposed project are to restore and enhance the estuary and inter-tidal habitats on Elk River and to increase public access to Elk River Spit, Elk River, and Humboldt Bay. 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. 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). The project may establish up to 9.7 acres of new Eelgrass habitat, defined as open water 2 ft and lower (NAVD 88)).

Project objectives include:

- Enhance existing salt marsh resiliency to sea level rise.
- Enhance and expand hydrologic connectivity through tide gate and dike removal, expansion of existing inter-tidal/estuary channels, and construction of new inter-tidal/estuary channels.
- Increase the tidal prism volume in the Elk River estuary, to assist with sediment routing in lower Elk River.
- Expand inter-tidal channel network with appropriate depths to provide Eelgrass habitat.
- Create salt marsh plains with a range of surface elevations to support low and high salt marsh species.
- Increase listed salmonid (Chinook Salmon (*Oncorhynchus tshawytscha)*, Coho Salmon (*Oncorhynchus kisutch)*, and Steelhead Trout (*Oncorhynchus mykiss))* habitat quality and quantity in the Elk River estuary.
- Increase inter-tidal, brackish, and freshwater habitats for other 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*).
- Remove invasive Spartina vegetation from salt marsh habitat.
- Create living shorelines (tidal ridges) as an alternative to hardened shorelines to help protect vital infrastructure such as Highway 101, Waterfront Trail, railroad grade, and underground sewer transmission line.

- Create and enhance riparian habitat.
- Create a non-motorized boat launch to provide access to Elk River Slough and Humboldt Bay.
- Extend the City's Waterfront Trail south through Area 1 and Area 2 to increase public access and recreation opportunities on Elk River estuary/spit and Humboldt Bay. The trail expansion will encourage an appreciation of the environment and the socio-cultural history of the area by providing opportunities for nature study, including up-close views of local vegetation/habitats, long-range views of Elk River Spit/Elk River/Humboldt Bay, and interpretive signs that include information regarding local habitats and cultural/historical sites.
- Continue to provide emergency access to underground and above ground utilities (Humboldt Community Services District (HCSD) and Pacific Gas & Electric (PG&E)).

Summary of Proposed Actions: Area 1

Area 1 is presently a degraded inter-tidal wetland that will be restored to a fully tidal estuary. The channel network will be expanded, providing coastal access opportunities with the extension of the City's Waterfront Trail, construction of a non-motorized boat launch, an elevated causeway, and a viewing platform. Following is a summary of the proposed activities for Area 1:

- Timing
  Construction period July 1st through October 31st.
- Access and staging
  Clearing and grading of project access and staging area off Pound Road in the northwest corner of Area 1; fenced construction yard and equipment staging area.
- Erosion control protection measures
  Install best management erosion control protection measures prior to and during project implementation, including:
  - Construction only between July 1st and October 31st;
  - No stockpiling of excavated materials over winter; repurpose excavated materials on site so no off-site hauling of saturated soils is necessary;
  - Use of silt fencing and other sediment control measures to prevent runoff and minimize sediment and pollutant transport
  - Fill placement at low tide
  - Prevent construction materials, debris, or waste from entering waters of the U.S./State.

Details regarding these and other Best Management Practices (BMPs) included in this project are detailed in Sections 1-18 of the Initial Study document. Dewatering will follow the general conditions for all fish capture and relocation activities, established by NOAA (Biological Opinion 151422SWR2009AR00566 3/21/2012 and Federal Consistency Determination 3/28/2013).

- Seal tide gates and isolate work area
- Dewater work area

- Replace or repair tide gates as necessary and enhance drainage
- Excavate and enlarge (widen and deepen) inter-tidal channels
  Excavate 3,385 ft of existing and 2,394 ft of new inter-tidal channels and excavate and intersperse tidal ponds or depressions in channels.
- Excavate interior dikes and abandoned railroad grade
- Place and grade fill and large wood debris
  Fill artificial depressions and linear in-board ditches, and create tidal mounds/hummocks (islands) with excavated material; increase habitat diversity and provide cover for wildlife using wood debris.
- Construct ADA Waterfront Trail extension
  Extend trail 1,000 ft from current terminus north of Area 1 southward into the NCRA and City property parallel to the railroad grade to Elk River.
- Construct an elevated causeway and viewing platform
  Salt marsh viewing trail causeway (250 ft total length and 3 ft wide) and platform (10 ft x10 ft) elevated 1 ft to 7 ft above the marsh and interpretive signage.
- Construct non-motorized boat access
  Near the terminus of Pound Road; textured, concrete ramp approximately 15' wide and 30' long.
- Eradicate Spartina
  Utilize aquatic tracked vehicle ("Marsh master") or heavy equipment during construction, or herbicide eradication method as approved under the Humboldt Bay Regional Spartina Eradication Plan (HBHRCD 2015); a small (< ½ acre) experimental flood area will be constructed to test the efficacy of flooding Spartina with salt water as a remediation treatment.
- Remove Elk River Slough tide gates
- Excavate dikes
- Remove access and staging
- Revegetate

Summary of Proposed Actions: Area 2

Area 2 is presently a degraded farmed wetland that will be restored to an inter-tidal wetland with a network of tidal channels with Eelgrass habitat. The inter-tidal area will be contained by tidal ridges that will also provide public and emergency vehicle access and riparian habitat. The City's Waterfront Trail will be extended approximately a mile and will have a new southern gateway for coastal access to Elk River Spit, Elk River Slough and Humboldt Bay. Following is a summary of proposed activities for Area 2:

- Timing
  Construction period July 1st through October 31st.
- Access and staging
  Upland area in the southeastern edge of the site, at the end of Tooby Road that will ultimately be paved to become the new public trailhead parking area.

- Install erosion control protection measures (same as Area 1)
- Dewater work area
- Excavate tidal and inter-tidal channels and depressions
  Approximately 125,200 CY; use excavated material to construct design features within Area 2.
- Excavate railroad ballast deltas
- Place and grade fill, hummocks, and large wood debris
- Construct tidal ridges and Waterfront Trail
  Extend trail from parking lot at the southern end of Tooby Road approximately 1 mile north to Elk River.
- Construct paved trail parking
- Construct an elevated causeway, viewing platform, and bridge
  Salt marsh viewing trail causeway (550 ft total length and 3 ft wide) and platform (10 ft by 10 ft) elevated 1 ft to 7ft above the marsh; 100 ft long elevated causeway bridge may span the newly constructed main tidal channel and may require helical piles; install interpretive signage.
- Eradicate Spartina
  Hand labor eradication methods currently utilized on Humboldt Bay and approved under the Humboldt Bay Regional Spartina Eradication Plan (HBHRCD 2015).
- Remove culvert
- Excavate dike
- Revegetate
- Remove access and staging

APPLICABLE REGULATIONS:

In order to give the district use regulations flexibility, in certain zoning districts conditional uses may be permitted subject to the granting of a use permit. Because of their unusual characteristics, conditional uses require special consideration so that they are located properly with respect to the objectives of the Zoning Regulations and with respect to their effects on surrounding properties. In order to achieve these purposes, the Planning Commission is empowered to grant an application for a use permit and to impose reasonable conditions provided, pursuant to Eureka Municipal Code Chapter 5, Article 24, Section 10-5.2407, the Planning Commission can make the following findings:

(a) *That the proposed location of the conditional use is in accord with the objectives of this chapter and the purposes of the district in which the site is located; and*

(b) *That the proposed location of the conditional use and the conditions under which it would be operated or maintained will not be detrimental to the public health, safety, or welfare or materially injurious to properties or improvements in the vicinity; and,*

(c) *That the proposed conditional use will comply with each of the applicable provisions of this chapter; and*

(d) *That the proposed conditional use, if located in the coastal zone, is consistent with the certified Local Coastal Program and is consistent with the intent of the zoning district.*

1. Objectives and Purpose

Pursuant to Eureka Municipal Code (EMC) § 10-5.102, the zoning regulations are adopted by the City Council in accordance with the City Charter to protect the public health, safety, peace, comfort, convenience, prosperity, and general welfare. More specifically, the chapter is adopted in order to achieve the following objectives:

(a) To provide a precise guide for the physical development of the City in such a manner as to achieve progressively the arrangement of land uses depicted in the General Plan adopted by the Council;

(b) To foster a harmonious, convenient, workable relationship among land uses;

(c) To promote the stability of existing land uses that conform with the General Plan and to protect them from inharmonious influences and harmful intrusions;

(d) To ensure that public and private lands ultimately are used for the purposes which are most appropriate and most beneficial from the standpoint of the city as a whole;

(e) To prevent excessive population densities and overcrowding of the land with structures;

(f) To promote a safe, effective traffic circulation system;

(g) To foster the provision of adequate off-street parking and off-street truckloading facilities;

(h) To facilitate the appropriate location of community facilities and institutions;

(i) To promote commercial and industrial activities in order to strengthen the City's tax base;

(j) To protect and enhance real property values; and,

(k) To safeguard and enhance the appearance of the City.

EMC §10-5.2902 provides the purposes of the Coastal Zoning Regulations, which are:

(a) Protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and human-created resources.

(b) Assure orderly, balanced utilization and conservation of coastal zone resources, taking into account the social and economic needs of the people of this city, the region, state, and nation.

(c) Maximize public access to and along the Humboldt Bay shoreline, and maximize public recreational opportunities in the coastal zone, consistent with sound resource conservation principles and constitutionally protected rights of private property owners.

(d) Assure priority for coastal-dependent and coastal-related development over other developments on the shoreline.

(e) Provide a definite plan for development so as to guide the future growth of the city within the coastal zone.

(f) Protect the social and economic character and stability of residential, commercial, agricultural and industrial areas within the City.

In addition to the objectives prescribed in Section 10-5.2902, the AC-Coastal Agriculture zone district is included in EMC §10-5.2970 to achieve the following purposes:

(a) To protect agricultural lands, including farmed or grazed wetlands, for long-term productive agricultural and wildlife habitat uses;
(b) To ensure adequate separation between dwellings and facilities for housing animals.

EMC §10-5.2973. prescribes the uses that are conditionally permitted in the AC district:

The following conditional uses shall be permitted upon the granting of a use permit in accord with the provisions of Article 24 of this chapter (Conditional Uses):
Aquaculture and similar resource-dependent activities;
Coastal-dependent oil and gas wells;
Oil and gas pipelines;
Incidental public service purposes;
Wetland restoration and enhancement projects.

EMC § 10-5.2960, provides the following purpose for the NR-Natural Resources zone district:

In addition to the objectives prescribed in Section 10-5.2902 (Objectives and purposes), the NR District is included in the zoning regulations to achieve the following purpose: to protect, enhance, and restore environmentally sensitive habitat areas, and to allow resource dependent uses consistent with the continuance of such habitat areas.

The Conditional Use section of the NR zone district is found in EMC §10-5.2963:

The following conditional uses shall be permitted in accord with the provisions of Article 24 of this chapter:
Aquaculture;
Educational/scientific study (by permit from management agency);
Restoration and enhancement for fish and wildlife habitat values;
Pedestrian access consistent with all applicable policies of the land use plan.
Oil and gas pipelines.

Pursuant to all of these EMC sections, restoration of wetlands and enhancement of fish and wildlife habitat are conditionally permitted uses in the AC and NR zone districts.

The land is not currently designated or zoned for commercial, industrial, or residential uses, so the project will have no effect on population densities. Because of the project's location in the coastal zone, and the fact agriculture uses and natural resources are priority uses in the coastal zone, it would be highly unlikely the zoning and land use designation for either of these project areas would by changed. No land that could be

used for residential, commercial, or industrial uses is being lost. Other than the fact there will be more water on the site, and the viewing platforms and causeways will be added, the land itself will not significantly change nor will it be overcrowded with structures.

The area is already used by hikers, bicyclists, and nature and bird watchers, and while traffic to the area will likely increase slightly due to the availability of the additional amenities, parking areas are being developed at both the north and south ends of the project. Bike and pedestrian traffic will likely increase through the use of the extended trail. However, none of these changes will effect traffic circulation, or parking in the vicinity.

Based on this discussion, the proposed Elk River Estuary/Inter-tidal Wetlands Enhancement and Coastal Access Project is in accord with the objectives of the zoning code, and the purposes and intent of the zone districts in which the project is located.

2. Public health, safety, or welfare:
Referrals were sent to agencies and City departments with interest or jurisdiction over the property or the intended use of the property. No comments were received that indicated the proposed wetland and estuary enhancements, or the extension of the coastal access trail would be detrimental to the public health, safety, or welfare, or materially injurious to the properties or improvements in the vicinity.

The archeological survey performed for the Initial Study found it is possible archaeological materials could be encountered during implementation of the project. The confidential cultural report was provided to the three local Tribal Historic Preservation Officers. Based on that information, the Tribes have requested inadvertent discovery language protocol, and the appropriate conditions have been included in the Resolution.

Pacific Gas & Electric (PG&E) commented that since 1961, a 12kv pole line has existed along the easterly boundary line of City-owned property, and they need to maintain safe access to the poles, and requested a turnaround be provided for their trucks. The City agreed to provide emergency access to PG&Es power poles and adequate room to turn around in the grassy field at the end of the emergency access area, and PG&E has indicated they are satisfied.

Because no potential impacts were identified by any agency, the finding can be made that the project will not impact the public health, safety or welfare.

3. Use complies with applicable provisions:
The applicable provisions include the development standards specified in the Eureka Municipal Code for yards, building height, size, and bulk, off-street parking and loading, landscaping, etc. There are no setback, parking, or lot coverage requirements for the proposed restoration.

The Eureka Municipal Codes specifies all conditionally permitted uses require Architectural Review. However, the construction being proposed is for viewing platforms, causeways, parking lots, a boat launch ramp, and interpretive signage. Although some of these features meet the definition of a structure, they are being designed to harmonize and complement the existing and restored natural environment, and there

would be very few, if any, modifications that could be made by the Design Review Committee. Additionally, the signs proposed will be exempt from the City's Sign Ordinance; therefore, no Sign Permit or Architectural Review is required.

The US Army Corps of Engineers responded to the project referral indicating a Section 404 Permit may be required for the project, and a condition of approval has been added.

4. Use is consistent with Local Coastal Program:
The property is located within the Coastal Zone, and conditionally permitted uses within the Coastal Zone require a Coastal Development Permit (CDP). A portion of the project site is located with the City's coastal permit jurisdiction and a portion is within the State's jurisdiction. The City will request the Coastal Commission process the Coastal Development Permit for the portion of the project located within the City's permit authority.

Land use designations (and zone districts) are created to establish the types of uses that should be located in different areas, and are adopted by the City Council and help to implement the Council's long term goals and vision for the City.

Appendix B of the current Land Use Plan provides the purposes and uses which are allowed within each Land Use Designation. The AC (Coastal Agricultural) land use designation exists to protect agricultural lands and give special protection to lands which are also farmed or grazed wetlands, for long term productive agricultural and wildlife habitat uses. The principal uses of the land use are agricultural-related, and wetland restoration projects are listed first in the conditional uses identified for AC land use.

The NR (Natural Resources) designation protects, enhances, and restores environmentally sensative habitat areas, and allows limited resource-dependent uses consistent with the continuance of such habitat areas. Principal uses are management for fish and wildlife habitat, and the conditional uses list leads off with wetland restoration.

The Natural Resources section of the City's Land Use Plan contains Goals and Policies that focus specifically on coastal wetlands and riparian habitats, as well as the preservation of agricultural lands, and applicable goals and policies are included *below with emphasis added to the portions that relate specifically to the proposed location and use*:

SECTION 6. NATURAL RESOURCES

Goal 6.A: Aquatic Resources and Marine, Wetland, and Riparian Habitat

6.A.1 The City shall maintain, *enhance, and, where feasible, restore valuable aquatic resources*, with special protection given to areas and species of special biological or economic significance. The City shall require that uses of the marine environment are carried out in the manner that will sustain the biological productivity of coastal waters and that will maintain health populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

6.A.3 The City shall maintain and, where feasible, *restore biological productivity and the quality of* coastal waters, streams, wetlands, and *estuaries* appropriate to maintain optimum

populations of aquatic organisms and for the protection of human health through, among other means, minimizing adverse effects of wastewater and stormwater discharges and entrainment, controlling the quantity and quality of runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

6.A.4 The City shall require that channelizations or other substantial alterations that could significantly disrupt the habitat values of rivers and streams incorporate the best mitigation measures feasible. Such channelizations and alterations shall be limited to the following:

Flood control projects where no other method for protecting existing structure in the floodplain is feasible and where such protection is necessary for public safety or to protect existing development;

Developments where the primary function is the improvement of fish and wildlife habitat.

6.A.6 The City declares the following to be environmentally sensitive habitat areas within the Coastal Zone:

a. *Rivers, creeks, sloughs, gulches and associated riparian habitats*, including but not limited to Eureka Slough, Fay Slough, Cut-Off Slough, Freshwater Slough, Cooper Slough, Second Slough, Third Slough, Martin Slough, Ryan Slough, Swain Slough, and *Elk River*.
b. *Wetlands and estuaries*, including that portion of Humboldt Bay within the City's jurisdiction, riparian areas, and vegetated dunes.[...]

e. *Grazed or farmed wetlands (i.e., diked former tidelands).*

6.A.8 *Within the Coastal Zone, prior to approval of a development, the City shall require that all development on lots or parcels designated NR (Natural Resources) on the Land Use Diagram or within 250 feet of such designation, or development potentially affecting an environmentally sensitive habitat area, shall be found to be in conformity with the applicable habitat protection policies of the General Plan. All development plans, drainage plans, and grading plans submitted as part of an application shall show the precise location of the habitat(s) potentially affected by the proposed project and the manner in which they will be protected, enhanced or restored.*

6.A.14 Consistent with all other applicable policies of this General Plan, the City shall limit development or uses within wetlands that are neither farmed nor grazed, or within estuaries, to the following:

a. Port facilities.
b. Energy facilities.
c. Coastal-dependent industrial facilities, including commercial fishing facilities.
d. Maintenance of existing or restoration of previously dredged depths in navigation channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.
e. Incidental public service purposes which temporarily impact the resources of the area, such as burying cables or pipes, inspection of piers, and maintenance of existing intake and outfall lines.
f. *Restoration projects.*
g. Nature study, aquaculture, or similar resource-dependent activities.
h. New or expanded boating facilities in estuaries, consistent with the demand for such facilities.
i. Placement of structural piling for public recreational piers that provide public access and recreational opportunities.

6.A.15 The City shall limit uses and development in grazed or farmed wetlands to the following:

Agricultural operations limited to accessory structures, apiaries, field and truck crops, livestock raising, greenhouses (provided they are not located on slab foundations and crops are grown in the existing soil on site), and orchards;

a. Farm-related structures, including barns, sheds, and farmer-occupied housing, necessary for the performance of agricultural operations. Such structures may be located on an existing grazed or farmed wetland parcel only if no alternative upland location is available for such purpose and the structured are sited and designed to minimize adverse environmental effects on the farmed wetland. No more than one permanent residential structure per parcel shall be allowed.
b. *Restoration projects, including the PALCO on-site restoration and enhancement program.*
c. Nature study, aquaculture, and similar resource-dependent activities; and,
d. Incidental public service purposes which may temporarily impact the resources of the area, such as burying cables or pipes.

6.A.17 The City shall require that any uses that involve substantial alterations of streams and rivers incorporate the best mitigation measures feasible and shall be limited to the following:

a. Flood control projects where no other method for protecting existing structures in the flood plain is feasible and where such protection is necessary for public safety or to protect development.
b. *Development where the primary function is the improvement of fish and wildlife habitat.*

Goal 6.B: Agricultural Preservation

6.B.2 The City shall require the retention in agricultural use of agricultural lands within the Coastal Zone with soils other than Classes I or II in agricultural use, except under the following conditions:

a. Continued or renewed agricultural use is demonstrated to be infeasible,
b. Conversion to urban uses would locate development within, contiguous with, or in close proximity to, existing developed areas, or
c. *Farmed wetlands are proposed and funded through a wetland management and restoration program for restoration of resource-dependent activities.*

6.B.3 The City shall limit uses in grazed or farmed wetlands to the following:

a. Agricultural operations (except for greenhouses on slab foundations).
b. Farm-related structures (including barns, sheds, and farmer-occupied housing) necessary for the continuance of the agricultural operation. Such structures may be located on an existing grazed or farmed wetland parcel only if no alternative upland location is available for such purpose and the structures are sited and designed to minimize the adverse environmental effects on the farmed wetland. No more than one primary residential structure per parcel shall be allowed.
c. *Restoration and enhancement projects.*
d. Nature study, aquaculture, and similar resource-dependent activities.
e. Incidental public service purposes which may temporarily impact the resources of the area, such as burying cable and pipes.

Agriculture in the coastal zone is both a coastal resource and a priority land use that is protected by a number of policies in the Coastal Act as well as by the City's Land Use Plan. Maintenance of the maximum amount of prime ag land in agricultural production and the limitation of conversion of ag land to non-ag uses assures the protection of the

agricultural economy. However, one exception to the requirement to retain ag land, and can in fact actually allow the reduction or loss of ag land is, when wetland, riparian, and/or habitat enhancement or restoration is proposed.

Currently, Area 2 is leased for livestock grazing with approximately 50 cows and calves utilizing the site, and occasionally Aleutian geese. Although the project will eliminate grazed wetland habitat in Area 2, there are other agricultural sites within the City limits that could accommodate the livestock. Additionally, significant areas of habitat are located immediately to the east in the Elk River Valley and to the south in the Humboldt Bay National Wildlife Refuge for the geese.

As discussed in the initial study, the restoration and enhancement project will provide a long-term benefit to the environment by enhancing estuary conditions in Elk River, restoring an inter-tidal wetland complex including a tidal channel network and tidal ponds, and greatly increasing aquatic and wetland habitat diversity relative to the existing conditions, which consist of diked inter-tidal wetlands infested with Spartina and over grazed pasture. The project will provide long-term benefits to resident and migratory fish, wildlife and waterfowl and has the potentially to substantially expand the number and range of protected fish species and several rare salt marsh plants. Construction of living shorelines, treatment and removal of invasive Spartina, enhancement of the structural complexity of tidal marshes and the increase in channel network complexity and connectivity will also improve the landscape capacity to adjust to midrange predictions of sea level rise. Although the project will change land management practices by eliminating livestock grazing, which has created short grass pasture that is also used seasonally by migrating Aleutian geese, the elimination of approximately 69 acres of pasture will not substantially reduce the amount of available gazing habitat for Aleutian geese on Humboldt Bay or in the Elk River valley.

Based on the above discussion and the Initial Study, it is clear the restoration/creation of approximately 114 acres of estuary and inter-tidal wetland habitat far outweighs the loss of agricultural lands that would result from the project. And because the proposed project will restore and enhance wetlands, fish, and bird habitat, the project conforms with and implements the City of Eureka's adopted and certified Local Coastal Program.

Staff Recommendation:
Hold a public hearing; and
Adopt a Resolution of the Planning Commission approving with conditions the Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project Use Permit, and adopting the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program.

Suggested Motion:

> *I move the Planning Commission adopt a Resolution of the Planning Commission, conditionally approving the Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project Use Permit, and adopting the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program.*

Attachments:

Attachment 1	Planning Commission Resolution 2017-___
Attachment 2	Draft Initial Study/MND
Attachment 3	Mitigation Monitoring and Reporting Program

Attachment 1

Planning Commission Resolution

RESOLUTION NO. 2017-

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF EUREKA CONDITIONALLY APPROVING THE ELK RIVER ESTUARY/INTER-TIDAL WETLANDS ENHANCEMENT AND COASTAL ACCESS PROJECT USE PERMIT AND ADOPTING THE MITIGATED NEGATIVE DECLARATION AND MITIGATION MONITORING AND REPORTING PROGRAM

WHEREAS, the City of Eureka proposes to restore and enhance estuary and inter-tidal wetland habitats on approximately 114 acres adjacent to Elk River; and

WHEREAS, the project will create approximately 2.8 miles of navigable channels connected to Elk River Slough; and

WHEREAS, the project will enhance public access to Elk River and Humboldt Bay with an approximately 1 mile extension of its Class 1 ADA Waterfront Trail; and

WHEREAS, a non-motorized boat launch, several causeways and viewing platforms, and a trail head parking area off Tooby Road will be constructed; and

WHEREAS, the project is bound by U.S. Highway 101 and Humboldt County's Tooby Road on the east and the North Coast Railroad Authority/Northwestern Pacific railroad (NCRA) on the west; the City's Waterfront Trail, waste water treatment facility, and private properties border the project on the north; and the southern project boundary is bordered by private property; and

WHEREAS, the project consists of two distinct areas located on the north bank (Area 1 approximately 25 acres) and zoned NR (Natural Resources) and on the south bank (Area 2 approximately 89 acres) and zoned AC (Coastal Agriculture) of the Elk River; and

WHEREAS, wetland restoration and enhancement is a conditionally permitted use in the zone districts where the project is located, and a Use Permit is required; and

WHEREAS, a Coastal Development Permit will be processed in the future by the California Coastal Commission.

NOW THEREFORE, BE IT RESOLVED by the Planning Commission of the City of Eureka, that the project, is *approved with conditions*, and the decision to *approve with conditions* the subject application was made after careful, reasoned and equitable consideration of the evidence in the record, including, but not limited to: written and oral testimony submitted at the public hearing; the staff report; site investigation(s); agency comments; project file; and, the evidence submitted with the permit application. The findings of fact listed below "bridge the analytical gap" between the raw evidence in the record and the Planning Commission's decision.

1. Approval of the proposed project is a discretionary action subject to environmental review in accordance with the California Environmental Quality Act (CEQA). A draft Initial Study (IS) and Mitigated Negative Declaration (MND) was prepared and circulated for review as required by CEQA (SCH #2017082048). The IS/MND concludes that with mitigation, no substantial adverse environmental impacts will result from the proposed project.

2. The draft IS/MND was submitted to the State Clearinghouse for a 30-day comment period which ended September 15, 2017.

3. A notice of the 30-day local comment period, and a Notice of Intent to Adopt a Negative Declaration were published in the Times-Standard; the local comment period ended September 21, 2017. The City received no comments on the IS/MND.

4. The goals of the proposed project are to restore and enhance the estuary and inter-tidal habitats on Elk River and to increase public access to Elk River Spit, Elk River, and Humboldt Bay.

5. The proposed Elk River Estuary/Inter-tidal Wetlands Enhancement and Coastal Access Project is in accord with the objectives of the zoning code, and the purposes and intent of the zone districts in which the project is located because the project will have no effect on population densities; no land that could be used for residential, commercial, or industrial uses is being lost; the land will not be overcrowded with structures, and although vehicular, bike and pedestrian traffic to the area will likely increase slightly due to the availability of the additional amenities, none of these changes will effect traffic circulation, or parking in the vicinity.

6. No potential impacts were identified by any agency so the project will not impact the public health, safety, or welfare.

7. The use complies with applicable provisions because there are no setback, parking, or lot coverage requirements for the proposed restoration, viewing platforms, causeways, parking lots, the boat launch ramp, and interpretive signage are designed to harmonize and complement the existing and restored natural environment.

8. Wetland restoration projects are consistent with the purposes of, and are conditional uses identified for, the AC (Coastal Agriculture) and NR (Natural Resources) land uses.

9. The benefits of the proposed restoration/creation of approximately 114 acres of estuary and inter-tidal wetland habitat outweigh the loss of agricultural lands that would result from the project.

10. The proposed project will restore and enhance wetlands, fish, and bird habitat, the project conforms with and implements the City of Eureka's adopted and certified

Local Coastal Program.

11. The Planning Commission has considered the proposed Mitigated Negative Declaration (MND), and finds, on the basis of the whole record before it, including the Initial Study, that there is no substantial evidence that the project will have a significant effect on the environment and that the MND reflects the City's independent judgment and analysis.

12. The Planning Commission hereby adopts the Mitigation Monitoring and Reporting Program required by the California Enviornmental Quality Act to reduce the severity and magnitude of potentially significant environmental impacts associated with project development.

FURTHER approval of the Use Permit is conditioned on the following terms and requirements. The violation of any term or requirement of this conditional approval may result in the revocation of the permit.

1. Prior to commencement of construction, the applicant shall obtain any necessary permits from the US Army Corps of Engineers to the satisfaction of the USACE.

2. The applicant and contractor shall at all times comply with the adopted Mitigation Monitoring and Reporting Program.

3. If archaeological resources are encountered during construction activities, all onsite work shall cease in the immediate area and within a 50 foot buffer of the discovery location. A qualified archaeologist will be retained to evaluate and assess the significance of the discovery, and develop and implement an avoidance or mitigation plan, as appropriate. For discoveries known or likely to be associated with native American heritage (prehistoric sites and select historic period sites), the Tribal Historic Preservation Officers for the Bear River Band of Rohnerville Rancheria, Blue Lake Rancheria, and Wiyot Tribe are to be contacted immediately to evaluate the discovery and, in consultation with the project proponent, City of Eureka, and consulting archaeologist, develop a treatment plan in any instance where significant impacts cannot be avoided. Prehistoric materials may include obsidian or chert flakes, tools, locally darkened midden soils, groundstone artifacts, shellfish or faunal remains, and human burials. Historic archaeological discoveries may include 19th century building foundations; structure remains; or concentrations of artifacts made of glass, ceramic, metal or other materials found in buried pits, old wells or privies.

4. If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, work shall stop in that area and within 100 feet of the find until a qualified paleontologist can assess the nature and importance of the find and, if necessary, develop appropriate treatment measures in conformance with Society of Vertebrate Paleontology standards, and in consultation with the City of Eureka.

5. In the event of discovery or recognition of any human remains during construction activities, the landowner or person responsible for excavation would be required to comply with the State Health and Safety Code 7050.5. Construction ~~such~~ activities within 100 feet of the find shall cease until the Humboldt County Coroner has been contacted to determine that no investigation of the cause of death is required. If the remains are determined to be, or potentially be, Native American, the landowner or person responsible for excavation would be required to comply with Public Resources Code Section 5097.8. In part, PRC Section 5097.98 requires that the Native American Heritage Commission (NAHC) shall be contacted within 24 hours if it is determined that the remains are Native American. The NAHC would then identify the person or persons it believes to be the most likely descendant from the deceased Native American, who in turn would make recommendations to the landowner or the person responsible for the excavation work for the appropriate means of treating the human remains and any associated grave goods within 48 hours of being granted access to the site. Additional provisions of Public Resources Code Section 5097.98 shall be complied with as may be required.

PASSED, APPROVED AND ADOPTED by the Planning Commission of the City of Eureka in the County of Humboldt, State of California, on the 13th day of November, 2017 by the following vote:

AYES: COMMISSIONER
NOES: COMMISSIONER
ABSENT: COMMISSIONER
ABSTAIN: COMMISSIONER

_____
Jeff Ragan, Chair, Planning Commission

Attest:

_____
Pamela J. Powell, City Clerk

Attachment 2

Initial Study/Mitigated Negative Declaration

City of Eureka

INITIAL STUDY and
MITIGATED NEGATIVE DECLARATION

Elk River Estuary/Inter-Tidal Wetlands Enhancement
and
Coastal Access Project

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City of Eureka

Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project

California Environmental Quality Act

Initial Study and Mitigated Negative Declaration

State Clearinghouse # 2017082048

Prepared for
City of Eureka
531 K Street
Eureka, CA 95501

November 2017

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Appendix I	Conceptual design modeling support technical memorandum
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Project Title

Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project (project)

Project Applicant

City of Eureka

State Clearinghouse

#2017_____

Project 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/Northwestern Pacific railroad (NCRA) on the west. The City's Waterfront Trail, waste water treatment facility, and private properties border the project on the north. The southern project boundary is bordered by private property.

This project contains two distinct areas located on the north bank (Area 1 approximately 25 acres) and south bank (Area 2 approximately 89 acres) of the Elk River (Figure 1). Nearly all the property within the project area is owned by the City of Eureka and NCRA, with the exception of a small (1.3 acre) private parcel parallel to the south bank of Elk River that the City is attempting to acquire. The entire project encompasses approximately 114 acres. The project area is within the United States Geological Survey (USGS) Eureka quadrangle in Township 4 north, Range 1 west, Section 04 (coordinates are provided for the center point of Area 1).

General Plan Land Use Designation & Zoning

Area 1: City property (APN 302-181-031, and 002), north of Elk River, has a Land Use designation and Zoning of Natural Resources (NR)

Area 2: City property (APN 302-181-040, and 305-181-005), a private parcel (APN 302-181-039), south of Elk River, have a Land Use designation of Agricultural and Zoning of Coastal Agriculture (AC).(Figure 1).

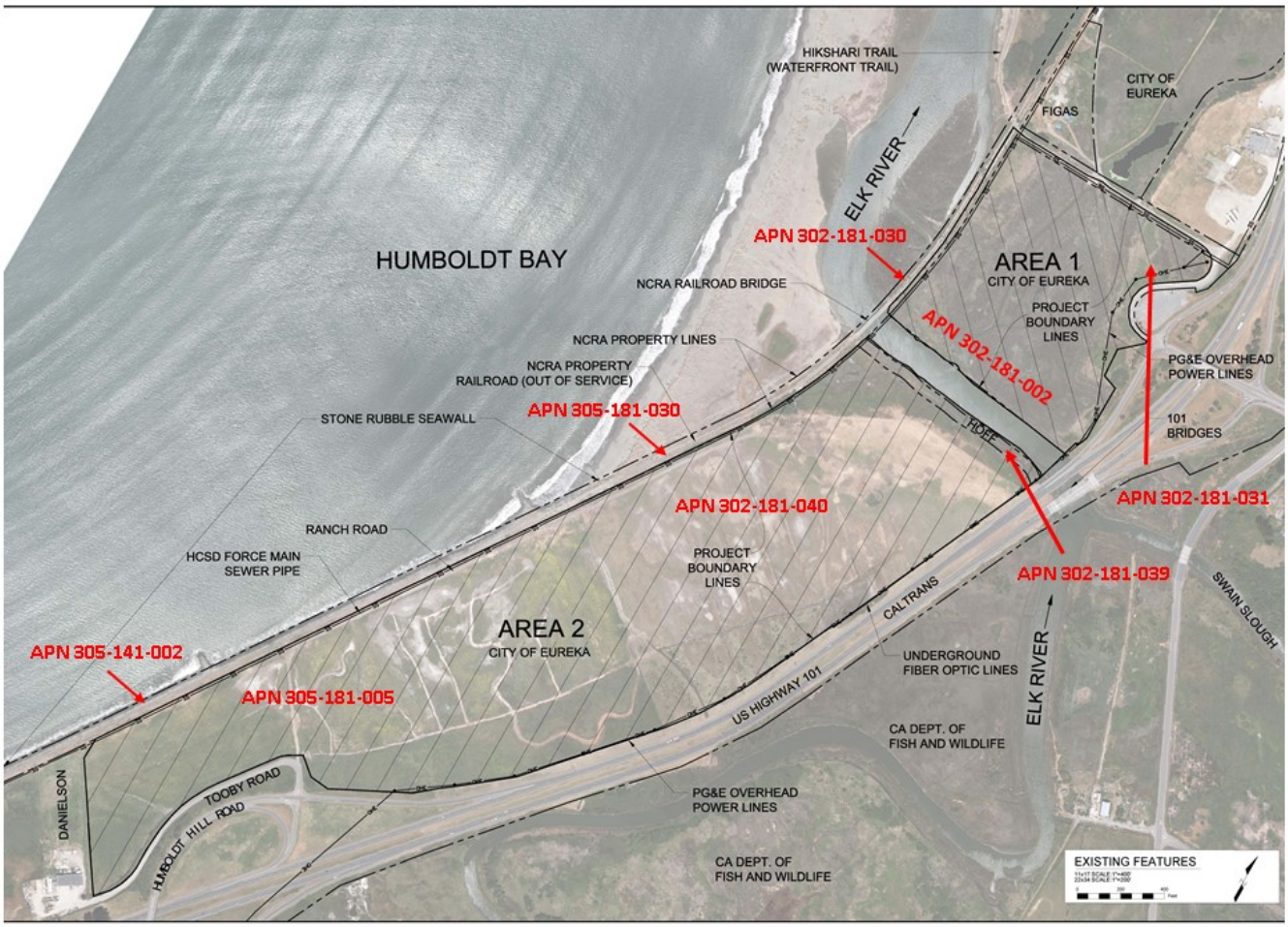


Figure 1. Map of project areas 1 and 2, including assessor parcels.

Project Overview

The City of Eureka proposes to restore and enhance estuary and inter-tidal wetland habitats on approximately 114 acres adjacent to Elk River. The project would enhance and restore approximately: 78 acres of salt marsh, 13 acres of riparian habitat, and 13 acres of inter-tidal channels, which may provide nearly ten acres of valuable Eelgrass (*Zostera marina)* habitat (Figure 2).

The City also proposes to enhance public access to Elk River and Humboldt Bay with an approximately 1 mile extension of its Class 1 ADA Waterfront Trail, and the construction of a non-motorized boat launch, several causeways and viewing platforms, and a trail head parking area off Tooby Road. The project may also create approximately 2.8 miles of navigable channels connected to Elk River Slough.

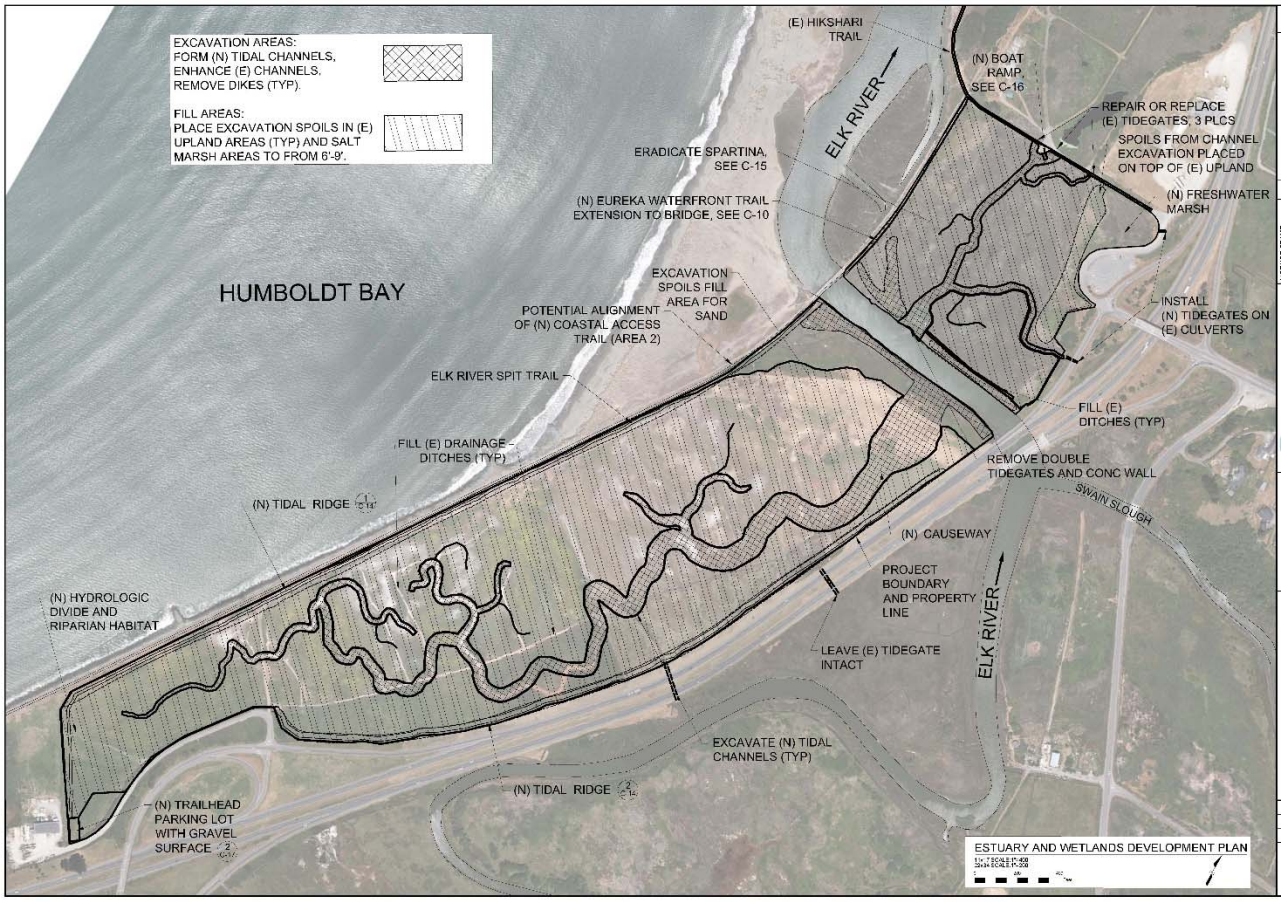


Figure 2. Overview of the estuary and wetland development plan, showing new tidal channels as well as locations of causeways, viewing platforms, trail extensions, and the non-motorized boat ramp.

The project is in the Elk River Slough complex, which historically included inter-tidal channels, salt marsh, windblown sand deposits, and riparian forest. The 1858 U.S. Coast Survey map (Figure 3) shows historic mudflats at the mouth of Elk River and along the entire project area shoreline. On the right bank of Elk River (Area 1), a salt marsh and inter-tidal channel complex were present. On the left bank of Elk River (Area 2), over wash from Humboldt Bay channels drained through salt marsh to Elk River, and a wind-blown sand upland ridge and sand spit dominated the left bank. A transportation corridor (trail) traversed a minor topographic/hydrologic divide between Elk River and Buhne Slough to the south.

Figure 3. Elk River Estuary Enhancement and Waterfront Trail Extension project area (USCS 1858).

Ultimately, the project area was diked off from Elk River Slough and drained to support agricultural development (Figure 4). The construction of the Northwestern Pacific Railroad (NWP) would also separate the project area from Humboldt Bay. The project area also became segmented with the construction of the Bucksport and Elk River Railroad grade in Area 1 and Highway 101. Over time, a sea wall was constructed to protect the NWP railroad from storm surges and waves and, secondarily, to protect the project area and other important infrastructure, such as the Humboldt Community Services District ‘s (HCSD) sewer line and Highway 101.

Elk River Slough is a tidal waterway, and the inter-tidal tributary channels behind tide gates in Area 1 and inboard ditch in Area 2 have a muted tide cycle. The broad habitat types mapped for existing conditions in the project area include open water, wetlands (salt, brackish, and freshwater), riparian, and upland (Table 1, Figure 5) (McBain Assoc. 2016).

Figure 4. Agricultural and transportation developments in the Elk River Estuary Enhancement and Waterfront Trail Extension project area (H.Co. 1939).

Table 1. Existing conditions broad habitat categories based on vegetation cover types were delineated for Areas 1 and 2. Categories were defined by vegetation and approximate elevation (NAVD 88): wetland habitats occur below 9 ft, riparian habitat occurs between 8 and 10 ft, and upland habitat above 10 ft.

Broad Habitat Types	**Area 1 (ac.)**	**Area 2 (ac.)**	**Total Acres**
Open Water	0.8	0.4	1.2
Salt Marsh	17.1	3.7	20.8
Seasonal Wetlands	1.3	68.9	70.2
Freshwater Wetlands	0.0	0.7	0.7
Riparian	0.0	0.2	0.2
Upland (Pasture, Coastal Scrub, road, and others)	5.8	15.0	20.8
Total	*25.0*	*88.9*	*113.9*

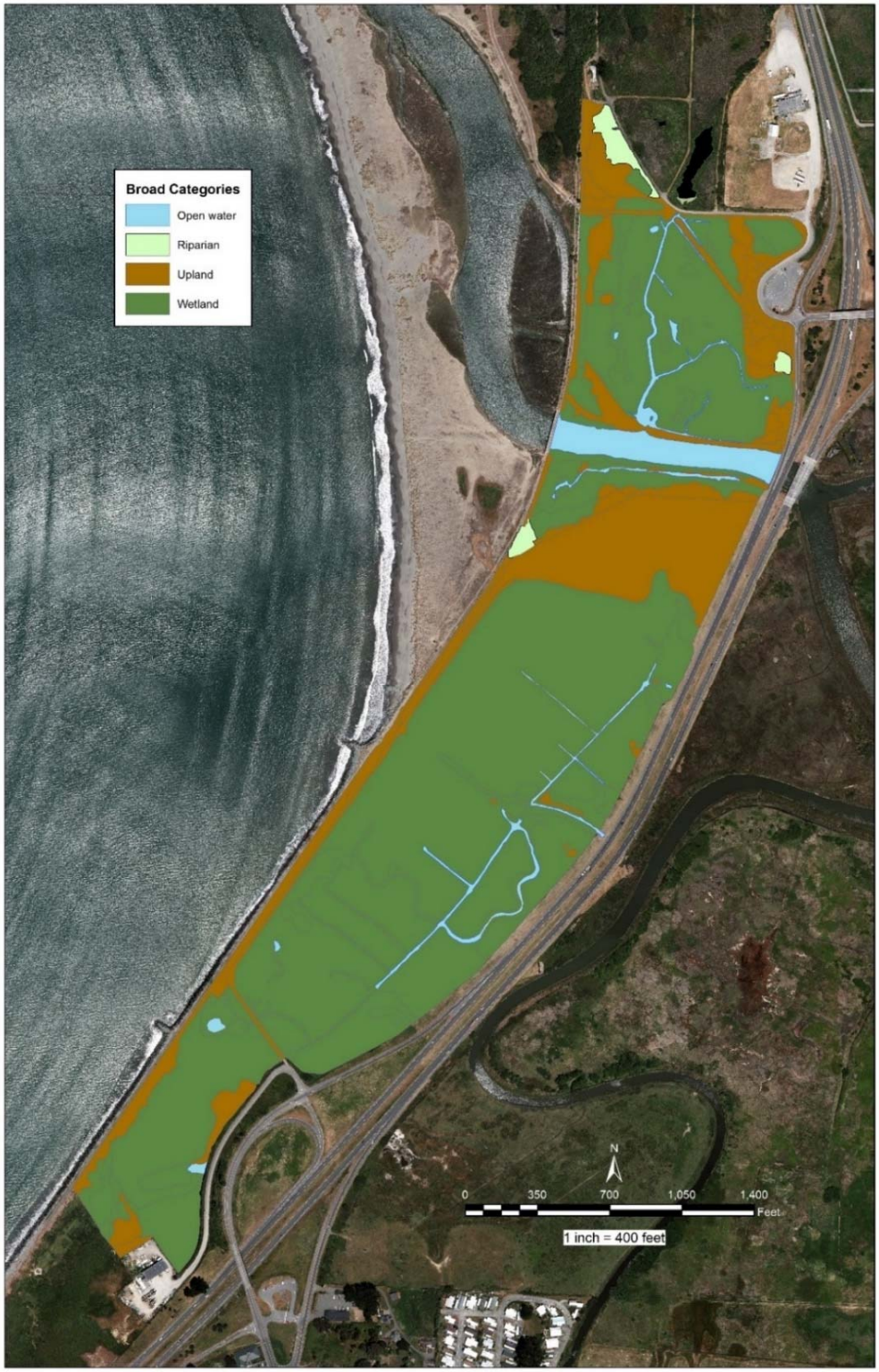


Figure 5. Existing broad habitat categories mapped in Areas 1 and 2 (McBain Assoc. 2016).

The project has multiple phases. Phase I of the project included preparing site assessments (topographic, hydrologic, vegetative, infrastructure, and cultural resources) and developing a constraint analysis. A collaborative stakeholder process was employed to review site constraints and conceptual design alternatives. Design review meetings were held seeking input and design concurrence with funding and regulatory agencies, including the State Coastal Conservancy (SCC), California Department of Fish and Wildlife (CDFW), the North Coast Regional Water Quality Control Board (NCWQCB), the California Coastal Commission (CCC), U.S. Army Corps of Engineers (USACE), the US. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS). Modeling and engineering designs (30%) have been developed, and were utilized to describe the proposed actions that are the subject of this Initial Study (Appendix A). The City will issue a Notice of Intent to Adopt, and send the draft Initial Study and Mitigated Negative Declaration (MND) to the State Clearinghouse and release the document to the public for comment. The City's Planning Commission will hold a public hearing to receive comments and adopt findings for the MND. Permit applications are being prepared and will be submitted to the appropriate agencies when the City issues its Notice of Determination, at the completion of Phase I. Phase II will develop final engineering designs and a construction cost estimate. Construction and monitoring would occur in Phase III.

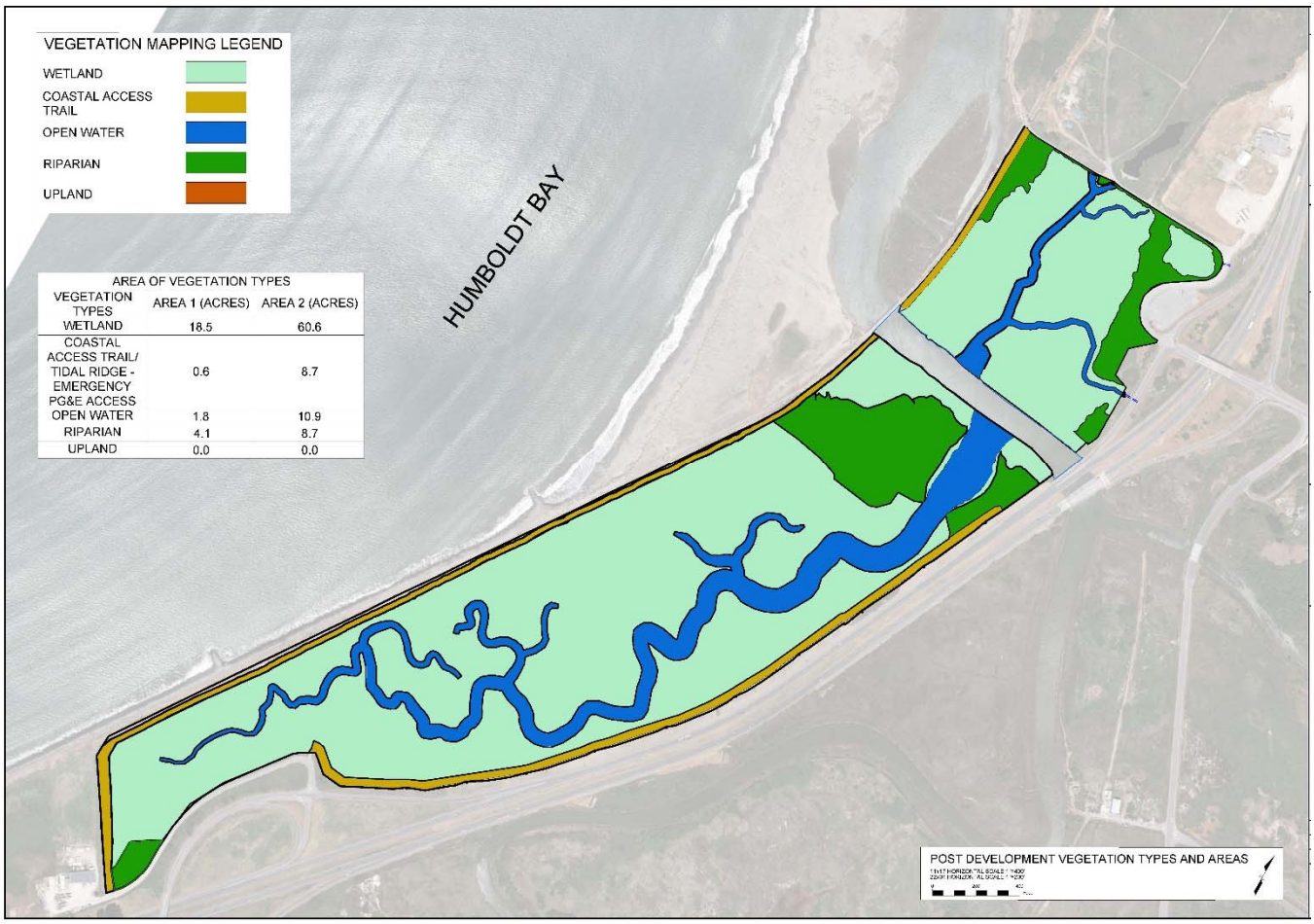
Project Goals and Objectives

The goals of the proposed project are to restore and enhance the estuary and inter-tidal habitats on Elk River (Figure 6), and to increase public access to Elk River Spit, Elk River, and Humboldt Bay. 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. 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). The project may establish up to 9.7 acres of new Eelgrass habitat, defined as open water 2 ft and lower (NAVD 88) (Table 2).

Project objectives include:

- Enhance existing salt marsh resiliency to sea level rise.
- Enhance and expand hydrologic connectivity through tide gate and dike removal, expansion of existing inter-tidal/estuary channels, and construction of new inter-tidal/estuary channels.
- Increase the tidal prism volume in the Elk River estuary, to assist with sediment routing in lower Elk River.
- Expand inter-tidal channel network with appropriate depths to provide Eelgrass habitat.
- Create salt marsh plains with a range of surface elevations to support low and high salt marsh species.
- Increase listed salmonid (Chinook Salmon (*Oncorhynchus tshawytscha)*, Coho Salmon (*Oncorhynchus kisutch)*, and Steelhead Trout (*Oncorhynchus mykiss))* habitat quality and quantity in the Elk River estuary.
- Increase inter-tidal, brackish, and freshwater habitats for other 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*).

- Remove invasive Spartina vegetation from salt marsh habitat.
- Create living shorelines (tidal ridges) as an alternative to hardened shorelines to help protect vital infrastructure such as Highway 101, Waterfront Trail, railroad grade, and underground sewer transmission line.
- Create and enhance riparian habitat.
- Create a non-motorized boat launch to provide access to Elk River Slough and Humboldt Bay.
- Extend the City's Waterfront Trail south through Area 1 and Area 2 to increase public access and recreation opportunities on Elk River estuary/spit and Humboldt Bay. The trail expansion will encourage an appreciation of the environment and the socio-cultural history of the area by providing opportunities for nature study, including up-close views of local vegetation/habitats, long-range views of Elk River Spit/Elk River/Humboldt Bay, and interpretive signs that include information regarding local habitats and cultural/historical sites.
- Continue to provide emergency access to underground and above ground utilities (Humboldt Community Services District (HCSD) and Pacific Gas & Electric (PG&E)).



AREA OF VEGETATION TYPES

VEGETATION TYPES	AREA 1 (ACRES)	AREA 2 (ACRES)
WETLAND	18.5	60.6
COASTAL ACCESS TRAIL/ TIDAL RIDGE - EMERGENCY PG&E ACCESS	0.6	8.7
OPEN WATER	1.8	10.9
RIPARIAN	4.1	8.7
UPLAND	0.0	0.0

Figure 6. Overview of the estuary and wetland enhancement showing post-development wetlands, open channels, and riparian habitats.

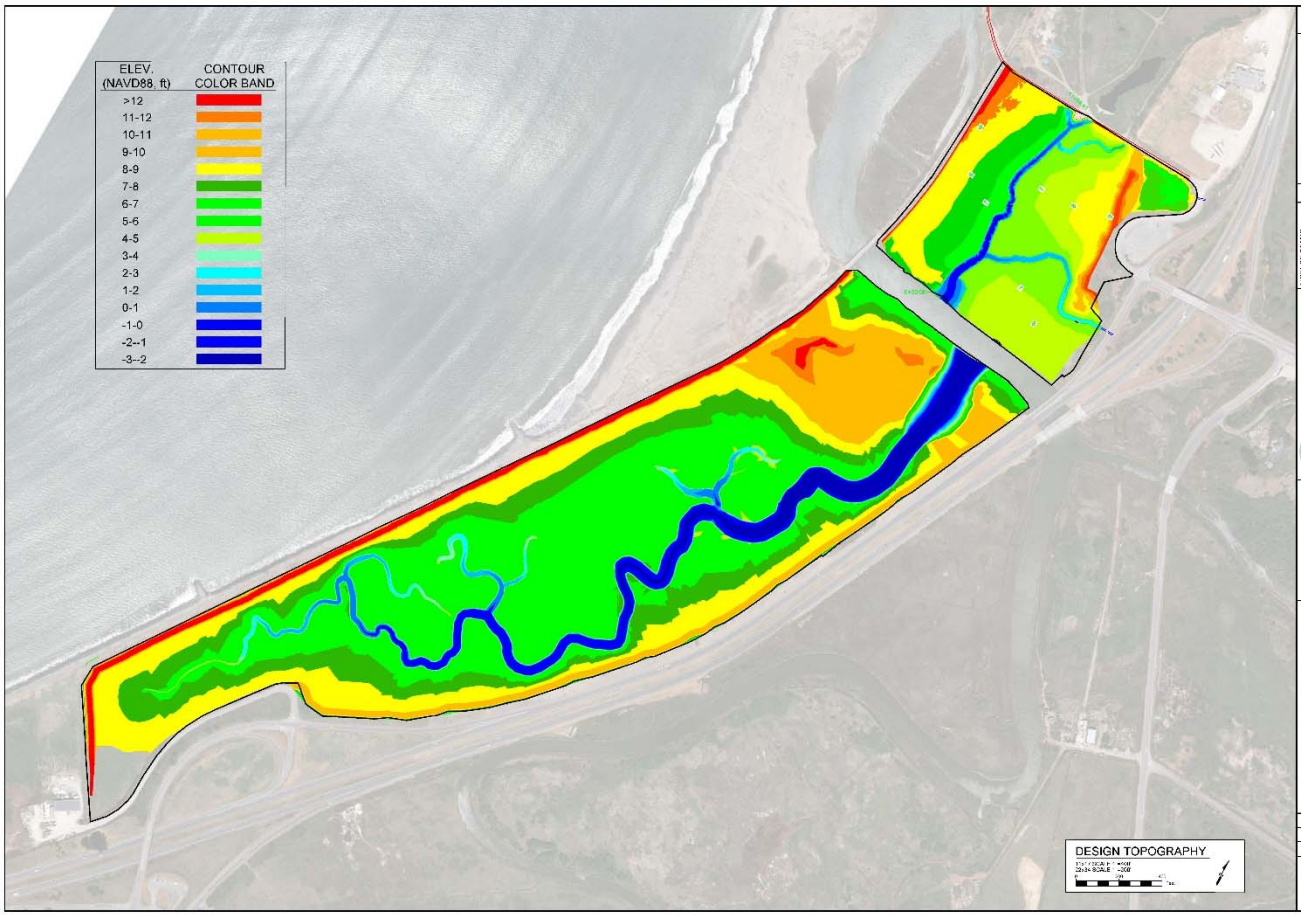


Figure 7. Anticipated post-construction 30% design topography showing intertidal channels with Eelgrass habitat and surrounding wetlands.

Table 2. *Change in acres of pre- and post-project Eelgrass, wetlands (saltwater, brackish water, and freshwater), and riparian, open water, as well as pre- and post-project acres of upland habitat and road/trail networks.*

Area 1	Pre	Post	Change	Area 2	Pre	Post	Change
Eelgrass	0	1.3	1.3	Eelgrass	0	8.4	8.4
Open Waters	0.8	0.5	-0.3	Open Waters	0.4	2.5	2.1
Wetlands	18.4	18.5	0.1	Wetlands	73.3	60.6	-12.7
Freshwater	0	0.7	0.7	Freshwater	0.7	0	-0.7
Brackish Marsh/Pasture	1.3	0	-1.3	Brackish Marsh/Pasture	68.9	0	-68.9
Salt Marsh	17.1	17.8	0.7	Salt Marsh	3.7	60.6	56.9
Riparian	0	4.1	4.1	Riparian	0.2	8.7	8.5
Upland	5.8	0	-5.8	Upland	13.8	0	-13.8
Road/Trail	0	0.6	0.6	Road/Trail*	1.2	8.7	7.5

*1.2 acres of Ranch Road is converted to trail.

Supporting Studies

The following analyses and studies of the project area have been conducted to support the project: 30% project designs (Appendix A), constraints analysis and conceptual design analysis (Appendix B), vegetation survey report (Appendix C), elevation summary for vegetation (Appendix D), soil and geotechnical survey results (Appendix E), hydrology evaluation (Appendix F), results of nine-quadrangle search for special status species (Appendix G), synthesis of existing fisheries data and potential fisheries impacts assessment (Appendix H), and conceptual design modeling support technical memorandum Appendix I). Field data collection occurred within the project study area, while record searches and other special studies may include information outside of the identified study area.

Description of Proposed Actions: Area 1 North of Elk River

Area 1 is approximately 25 acres of existing salt marsh that is maintained by a muted tide cycle supported by dikes and tide gates on Elk River Slough (Figure 8). Area 1 is composed of diked former tidelands and fill from the Highway 101 Herrick Avenue interchange and NCRA railroad. Proposed actions in Area 1 include: restoring hydrologic connectivity with Elk River and enhancing salt marsh resiliency to sea level rise, expanding intertidal channel area and depth to create new Eelgrass habitat, creating variable salt marsh topography, creating riparian habitat, eradicating Spartina, and providing public access and recreational opportunities.

Figure 8. Existing conditions of the Elk River Estuary Enhancement Project, Area 1.

Restore Hydrologic Connectivity with Elk River and Enhance Salt Marsh Resiliency to Sea Level Rise

To restore and maximize hydrologic connectivity with Elk River, two existing tide gates (Figure 9) and most of the dike separating Elk River from Area 1 will be removed. Short segments of the dike may be retained to provide wildlife habitat. The abandoned Bucksport Elk River railroad grade will also be removed to improve hydrologic connectivity and create additional salt marsh habitat. Excavated material will be utilized to fill in-board ditches. Filling in-board ditches will focus the tidal prism in the main channels and reduce sedimentation of these channels. The property owners of the three existing tide gates on the northern boundary of Area 1 (Figure 10) will need to maintain and, when necessary, repair these tide gates to prevent salt water inundation of their properties. There may be an opportunity in the future to install a fish friendly tide gate draining the City's property to the north of Area 1 to expand overwintering habitat for listed salmonids in these freshwater wetlands.

Figure 9. Existing dike and tide gates on right bank of Elk River in Area 1, that will be removed.

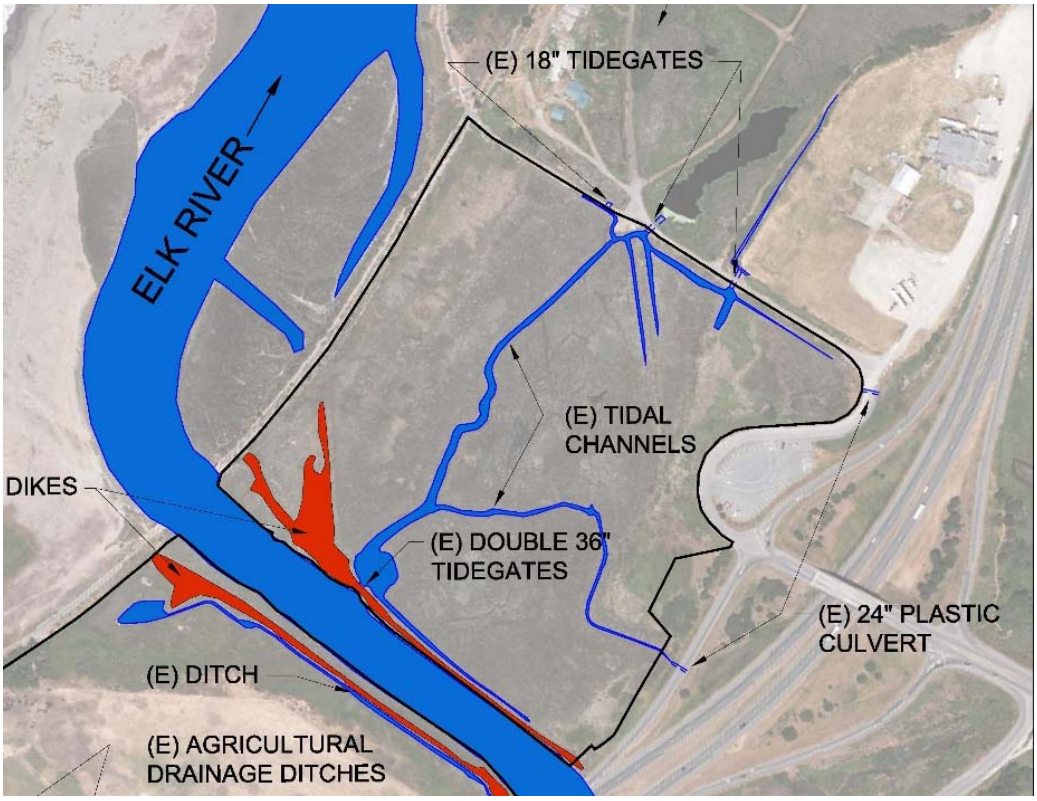


Figure 10. Location of the three existing 18 in culverts on the northern boundary of Area 1.

Expand Intertidal Channel Area and Depth to Create New Eelgrass Habitat

The width and depth of 3,385 ft of existing channels will be increased to maximize Eelgrass habitat (less than 2 ft elevation NAVD 88), in addition to developing 2,395 ft of new tidal channels. The maximum channel depth in Area 1 will be equal to the thalweg depth of the adjacent reach of Elk River. The new channel widths have been modeled, to accommodate the projected salt marsh elevations and tidal prism volume, and on other naturally formed channels that drain similar salt marsh plains, in Humboldt Bay. It is anticipated that the channel widths will adjust and stabilize after the project is completed, while channel depths are not expected to adjust. The existing eastern inter-tidal channel will be widened and extended to the culvert under Highway 101. Additionally, new secondary intertidal estuary channels will be excavated to provide low velocity and shallower aquatic habitat and extend up to the culverts under Pound Road with an outlet bay. A freshwater marsh will be created in the northeast corner of Area 1 at the outlet of a culvert that seasonally conveys freshwater in flow to Area 1. Several salt marsh depressions will be excavated adjacent to inter-tidal channels where high tides can inundate these areas to form pond habitats.

Create Variable Salt Marsh Topography

All excavated material will be used on-site within Area 1 to create salt marsh hummocks and marsh plain, a living shoreline on a gradient from 5 to 9 ft (NAVD 88) will merge with the Waterfront Trail extension prism. The salt marsh hummocks will function as islands for multiple bird species. The varying elevation of these hummocks and living shoreline will also support the migration of salt marsh habitat to higher elevations as sea levels rise.

Creation of Riparian Habitat

Excavated materials will be reused on-site to increase elevations for riparian habitat in Area 1 by 4 acres after project construction. These riparian areas will be planted with appropriate native riparian species.

Eradicate Spartina

Area 1 is included within the geographic limits of the approved *Humboldt Bay Regional Spartina Eradication Plan* (HBHRCD 2015). Approved methods included in the eradication plan that will be applied to Area 1 include mowing, grinding, tilling, excavating, crushing as well as approved herbicide application of the invasive Spartina.

Excavation and grading activities, including dike and railroad grade removal, inter-tidal channels and tidal depressions, and living shoreline, will provide a mechanical support to Spartina removal to be used in conjunction with manual removal methods. Periodic Spartina removal will likely be necessary to prevent the re-establishment of this invasive species in Area 1.

In addition to standard Spartina methods, a plot of Spartina less than half an acre will be treated with experimental remediation methods (Figure 11, Figure 12). The experimental zone will be flooded with salt water for an extended period (approximately three months) during project construction. It is hypothesized that the salt water will help treat Spartina and reduce regrowth rates.

Figure 11. Spartina dominated salt marsh and fill from Highway 101 looking west in Area 1.

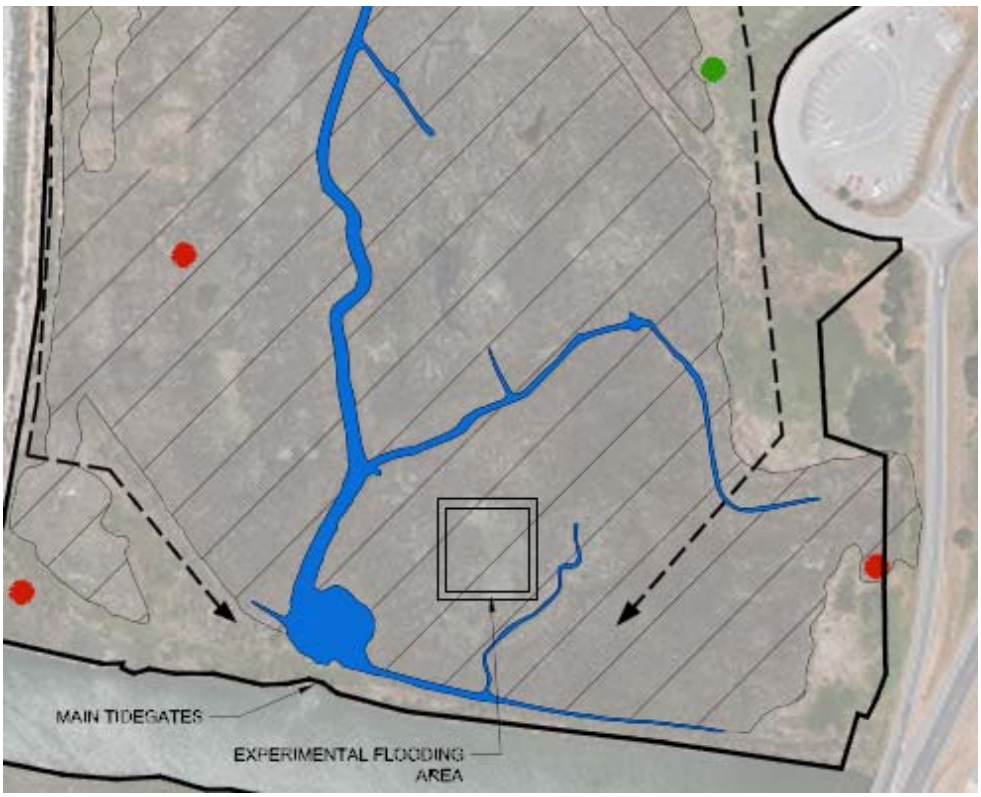


Figure 12. Location of Area 1 Spartina flood experiment. Red dots indicate location of Humboldt Bay Owl's Clover. Green dots indicate location of Lyngebye's Sedge. Both are sensitive plant species (Sheet C-14).

Provide Public Coastal Access and Recreational Opportunities

A public trail causeway will provide access to a viewing platform in Area 1 alongside salt marsh/pond/inter-tidal channel habitats. The City will amend its license with the NCRA to extend its Waterfront Trail on their property in Area 1. The City will seek funding to extend its Class 1 ADA Waterfront Trail through the NCRA property to Elk River Slough, and through Area 2. The trail in Area 1 will be extended by approximately 1,000 ft and will be paved.

The trail is proposed to be 14 ft wide (5 ft for each lane) with an additional 2 ft of shoulder on each side (14 ft total width). The side slope of the trail will be 1:3. The general design characteristics of the Waterfront Trail extension include:

- Minimum Tread Width: 10 ft
- Minimum shoulder width: 2 ft on each side of trail tread surface where space allows
- Minimum setback from railroad track centerline to obstructions or edge of trail tread: 8.5 ft on tangent sections of tracks and 9.5 ft on curved sections of tracks
- Minimum Design Speed: 20 miles per hour for emergency and approved maintenance vehicles only
- Maximum Gradient: 5%
- Minimum Curve Radius: 90 ft
- ADA Accessibility: The trail would be ADA accessible

Additional Waterfront Trail extension design specifications include:

- Signage and Striping

The Waterfront Trail extension would include yellow centerline striping and additional warning signage and striping approaching intersections with existing roads and railroad crossings. In addition, signage would be added along the trail warning users of curves, bends, and other hazardous situations.

- Speed Control

Speed control would be maintained through signage, striping, speed bumps, or other surface irregularities.

- Bollards

If determined necessary, bollards could be installed at trail intersections and entrances to prevent vehicles from entering the trail, with a maximum separation of 5-ft between bollards. Bollards could be located adjacent to the trail with a removable center bollard for emergency and maintenance access. Bollards would not be located in travel lanes. Bollards would be designed to be visible to bicyclists and others, especially at night time, with reflective materials and appropriate striping guiding bicyclists around the center bollards.

- Drainage

Design standards for the project require a 2% cross slope, except along cut sections where uphill water must be collected in a ditch and directed to a catch basin, in which case water would be directed under the trail in a drainage pipe of suitable dimensions.

The project will also include the installation of a non-motorized boat launch at the northern edge of Area 1 (Figure 14). This location can utilize the existing inter-tidal channel that will be deepened and widened to form a bay so the public can launch kayaks and other floatation devices. The maze of inter-tidal channels could serve a dual function of providing Eelgrass habitat and public navigation opportunities.

Summary of Proposed Actions: Area 1

Area 1 is presently a degraded inter-tidal wetland that will be restored to a fully tidal estuary. The channel network will be expanded, providing coastal access opportunities with the extension of the City's Waterfront Trail, construction of a non-motorized boat launch, an elevated causeway, and a viewing platform (Figure 13). The following summary of proposed activities for Area 1 will be utilized in this Initial Study's impact assessment.

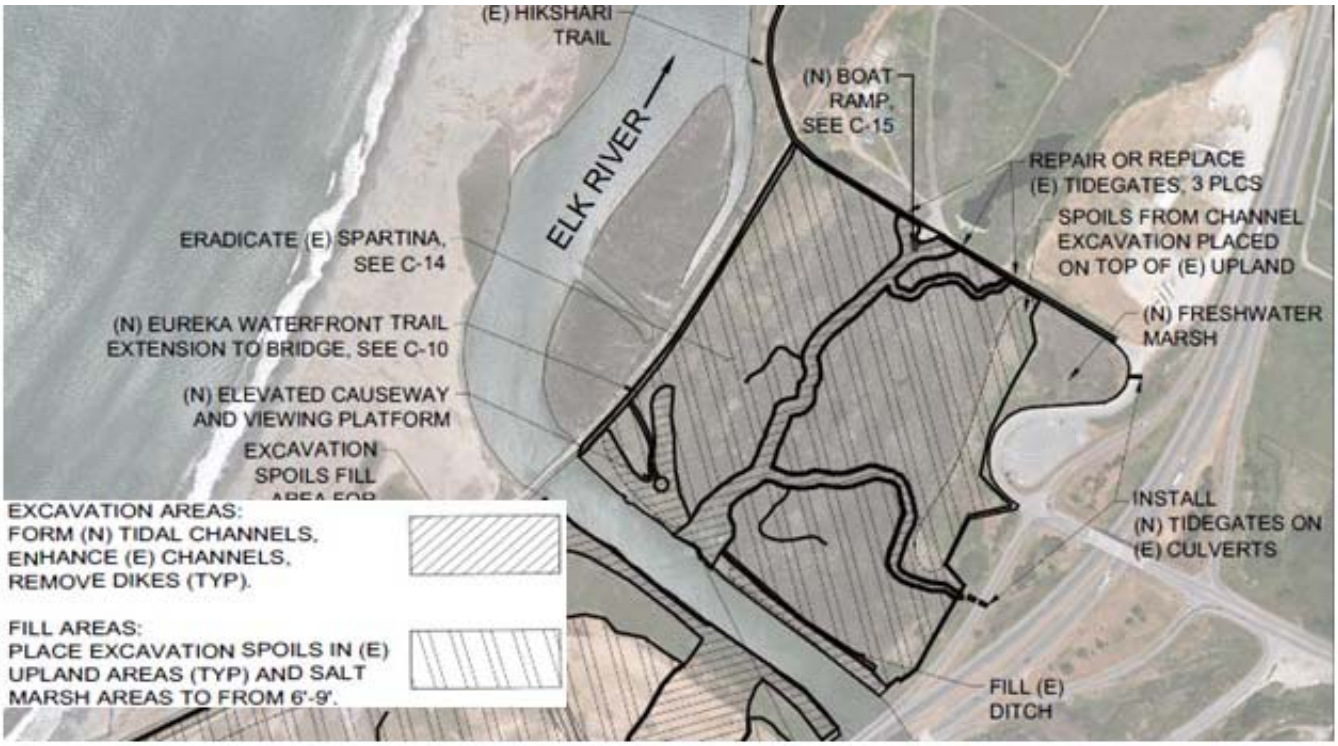


Figure 13. Overview of Area 1 design elements. Excerpted from Appendix A (30% project designs). (References to C-14 and C-15 refer to other pages with this design set (Appendix A)).

- Timing

Construction will occur when stormwater runoff is not likely (July 1st through October 31st) for the duration of construction activities.

- Access and staging

Clear and grade project access and staging area off Pound Road in the northwest corner of Area 1. The fenced construction yard and equipment staging area will be 100 ft x 100 ft and will include a fueling and lubrication area, job site trailer, generator, parking areas, and a porta pottie. The fueling area will be approximately 20 ft x 20 ft and be underlain by an impermeable plastic membrane covered with 12 in of soil. Fuel and lubricants will be stored in 55 gallon drums on top of containment pallets (Figure 14).

Figure 14. Construction yard and staging area located in the northwest corner of Area 1.

- Install erosion control protection measures

Install best management erosion control protection measures prior to project implementation, including:

- Construction will only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when background Elk River freshwater inputs are at summer baseflow thresholds. Excavated materials shall not be stockpiled over winter. Sediment control measures shall be in place while materials are being stockpiled to minimize sediment and pollutant transport from the project site.

- Placement of fill in the project area will occur when the area is not inundated by tide water.

- Excavation shall include handling of saturated soils. Saturated soils shall be dewatered and/or transported saturated in a manner that prevents excess discharge or spillage of soils or water within the project area. All excavations will be repurposed on site, and off-site hauling of saturated soils will thus not occur. A silt fence will be installed around the perimeter of temporary stockpiles of saturated soils to prevent runoff from leaving the site.

- During construction, a silt fence will be deployed to isolate work areas from existing channels, and to trap suspended sediment that might leave the construction site if stormwater runoff were to occur. If the silt fence is not adequately containing sediment, the construction activity shall cease until remedial measures are implemented that prevent sediment from entering the waters below.

- No construction materials, debris, or waste, shall be placed or stored where it may be allowed to enter or be placed where it may be washed by rainfall into waters of the U.S./State.

- Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.

Details regarding these and other Best Management Practices (BMPs) included in this project are detailed in Sections 1-18 of this Initial Study document. Dewatering will follow the general conditions for all fish capture and relocation activities, established by NOAA (Biological Opinion 151422SWR2009AR00566 3/21/2012 and Federal Consistency Determination 3/28/2013).

- Seal tide gates and isolate work area

Close gate value discharging into Area 1 from City's property to the north to minimize the residual wetted channel area during low tides and allow water quality to convert to salt water prior to the closing of the tide gates on Elk River. During a minus tide, seine nets will be used to passively encourage any fish remaining in the residual channel and pool behind the tide gate out into Elk River. The two existing tide gates currently connecting Elk River to Area 1, will be closed following seine netting effort during a minus tide to hydrologically isolate Area 1 prior to construction.

- Dewater work area

Establish bypass pumping system in two locations that will divert storm water, if any, entering the site from properties to the north and east directly into Elk River. Dewatering during excavations (as necessary) will rely on gasoline-powered trash pumps. The trash pumps will be set up on a containment pallet to prevent fuel spills.

The first earthen sump will be excavated at the confluence of the drainage ditches running along the northern boundary of the Site (Figure 15), An electric pump with a float valve will draft water from the sump. A pipe will be routed along the northern shoulder of Pound Road across the railroad tracks and into a tidal channel over which the Waterfront Trial crosses that discharges to Elk River.

A second earthen sump will be placed in the pool behind the Elk River tide gates. Water will be pumped and dispersed into a containment area (straw bales lined with geotextile fabric) to settle out fine sediments before the water filters into the ground and into the mainstem Elk River. The containment area will be installed in a small upland area near the southwest corner of Area 1.

Additionally, water from the residual pool behind the Elk River tide gates will be pumped into a half acre experimental Spartina eradication area or dispersed onto vegetated, upland areas surrounded with hay rolls (filter beds, Figure 16). The filter beds will capture silt particles and will drain to Elk River.

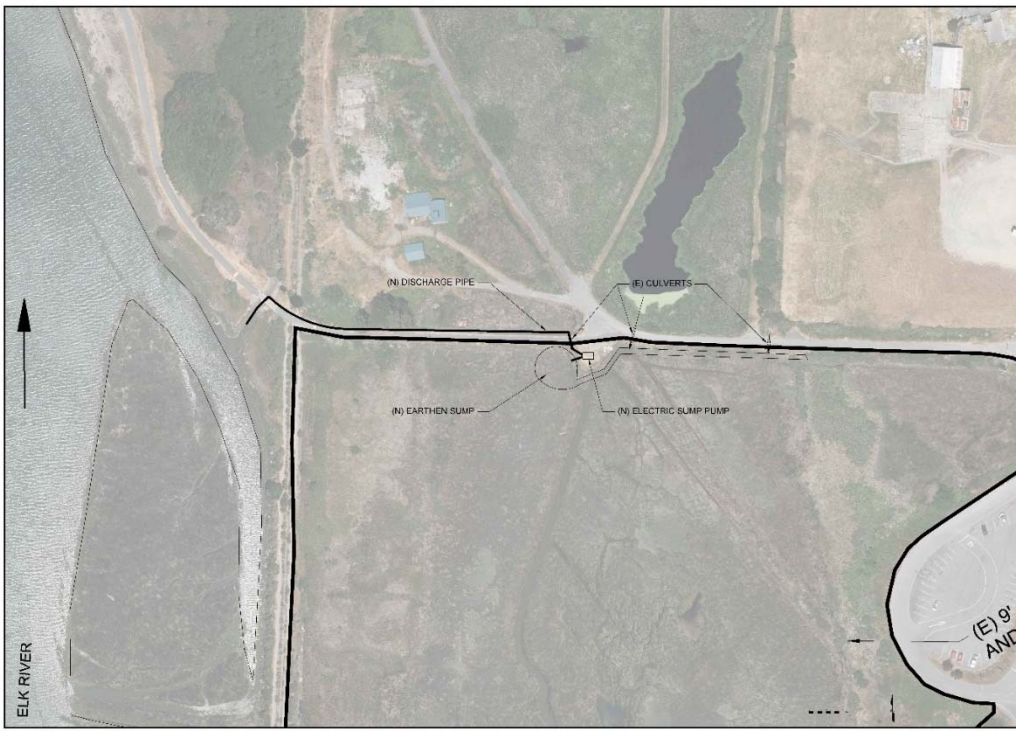


Figure 15. Area 1 dewatering schematic showing planned dewatering set up near Pound Road.

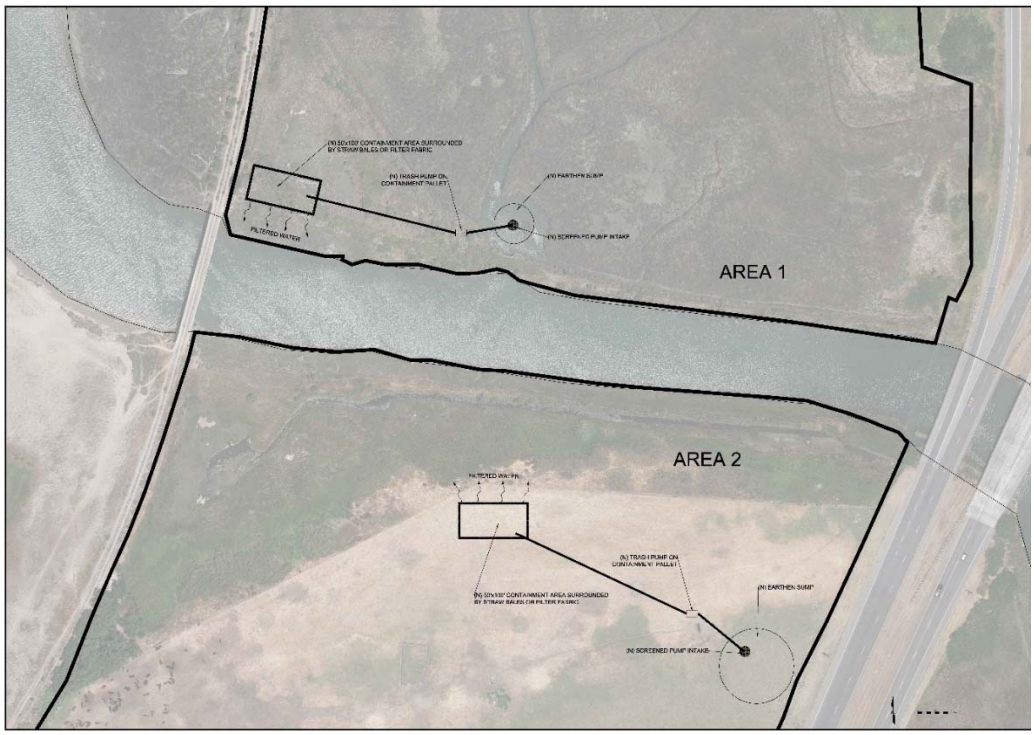


Figure 16. Area 1 and Area 2 dewatering schematic showing planned dewatering set up near the main Elk River tide gates (Area 1) and channel development activities in Area 2.

- Replace or repair tide gates and enhance drainage

Replace or repair three existing tide gates and concrete headwall on the northern project boundary, if necessary, to avoid flooding adjacent properties. Excavate the inlet and outlet of the existing culvert that drains the County's roadside ditch at the northeast corner of the site (Figure 17). The freshwater marsh area at the outlet of this culvert will be excavated. The excavated soil will be used to raise and level the existing berm (old railroad grade) to elevation 9.0 ft (NAVD 88). A rock-lined overflow weir in the berm that allows freshwater to overflow from the wetland into the salt marsh will be created. This work will also expose the outlet of the existing culvert that drains the area east of the Highway 101 onramp at the southeast corner of the site.

- Excavate and enlarge (widen and deepen) inter-tidal channels

Excavate 3,385 ft of existing and 2,394 ft of new inter-tidal channels. Tidal ponds or depressions will also be excavated and interspersed amongst the channels (Figure 17). Excavation activities may occur from both sides of the channels depending on the width of the channel and the reach of the excavator. The entrance of the main navigation channel into Area 1 will be widened where the tide gate structure was removed and the channel will be deepened to provide low tide access, as it extends north to the location of the proposed non-motorized boat access. Additional tributary inter-tidal channels will be widened and deepened as they are extended east. All excavated material will be used to construct design features within Area 1.

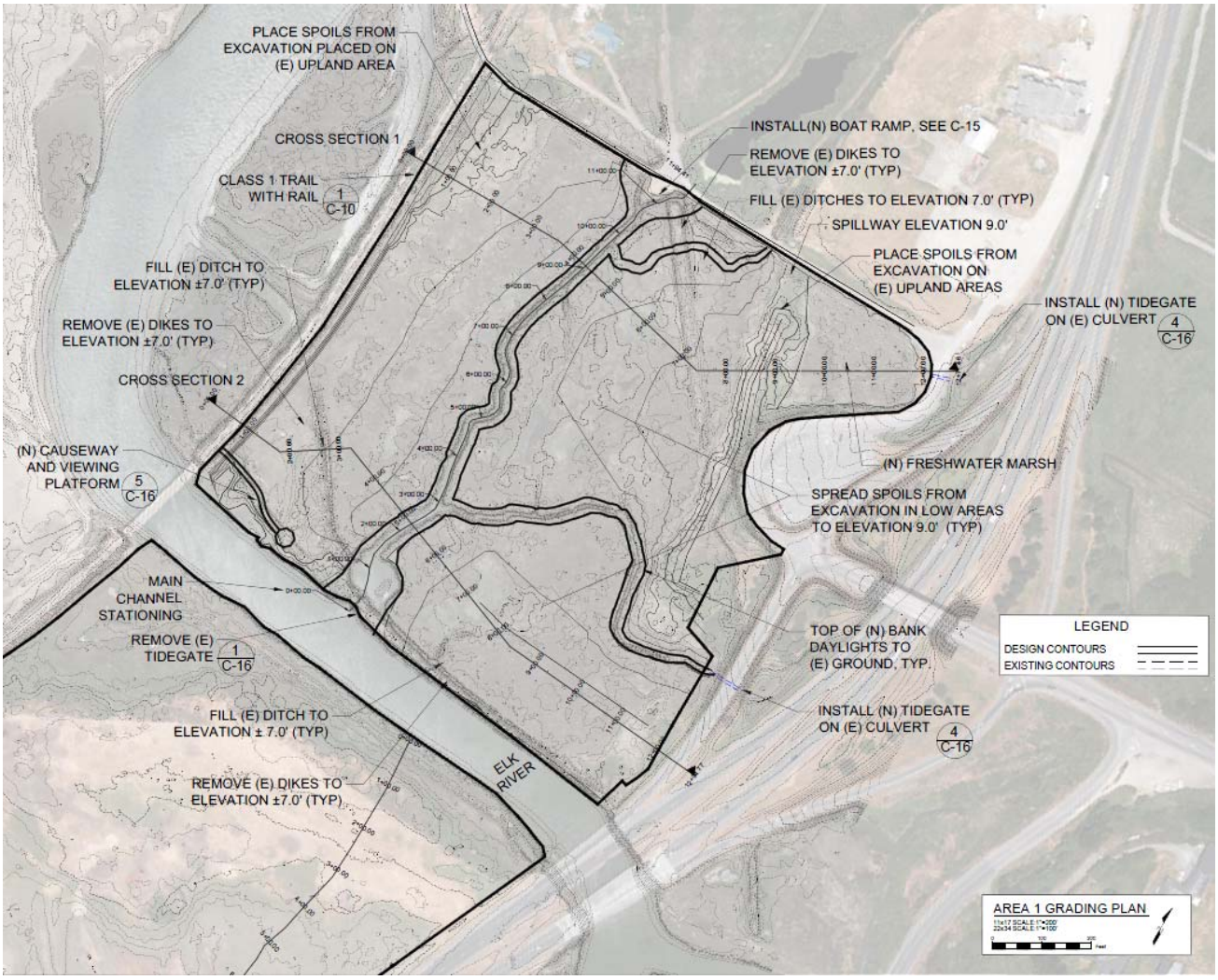


Figure 17. Area 1 grading schematic showing location of primary cut and fill activities and focal design features .

- Excavate interior dikes and abandoned railroad grade

Interior dikes within Area 1 (inside of the dikes on Elk River) will be excavated to restore natural topography in the estuary and salt marsh plain (200 CY of excavation). Interior dikes will be lowered as well as the abandoned Bucksport and Elk River railroad grade west of the Pound Road Park and Ride lot.

- Place and grade fill and large wood debris

Excavated soil will be left in stockpiles or windrows and allowed to dry out before attempting to spread it to conform to the design topography. Throughout Area 1, fill (reuse of excavated materials) will be placed to fill artificial depressions and linear in-board ditches, and spread over the existing marsh plain between channels to raise the salt marsh plain surface elevation. Soil will also be used to form tidal mounds/hummocks (islands) and to increase the elevation of upland areas. Hummocks may be graded to promote habitat diversity and provide roosting habitat for shore birds. Approximately 18,000 CY will be excavated and graded onsite with no export of materials. Several large wood debris currently in Area 1 along with imported large wood debris will be strategically placed to increase habitat diversity and cover for wildlife.

- Construct ADA Waterfront Trail extension

The Waterfront Trail will be extended 1,000 ft from its current terminus north of Area 1 southward into the NCRA and City property parallel to the railroad grade to Elk River (Figure 18). The Class 1, non-motorized paved trail will be parallel to the existing railroad, located atop 1,520 CY of fill derived from on-site excavation to expand the rail road prism. The trail is proposed to be 14 ft wide (5 ft for each lane) with an additional 2 ft of shoulder on each side (14 ft total width). The side slope of the trail will be 1:3.

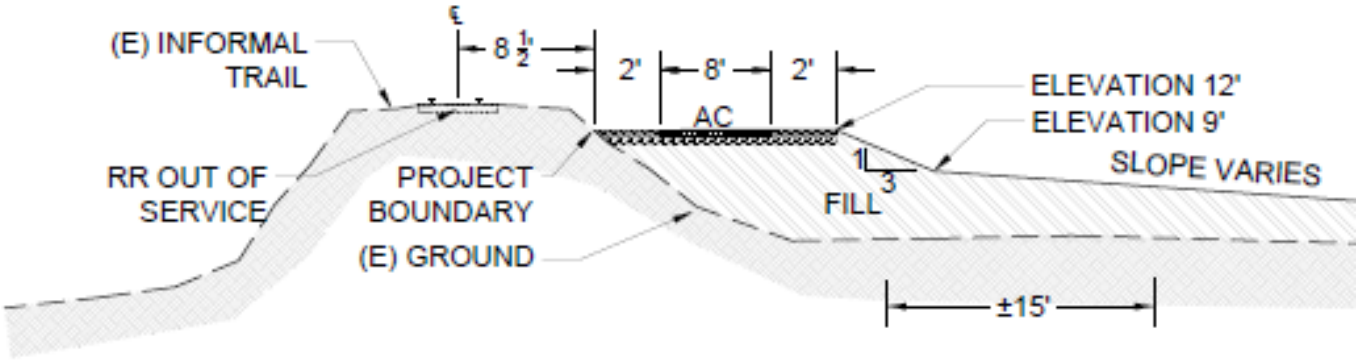


Figure 18. Conceptual Waterfront Trail extension cross section showing trail width, slope ration, and fill elevation relative to the existing railroad grade (Appendix A, Sheet C-11.

- Construct an elevated causeway and viewing platform

An elevated salt marsh viewing trail causeway (250 ft total length and 3 ft wide) and platform (10 ft x10 ft) will be constructed of aluminum, plastic, or treated lumber atop helical anchors drilled into the marsh plain (Figure 19 - Figure 21). The causeway and viewing platform will be elevated 1 ft to 7 ft above the marsh below and will include railings compliant with City Building Code and ADA regulations and will be 4.5 ft high (Figure 22). Interpretive signage will be installed on posts set into concrete footings.

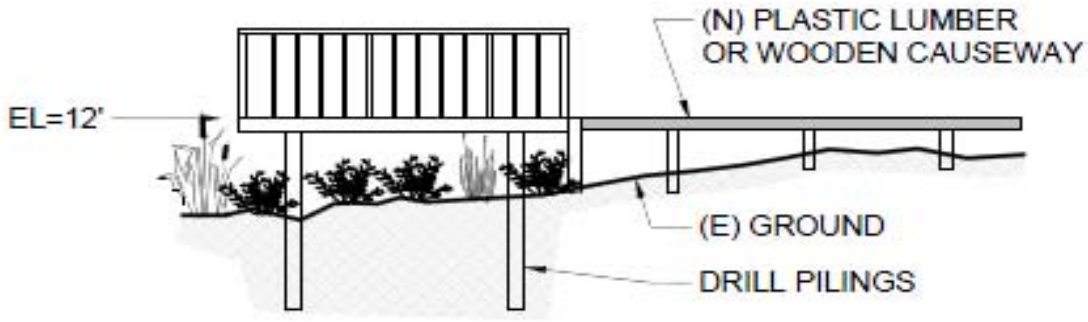


Figure 19. Conceptual diagram of elevated causeway and viewing platform (Appendix A, Sheet C-17).

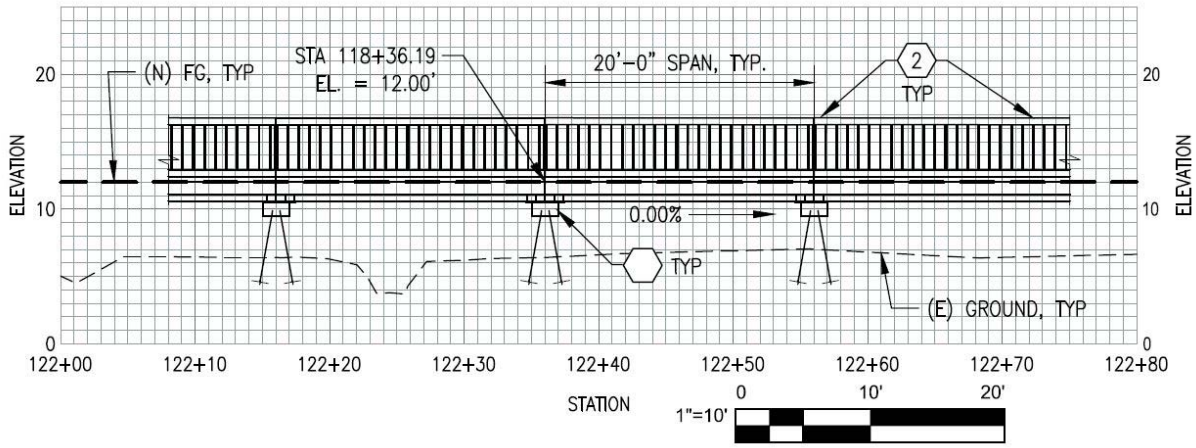


Figure 20. Cross sectional view of typical elevated causeway and viewing platform, to be constructed in Area 1 (Appendix A, Sheet C-17).

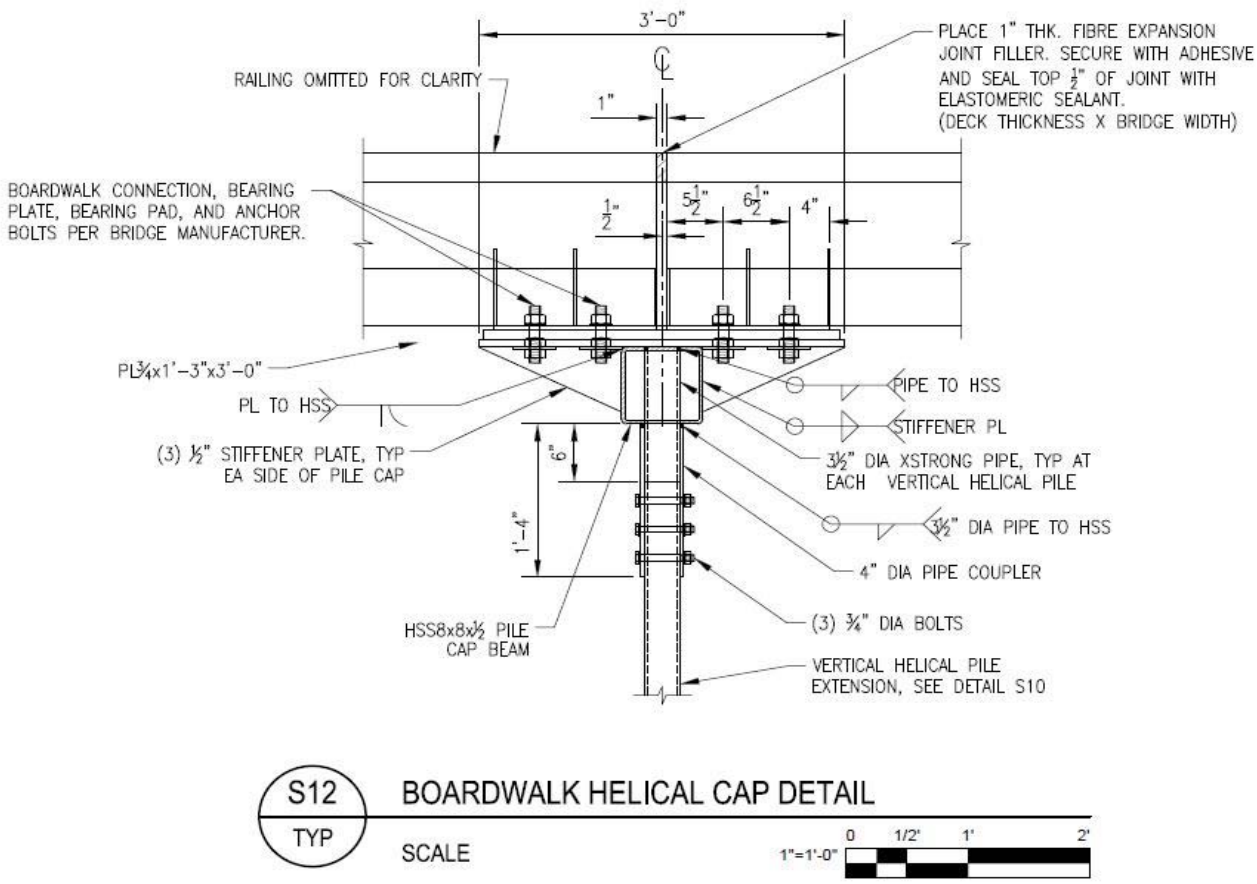


Figure 21. Detailed drawing of helical cap detail that will be used to install and elevated causeway and viewing platforms (Appendix A, Sheet C-17). The helical caps allow the causeways and viewing platforms to be elevated above the salt marsh and estuary, minimizing trail impacts to sensitive habitats in both the implementation and post-implementation public uses phases of the project. Helical caps avoid the need to drive pile posts, which typically have greater environmental impacts.

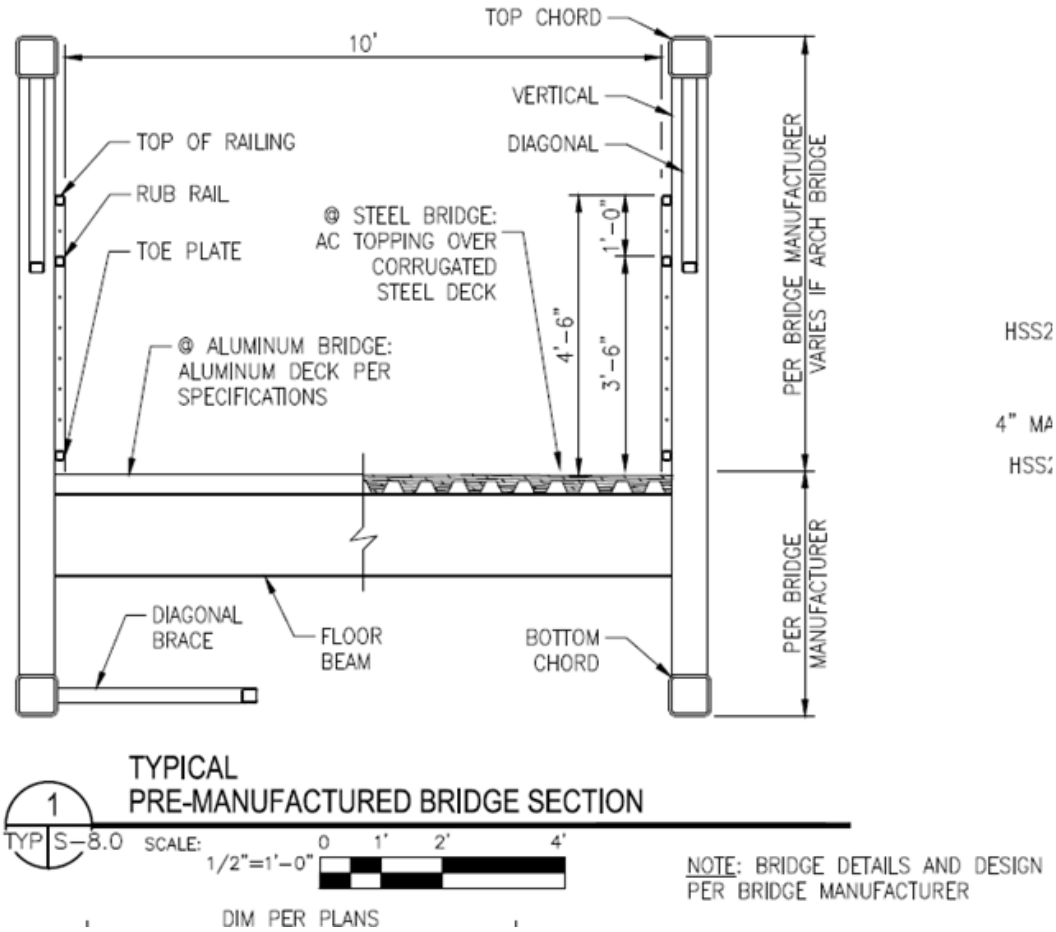


Figure 22. Typical cross section showing height of railings on elevated causeway and viewing platform, designed to meet City Building Code and ADA regulation requirements.

- Construct non-motorized boat access

Non-motorized boat access will be provided at the north end of the widened and deepened navigation channel near the terminus of Pound Road. The boat ramp will be a textured, 12% to 15% sloping, concrete ramp approximately 15' wide and 30' long, extending from above mean annual maximum tides to minus 1 foot below mean lower low tides. It will have a 12" tall wall on one edge with a galvanized or aluminum pipe railing to hold onto. There will be 20 CYs of 4” crushed foundation rock, 10 CYs of Class 2 Aggregate Base, and 15 CYs of poured concrete below and within its footprint.

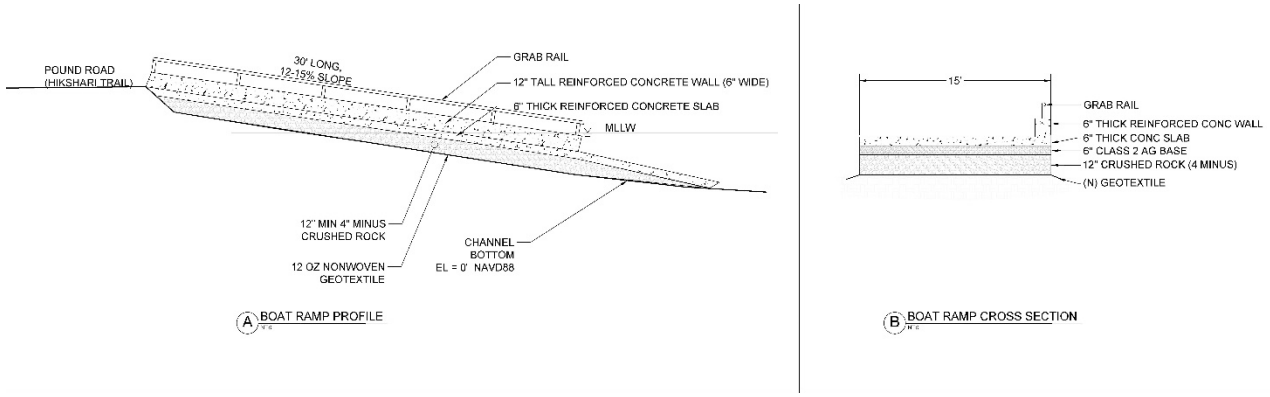


Figure 23. The Area 1 boat ramp will use a concrete slab or a similar material (Appendix A, Sheet C-16).

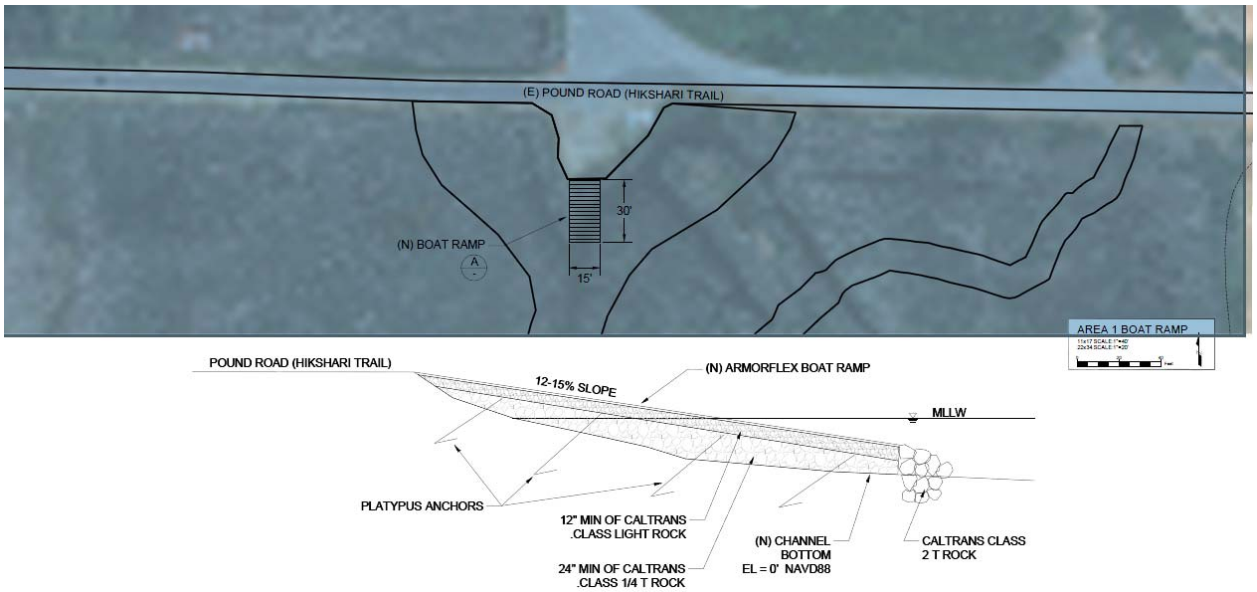


Figure 24. Area 1 boat ramp specifications showing location, dimensions, cross sectional view, and materials (Sheet C-16).

- Eradicate Spartina

Invasive Spartina will initially be removed with the use of an aquatic tracked vehicle ("Marsh master") and heavy equipment during construction to disturb the upper 6 inches of soil while excavating channel areas and grading fill areas. Remaining Spartina areas will be treated with mechanical and hand labor, or herbicide eradication methods currently utilized on Humboldt Bay and approved under the Humboldt Bay Regional Spartina Eradication Plan (HBHRCD 2015). Approved methods included in the eradication plan that will be applied to Area 1 include mowing, grinding, tilling, excavating, or treating the invasive Spartina with approved herbicides.

Additionally, a small (< ½ acre) experimental flood area will be constructed to test the efficacy of flooding Spartina with salt water as a remediation treatment. A 100 ft x 100 ft area will be enclosed with a temporary earthen berm and flooded with salt water pumped from behind the closed tide gates on Elk River for at least three months. The berm will be graded to merge with the new salt marsh plain. This activity is not covered under the approvals already obtained by the regional plan (HBHRCD 2015) (Figure 12). Monitoring and retreatment will continue for at least three years.

- Remove Elk River Slough tide gates

The tide gates and concrete headwalls on the mainstem Elk River will be removed following excavation to allow natural tidal inundation of Area 1 and not impede navigation. The tide gates are metal pieces bolted to a concrete wall and can be removed on a single low tide cycle. Removal will leave two big circular holes in the concrete wall and will immediately result in a non-muted tidal cycle. The concrete structure will subsequently be removed by excavators, one with a jack hammer and the other with a thumb and bucket during ebbing tides. Adjacent dikes will be excavated from either side of the concrete wall. Concrete and tide gates will be disposed off-site.

- Excavate dikes

The dikes south of Area 1 parallel to Elk River will be breached and lowered to be consistent with adjacent salt marsh surface topography, several discontinuous segments of dike will be retained to provide shorebird/waterfowl roosting habitat.

- Remove access and staging

Access and staging areas will be removed, and be regraded to be consistent with adjacent natural surface topography and revegetated. The temporary stormwater bypass system will be dismantled.

- Revegetation

Plant approximately 4 acres of riparian areas with appropriate native species.

Description of Proposed Actions: Area 2 South of Elk River

Nearly all of Area 2, approximately 89 acres, is owned by the City of Eureka, except for a 50-foot-wide strip of private land (1.3 acres) parallel to Elk River, on the left bank (Figure 25). Area 2 is composed of diked former tidelands and a windblown sand formation parallel to Elk River Slough. Construction of a rock seawall and the Northwestern Pacific (NWP) railroad bed has isolated Area 2 from Humboldt Bay. Large waves during extreme tides and storm surges wash through the sea wall introducing saltwater to Area 2 that supports seasonal brackish water wetlands. Construction of Highway 101 and the off-ramp for Humboldt Hill Road, and Tooby Road on the eastern boundary isolated Area 2 from Elk River.

There is a minor topographic divide along the southern boundary that separates Area 2 from private property to the south and Buhne Slough drainage complex. There are two culverts with tide gates that allow stormwater from Area 2 to drain beneath Highway 101 to Elk River. The City has leased Area 2 to a local rancher who uses the area to graze livestock. This management practice has also provided suitable seasonal grazing habitat for Aleutian geese in the winter and spring (Figure 26).

Figure 25. Proposed Elk River Estuary Enhancement Project Area 2.

Figure 26. Project Area 1 grazed pasture and Aleutian goose habitat.

There is no freshwater inflowto Area 2. Winter precipitation forms temporary ponds and fills ditches and historic tidal channels. This stormwater drains east to Elk River via culverts with tide gates, under Highway 101. A naturally occurring windblown sand formation creates upland habitat parallel to Elk River and along a portion of the NWP railroad. This site feature, 13.8 acres in extent, is an upland but currently supports annual grassland vegetation due to grazing livestock. There are remnants of the historic inter-tidal channels, but most of Area 2 is drained by a network of linear agricultural ditches. Approximately 68.9 acres is brackish wetlands dominated by pasture grasses and forbs, ranging in elevation from 3 ft to 7 ft (NAVD 88). Most of Area 2 is not infested with Spartina, except for a small 0.02-acre area with a muted tide cycle along the south bank of Elk River.

Vehicular access to Area 2 is from the Highway 101 Humboldt Hill off ramp and Tooby Road. A dirt road extends from Tooby Road to the western boundary and then runs north to the upland area near Elk River Slough. A HCSD forced main sewer line runs north from King Salmon through the City's properties in Area 2 and Area 1 parallel to the eastern boundary of the railroad properties all the way to the Elk River Waste Water Treatment Plant.

Recent king tides and storm surges have washed away railroad ballast, forming delta-like deposits on the City's grazed pasture (Figure 27).

Figure 27. The existing railroad grade after the 2015-2016 king tides and storm surge erosion, showing fill of Area 2 wetlands.

Proposed actions in Area 2 include: enhance hydrologic connectivity with Elk River, create intertidal channel network and new Eelgrass habitat, create variable salt marsh topography, restore riparian habitat, eradicate Spartina, and provide public coastal access.

Enhance Hydrologic Connectivity with Elk River

The dike on Elk River will be breached in multiple locations. The existing dilapidated 12-inch culvert will be removed to reconnect the muted tide area north of the sand formation with Elk River. A large new tributary channel will be excavated to connect the area south of the sand formation directly to Elk River. An inter-tidal channel network will be created that extends from the Elk River approximately 4,200 ft to the southern boundary at the end of Tooby Road. Based on local salt marsh vegetative survey areas adjacent to the channels, less than approximately 9 ft (NAVD 88) in elevation should become salt marsh.

During the winter and spring rainfall events, freshwater will create brackish water conditions as stormwater flows through the inter-tidal channels seasonally, to Elk River. In the future, if Caltrans chooses to increase connectivity with Elk River, the southernmost culvert in Area 2 could be connected via a culvert through the proposed tidal ridge parallel to Highway 101 to the City's new tidal channel network. This secondary connection with Elk River would facilitate movement of aquatic species between Area 2 if Caltrans wants to replace their culvert and remove the tide gate as part of a separate and future action. Excavated material will be utilized to fill the agricultural drainage ditches. Filling in ditches will focus the tidal prism in the new tidal channel network and reduce sedimentation of new channels. To enhance hydrologic connectivity with Elk River, the elevation of the natural topographic divide at the southern end of Area 2 will be increased to approximately 12 ft (NAVD 88) to provide riparian habitat and maintain hydrologic integrity (Figure 28).

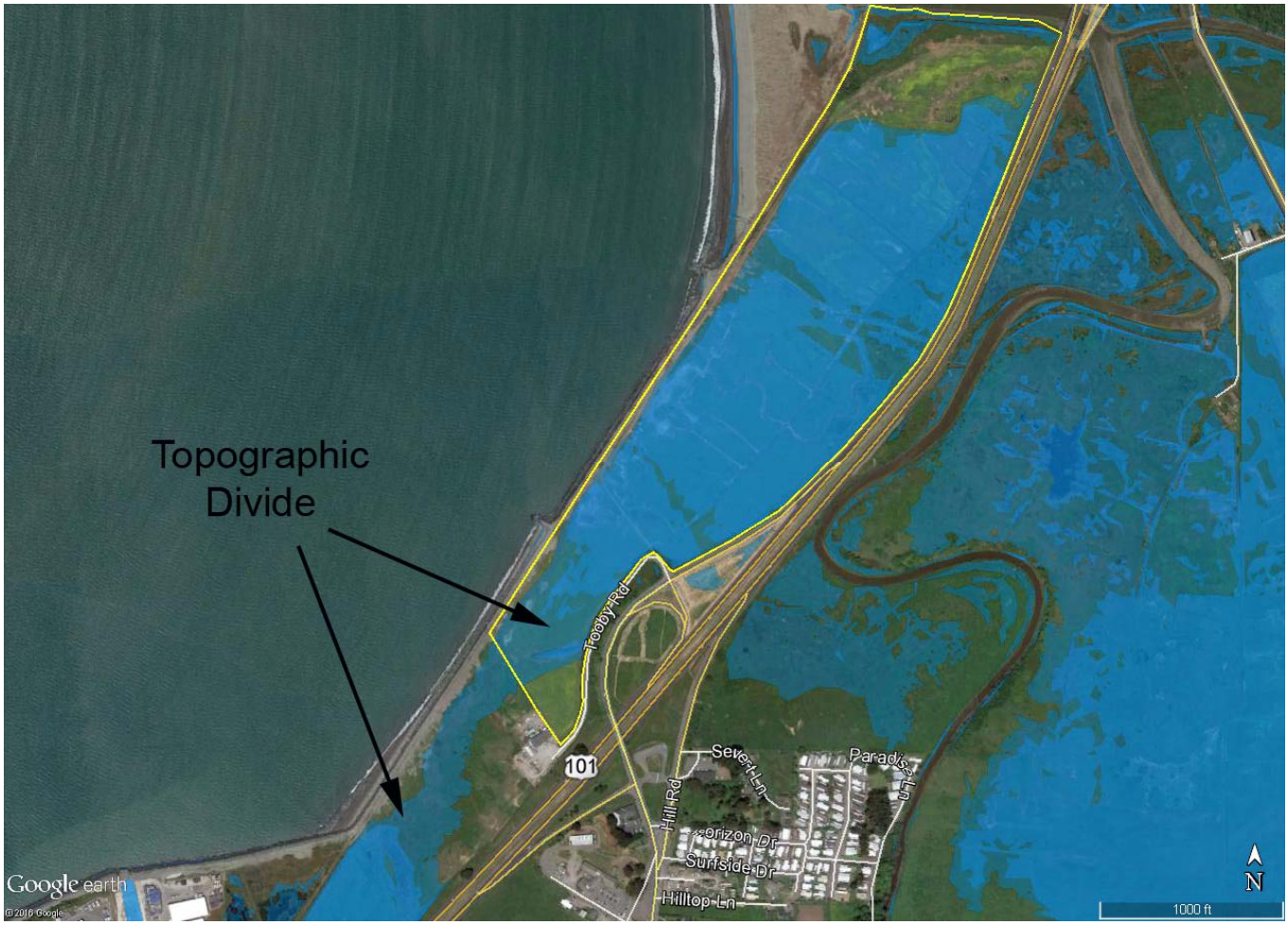


Figure 28. Potential tidal inundation during MHHW 5.6 ft (dark blue shading) and tidal expansion during MMMW 7.7 ft (NAVD 88) (light blue shading) beyond Area 2 to the south.

Create Inter-Tidal Channel Network to Support Eelgrass Habitat and Habitat for Other Aquatic Species

The width and depth of the new main channel has been sized to maximize creating Eelgrass habitat. Channel sinuosity emulates historic channels in former salt marsh areas of Area 2 and adjacent areas of Elk River (Figure 29). The new inter-tidal channel network will extend south approximately 4,200 ft. The channel depth in Area 2 will range from -4 ft at Elk River Slough to +2 ft at its southern terminus. The new channel widths have been modeled to accommodate the projected salt marsh elevations and tidal prism volume, and on other naturally formed channels that drain similar salt marsh plains, in Humboldt Bay. It is anticipated that the channel widths will adjust and stabilize after the project is completed while channel depths are not expected to significantly adjust.

The new secondary inter-tidal channels will be excavated to provide low velocity and shallower aquatic habitat. Salt marsh depressions will be excavated adjacent to inter-tidal channels where high tides can inundate these areas to form pond habitats. See Appendix A, Sheets C-11A and B.

Figure 29. Historic Elk River inter-tidal channel sinuosity examples (1939 aerial photography Humboldt County).

Create Tidal Ridges and Living Shoreline Buffer

Tidal ridges will be constructed, to contain mean annual maximum tides (8.8 feet NAVD 88 at North Spit tide gage), along the City's property boundaries parallel to the NCRA and Caltrans properties using fill materials excavated onsite. The western tidal ridge will provide a high platform 12 to 14 foot elevation (NAVD 88) for the extension of the ADA Waterfront Trail (14 ft wide) and emergency access for HCSD to their sewer line. A second tidal ridge, 10 ft to 12 ft in elevation (NAVD 88) (16 ft wide), parallel to Highway 101 extending north from Tooby Road will allow PG&E vehicular access to their nine electrical distribution poles. The western tidal ridge/Waterfront Trail inside slopes will be graded 3:1 down to 9 foot elevation and then grade to the top of the nearest tidal channel bank (Figure 30, Appendix A, Sheets C-11A,11 B, and 12)). The tidal ridge/trail slope on NWP railroad side will be 3 to 1 and may be fortified with rock from the southern property boundary north approximately 2,720 feet to prevent erosion of the Waterfront Trail from wave wash through the sea wall. The tidal ridges will support tidal marsh vegetation along their side slopes below 9 ft elevation (NAVD 88), with transitional ecotone habitat along the top of the slope. The tidal ridge will prevent tidal inundation of Caltrans property and Highway 101 road base, as well as form a barrier to prevent rail road ballast from creating deltas in Area 2 salt marsh habitat. The tidal ridges will demonstrate a living shoreline approach to the protection of Highway 101, PG&E's access to electrical distribution poles, the Waterfront Trail, and the Elk River estuary's restored salt marsh.

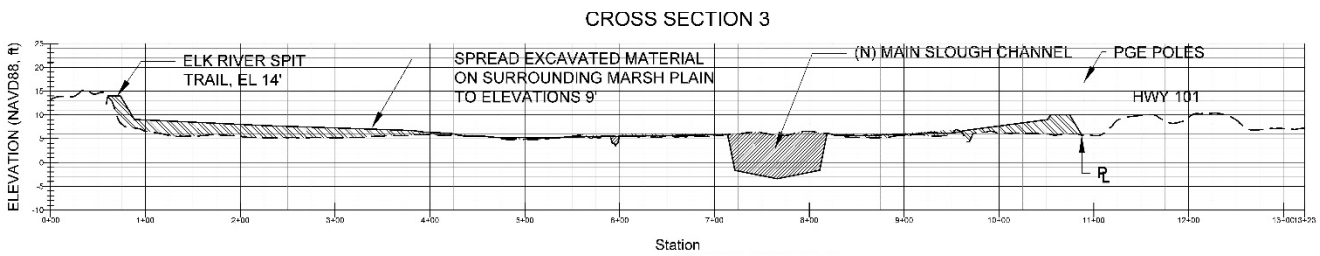


Figure 30. Typical cross section of living shoreline/tidal ridge parallel to Highway 101 in Area 2. Dark grey hatching (left) indicates Caltrans Highway 101 road prism. Light hatching (right) indicates living shoreline fill.

Create Variable Salt Marsh Topography

Excavated material will be used on-site between newly excavated inter-tidal channels to create salt marsh plains from 6 to 9 ft (NAVD 88) (Appendix A, Sheets C-4B, 7, and 11A-B). Salt marsh hummocks greater than 9 ft in elevation will function as islands for shorebird and waterfowl species. The varying elevation of these hummocks will also support the migration of salt marsh habitat to higher elevations as sea levels rise.

Excavation of fill deposited on Area 2 wetlands from erosion of the NWP railroad ballast will restore approximately 1 acre of inter-tidal wetlands.

Creation of Riparian Habitat

Decades of agricultural use has prevented the establishment of riparian vegetation in Area 2. Excavated sand material from the new tidal channel will be reused on-site to enhance the windblown sand formation and increase riparian habitat in Area 2. Other excavated materials will be used to enhance the existing topographic divide at the southern boundary of Area 2 to approximately 12 ft (NAVD 88) and link this area with the upland area along Tooby Road to create riparian habitat. These areas, above 9-foot elevation, will be planted with appropriate native riparian species, creating approximately nine additional acres of riparian habitat.

Eradicate Spartina

Approximately 0.02 acres of existing salt marsh dominated by Spartina is located between the dike on the left bank of Elk River and the natural sand upland. Area 2 is also included within the geographic limits of the approved *Humboldt Bay Regional Spartina Eradication Plan* (HBHRCD 2015). Approved methods included in the eradication plan that will be applied to Area 1 include mowing, grinding, tilling, excavating, and crushing, as well as approved herbicide application of the invasive Spartina. Periodic maintenance will likely be necessary to prevent the re-establishment of this invasive species in Area 2.

Provide Public Coastal Access

Within Area 2, the project will provide public coastal access via a 1-mile extension of the ADA Waterfront Trail to salt marsh and riparian habitats, Elk River Spit, Elk River Slough, and Humboldt Bay. The maze of inter-tidal channels will serve a dual function of providing Eelgrass habitat and public navigational opportunities by kayaks or other non-motorized watercrafts. The existing dirt road from Tooby Road to the NWP railroad will be removed. A paved public parking area and trailhead will be constructed at the southern end of Tooby road on the City's property. The Waterfront Trail will extend approximately one mile north to Elk River. The trail and tidal ridge parallel to the NCRA property will average 12 to 14 ft elevation (NAVD88). A public elevated causeway will also provide access out into the salt marsh plain and a viewing platform. A walking bridge may be installed at the northern end of Area 2, spanning the new channel entrance, to connect the Waterfront Trail extension, to the eastern tidal ridge. The eastern tidal ridge, located on the City's property will average 16 ft wide and 10 to 12 ft elevation (NAVD88) and provide PG&E access to their electrical distribution poles and be surfaced with crushed rock.

The Area 2 Waterfront Trail extension is proposed to be 14 ft wide (5 ft for each lane) with an additional 2 ft of shoulder on each side (14 ft total width). The side slope of the trail will be 1:3. The general design characteristics of the trail network include:

- Minimum Tread Width: 10 ft
- Minimum shoulder width: 2 ft on each side of trail tread surface where space allows
- Minimum setback from railroad track centerline to obstructions or edge of trail tread: 8.5 ft on tangent sections of tracks and 9.5 ft on curved sections of tracks
- Minimum Vertical Clearance: 8 ft (10 ft if emergency vehicles use trail)
- Minimum Design Speed: 20 miles per hour
- Maximum Gradient: 5%
- Minimum Curve Radius: 90 ft
- ADA Accessibility: the trail would be constructed to be ADA accessible

Additional Waterfront Trail design specifications similar to those described in Area 1 will be included.

Summary of Proposed Actions: Area 2

Area 2 is presently a degraded farmed wetland that will be restored to an inter-tidal wetland with a network of tidal channels with Eelgrass habitat (Figure 31 - Figure 32). The inter-tidal area will be contained by tidal ridges that will also provide public and emergency vehicle access and riparian habitat. The City's Waterfront Trail will be extended approximately a mile and will have a new southern gateway for coastal access to Elk River Spit, Elk River Slough and Humboldt Bay. The following summary of proposed activities for Area 2 will be utilized in this Initial Study's impact assessment.

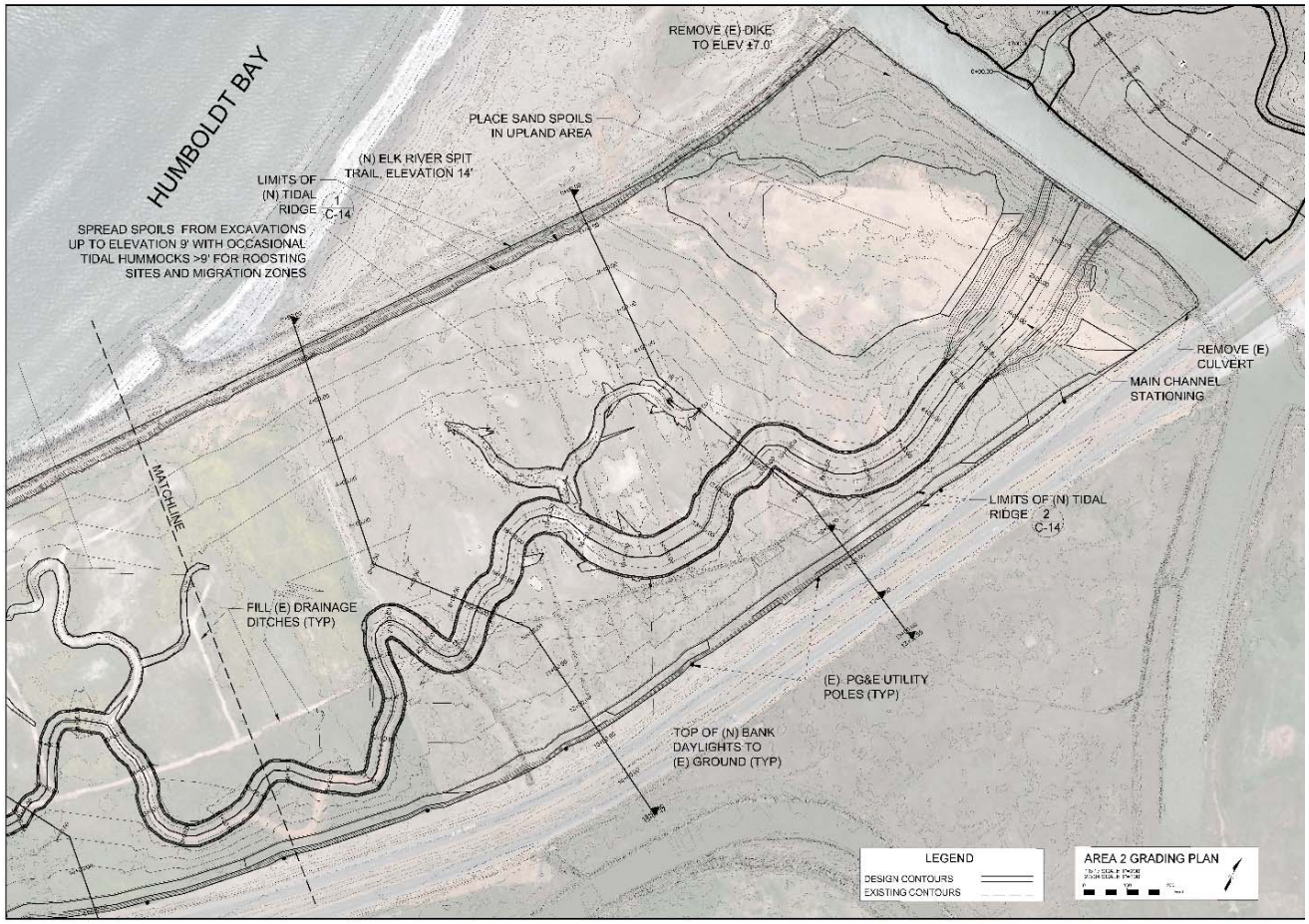


Figure 31. Overview of Area 2 design elements, northern end (Appendix A, Sheet 12A).

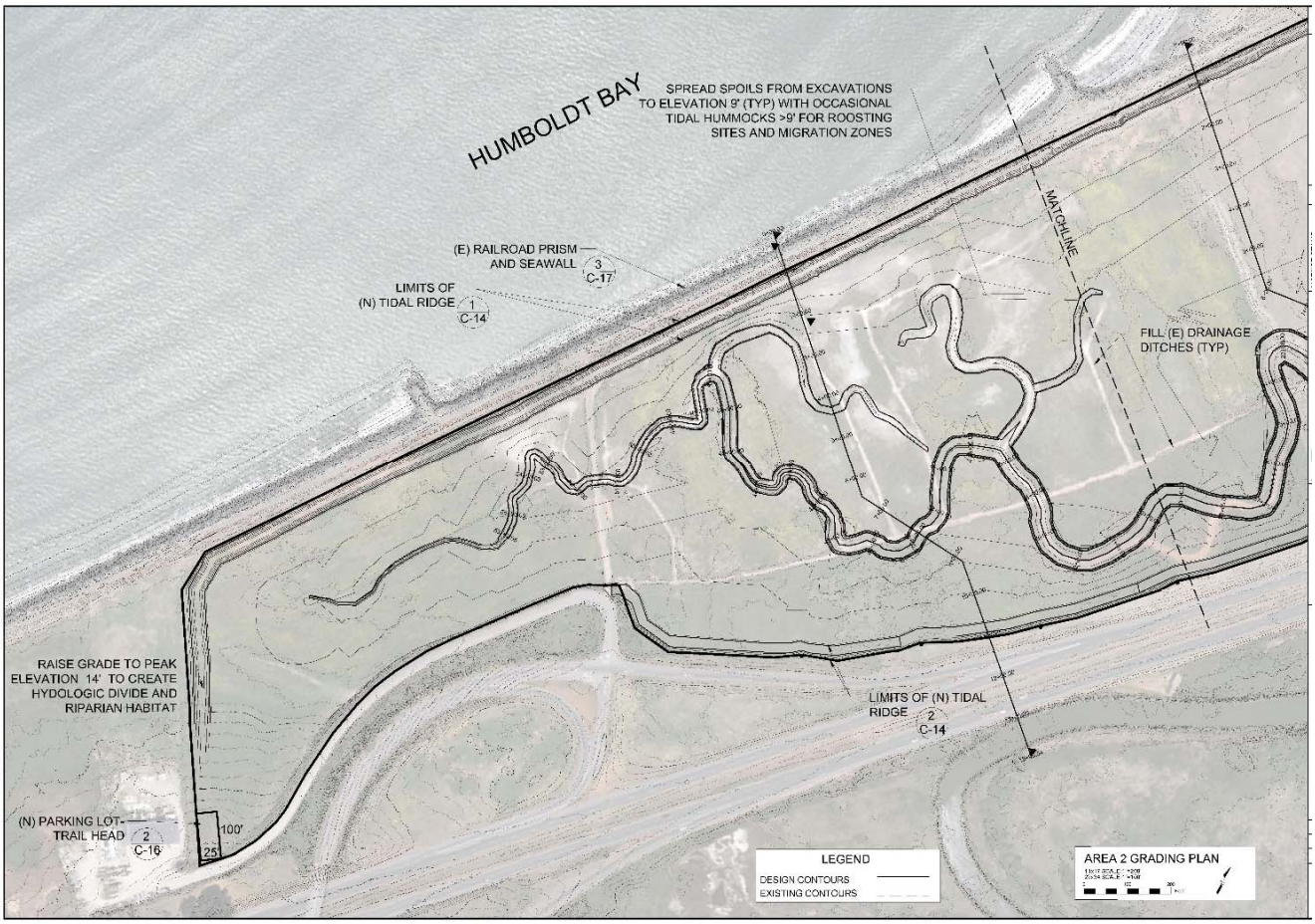


Figure 32. Overview of Area 2 design elements, southern end (Appendix A, Sheet 12B).

- Timing

Construction would occur when stormwater runoff is not likely (July 1st through October 31st) for the duration of construction activities.

- Access and staging

Establish a construction staging area. The staging area will be located on the upland area in the southeastern edge of the site, at the end of Tooby Road that will ultimately be paved to become the new public trailhead parking area, (Figure 32 and Appendix A, Sheet C-16). The staging area will be fenced and include a fueling and lubrication area. The fueling area will be approximately 20 ft x 20 ft and be underlain by an impermeable plastic membrane covered with 12" of soil. Fuel and lubricants will be stored in 55 gallon drums on top of containment pallets.

Figure 33. Location and dimensions of Area 2 staging area at the end of Tooby Road, which will become the new trail head parking lot and access point at the end of construction.

- Install erosion control protection measures

Install best management erosion control protection measures prior to project implementation, including:

- Construction will only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when background Elk River freshwater inputs are at summer baseflow thresholds. Excavated materials shall not be stockpiled over winter. Sediment control measures shall be in place while materials are being stockpiled to minimize sediment and pollutant transport from the project site.

- Placement of fill in the project area will occur when the area is not inundated by tide water.

- Excavation shall include handling of saturated soils. Saturated soils shall be dewatered and/or transported saturated in a manner that prevents excess discharge or spillage of soils or water within the project area. All excavations will be repurposed on site, and off-site hauling of saturated soils will thus not occur. A silt fence will be installed around the perimeter of temporary stockpiles of saturated soils to prevent runoff from leaving the site.

- During construction, a silt fence will be deployed to isolate work areas from existing channels, and to trap suspended sediment that might leave the construction site if stormwater runoff were to occur. If the silt fence is not adequately containing sediment, the construction activity shall cease until remedial measures are implemented that prevent sediment from entering the waters below.

- No construction materials, debris, or waste, shall be placed or stored where it may be allowed to enter or be washed by rainfall into waters of the U.S./State.

- Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.

Details regarding these and other Best Management Practices (BMPs) included in this project are detailed in Sections 1-18 of this Initial Study document.

- Dewater work area

Pumping will occur continuously throughout construction to remove groundwater seepage. Water will be pumped to settling ponds to filter out fine sediments (Figure 16).

Excavate tidal and inter-tidal channels and depressions

Excavate Area 2 channels and depressions, starting at the south end of the property and working north to connect to Elk River (total volume 125,200 CY). Excavation activities may have to occur on both sides of the channels depending on the width of the channel and the reach of the excavator. Excavation will be volume neutral, as all excavated material will be used to construct design features within Area 2 (Figure 31 - Figure 32).

- Excavate railroad ballast deltas

Remove deltas (approximately 1 acre) formed east of the railroad ballast Area 2. The railroad ballast will be used on-site as part of the top surface of the tidal ridge surrounding Area 2. These areas will become inter-tidal wetlands.

- Place and grade fill, hummocks, and large wood debris

Excavated soil will be left in stockpiles or windrows and allowed to dry out before attempting to spread it to conform to the design topography. Approximately 125,200 CY will be excavated and graded onsite with no export of materials. Throughout Area 2, fill (reuse of excavated materials) will be placed to fill artificial depressions and linear in-board ditches, and spread between newly excavated channels to create a salt marsh plain with surface elevations ranging from 6 to 9 ft (NAVD 88). Soil will also be used to form tidal mounds/hummocks (islands) and to increase the elevation of upland areas. Hummocks may be graded to promote habitat diversity and provide roosting habitat for shore birds. Soil will also be used to increase the southern topographic divide to 12 ft in order to tidally separate Area 2 from private property to the south (Figure 32). Imported large wood debris will be strategically placed to increase habitat diversity and cover for wildlife

- Construct tidal ridges and Waterfront Trail

Tidal ridges will be constructed to contain mean annual maximum tides (8.8 feet NAVD 88 at North Spit tide gage) (maximum tide elevation of record at North Spit tide gage is 9.55 feet NAVD 88), from excavated materials, along the City's property boundary with the NCRA and Caltrans. The western tidal ridge will support an extension of the Waterfront Trail. The tidal ridge/trail slope on NWP railroad side will be 3 to 1 and may be fortified with rock rip from the southern property boundary north approximately 2,720 ft to prevent erosion of the Waterfront Trail from wave wash through the sea wall. The eastern tidal ridge will provide PG&E access to their electrical distribution poles. The tidal ridges will demonstrate how a living shoreline approach can protect transportation infrastructure from tidal inundation and restore salt marsh habitat.

The Waterfront Trail will extend from a parking lot at the southern end of Tooby Road approximately 1 mile north to Elk River, providing the public access to salt marsh, riparian habitats, Elk River Spit, Elk River Slough, and Humboldt Bay (Figure 31 and Appendix A). The trail is proposed to be 10 ft wide (5 ft for each lane) with an addition 2 ft of shoulder on each side (14 ft total width). The railroad base that has washed out onto the field (~200 CY) will be collected and used to surface portions of the tidal ridge/trail. The ADA Class 1 trail will be paved, but the eastern tidal ridge emergency access will be covered with crushed rock. The Waterfront Trail will accommodate emergency, City of

Eureka, NCRA, HCSD, and other approved vehicles.

- Construct trail parking

Paved parking will be constructed at the end of Tooby Road to provide access to Area 2 and the Waterfront Trail. (Appendix A, Sheet C-16).

- Construct an elevated causeway, viewing platform, and bridge

An elevated salt marsh viewing trail causeway (550 ft total length and 3 ft wide) and platform (10 ft by 10 ft) will be constructed of aluminum, plastic, or treated lumber atop helical anchors drilled into the marsh plain (Figure 19). The causeway and viewing platform will be elevated 1 ft to 7ft above the marsh below and will include railings compliant with City Building Codes and ADA and will be 4.5 ft high. An elevated causeway bridge may span the newly constructed main tidal channel. The bridge would be 100 ft long and may require helical piles. Interpretive signage will be installed on posts set into concrete footings.

- Eradicate Spartina

Spartina area (0.02 acres) will be treated with hand labor eradication methods currently utilized on Humboldt Bay and approved under the Humboldt Bay Regional Spartina Eradication Plan (HBHRCD 2015). Approved methods included in the eradication plan that will be applied to Area 2 include mowing, grinding, tilling, excavating, or treating the invasive Spartina with approved herbicides.

- Remove culvert

An existing 12-inch culvert will be removed along mainstem Elk River channel margin after excavation of the new Area 2 entrance channel is completed.

- Excavate dike

The dike parallel to Elk River will be breached and lowered to be consistent with adjacent surface topography. Several discontinuous segments of dike will be retained to provide waterfowl roosting habitat. A portion of the dike (approximately 200 ft) will be fully breached to allow for the new channel entrance into Area 2.

- Revegetation

Plant approximately nine acres of riparian areas with appropriate native species.

- Remove access and staging

Access and staging areas will be removed, regraded to be consistent with adjacent natural surface topography and revegetated. Temporary erosion control materials (silt fences and straw wattles) will be removed after weed-free straw mulch has been placed on bare surfaces.

Approvals Required

The following regulatory approvals are required prior to project implementation:

Local Governments

- Humboldt Bay Harbor Recreation and Conservation District – Shoreline Development Permit
- City of Eureka – Use Permit and Coastal Development Permit, although the City will defer to the Coastal Commission for the Coastal Development Permit, as there is state retained jurisdiction areas in Area 2.

State

- North Coast Railroad Authority – Encroachment Permit and License Amendment (Waterfront Trail extension)
- North Coast Regional Water Quality Control Board – Water Quality Certification and Water Pollution Prevention Plan
- California Coastal Commission – Coastal Development Permit
- California Department of Fish and Wildlife – Streambed Alternation. Additionally, if a take of a listed species cannot be avoided, a Safe Harbor Agreements for Coho salmon and Long fin smelt will be obtained.

Federal

- United States Army Corps of Engineers – Individual Permit
- National Oceanic and Atmospheric Administration – NMFS Endangered Species Act Section 7 Consultation for Coho salmon will be initiated if take of listed species cannot be avoided.
- United States Fish and Wildlife Service – Endangered Species Act Section 7 Consultation for Tidewater goby will be initiated if take of listed species cannot be avoided.

Tribal Consultation

- Per Pubic Resources Code Section 21080.3

Environmental Setting

This section includes a summary of the following:

- Ecosystem attributes
- Surface topography
- Hydrology
- Vegetation
- Wetlands
- Riparian habitat
- Fisheries
- Land use

Ecosystem Attributes

Humboldt Bay and its estuaries, including Elk River, provide valuable habitats to many aquatic species, some of which are listed under the state and federal Endangered Species Acts (ESA) such as the Coho Salmon, Chinook Salmon, Steelhead trout, Longfin Smelt, and Tidewater Goby. Estuaries are important transition zones for juvenile salmonids moving from freshwater to saltwater and provide valuable over-winter juvenile habitat (NMFS 2016, Wallace et. al 2015), which may be a limiting factor in salmonid recovery. Functioning estuaries provide feeding areas and refuge from predators and increase the fitness of smolts entering the ocean. The Elk River estuary is a vital ecosystem component given the impaired conditions of much of the upstream habitat (NMFS 2016). The Elk River estuary is greatly reduced from its historic condition because of diking and filing of tidal wetlands. Additionally, the little remaining estuary habitat is severely channelized and degraded, suffering from a reduction in tidal function, urban development, land use practices, and other ecological strains. The proposed project will increase the areal extent of inter-tidal wetlands and create a network of tributary channels covering approximately 70 acres and 12.8 acres of riparian habitat associated with the estuary of Elk River. In particular, these types of habitats may offer valuable off-channel refugia for juvenile Chinook salmon in Elk River (Wallace pers. Comm. 2017).

Eelgrass has been mapped in the Elk River estuary between the project area and Humboldt Bay (Shlosser and Eicher 2012). Eelgrass has been observed (2017) immediately down river of the NWP railroad Bridge, but not in the reach of river between Area 1 and 2 of the project. The plant is typically found submerged in shallow subtidal and lower intertidal zones, generally below 2-foot elevation NAVD 88. Eelgrass provides important structure, habitat and food for a broad range of bird, fish and amphibian invertebrates (Schlosser and Eicher 2012). Eelgrass habitat is protected under federal and state law. Eelgrass is not currently present within the project area because it is separated from tidal influence by dikes, but one of the objectives of the proposed project is to create new Eelgrass habitat. Based on water depth and general habitat conditions, 9.7 acres of new habitat may be created by the project.

Both Areas 1 and 2 contain inter-tidal wetland habitats, including salt marsh and brackish marsh habitats (McBain Associates 2016). Elk River's intertidal wetlands are dynamic habitats within the estuary. Because tidal influence may extend further inland than saltwater intrusion, inter-tidal wetlands range from saline to brackish. Patterns of plant distribution vary in response to frequency and duration of tidal inundation, as well as other factors (Schlosser and Eicher 2012).

Surface Topography

The surface topography of Area 1 ranges from 1 ft to greater than 14 ft in elevation (Figure 34). There is an elevated linear dike built along the north bank of the Elk River. The NCRA railroad grade is also elevated along the western border of Area 1 and 2. The surface topography of Area 2 ranges from 1 ft to more than 14 ft in elevation NAVD 88. An elevated dike and upland sand deposit feature that rises to 14+ ft separate Area 2 from the Elk River. The NCRA railroad grade is elevated between 10 and 12 ft along the western border of Area 2, and Highway 101 separates Area 2 from Elk River. Topography in both Area 1 and Area 2 indicate linear in-board ditch features were excavated to help drain these coastal marsh habitats for other uses.

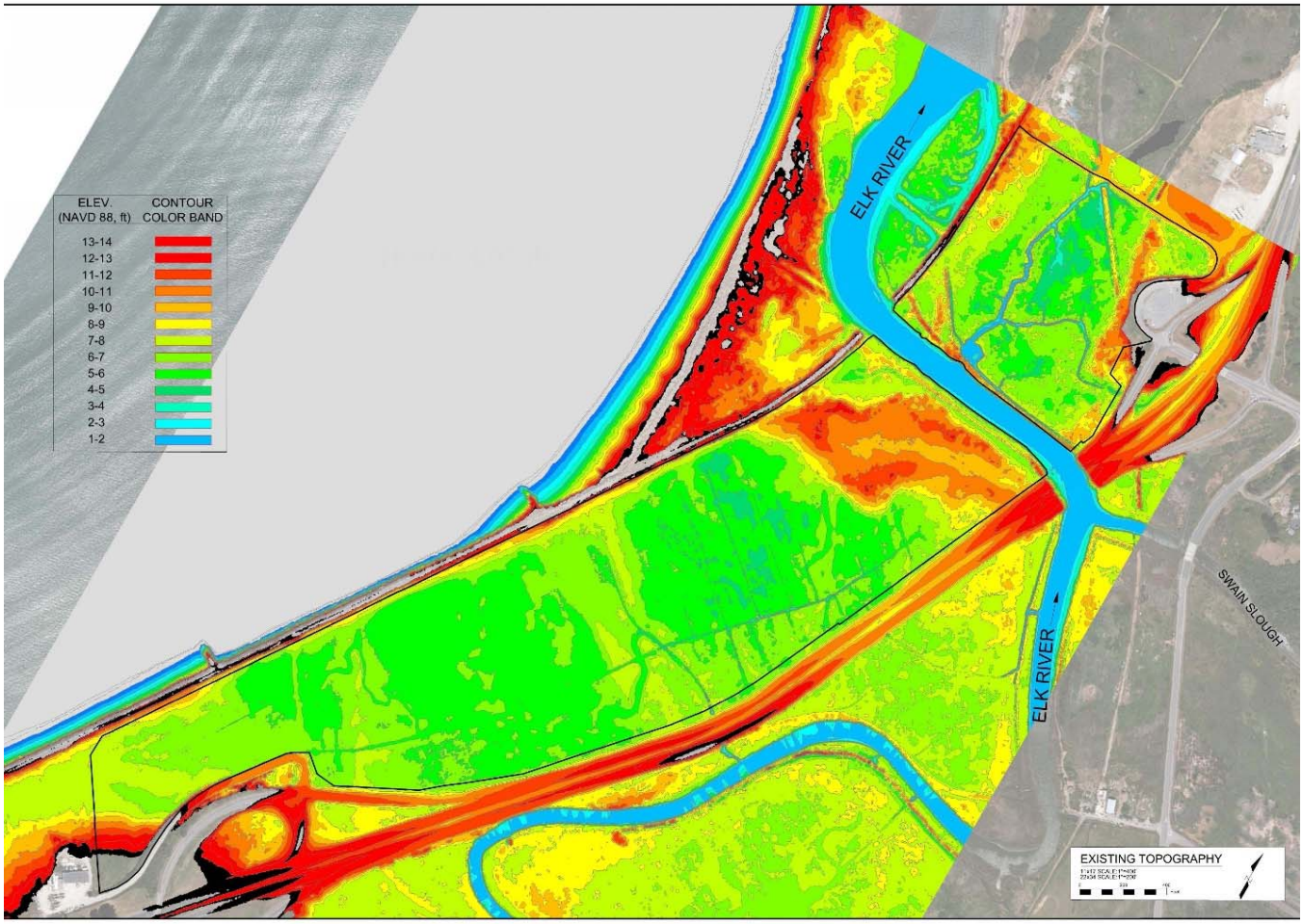


Figure 34. Existing surface topography for Area 1 and Area 2.

Hydrology

The Elk River is the largest tributary to Humboldt Bay and is tidally influenced approximately 2.5 miles upstream from its mouth (Wallace et al. 2015). The low-gradient main channel of the Elk River is diked and channelized. There is a remnant tidal channel in Area 1 that have a muted tide cycle supported by two existing tide gates that the City has kept open (Figure 35). This tidal channel connects with multiple linear in-board ditch features that inundate an existing salt marsh environment, much of which is dominated by invasive Spartina (Figure 11). There are five water control structures that convey

stormwater runoff into Area 1, but only three have tide gates. The City often discharges freshwater to Area 1 from it open water/wetland/riparian complex to the north; thereby creating brackish water conditions particularly during the winter in the main channel and residual pool.

A windblown sand deposit parallel to Elk River and Highway 101 hydrologically separates Area 2 from the mainstem Elk River. In Area 2, there are two water control structures with tide gates that allow stormwater runoff to drain beneath Highway 101 and discharge to Elk River. Other than precipitation there is no freshwater inflow to Area 2. Linear in-board ditches were constructed to help drain Area 2 for agricultural and other uses (Figure 35). During extreme tides or storm surges large waves wash through the sea wall to the west of Area 2, and have eroded railroad ballast that is deposited as alluvial fans on the pasture and seasonal freshwater/brackish wetlands. This saltwater over wash combined with precipitation in the winter help support seasonal brackish water wetlands in Area 2.

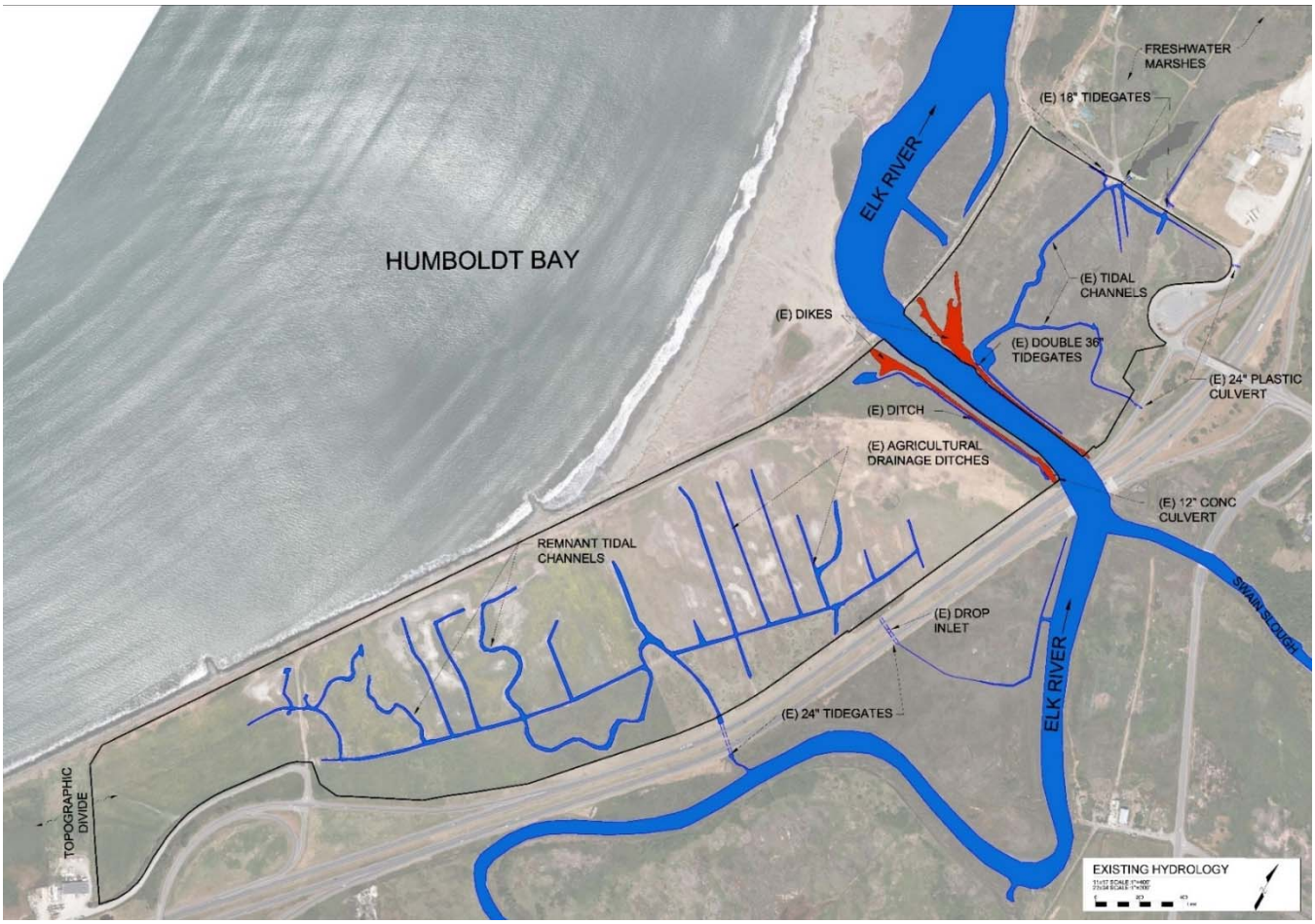
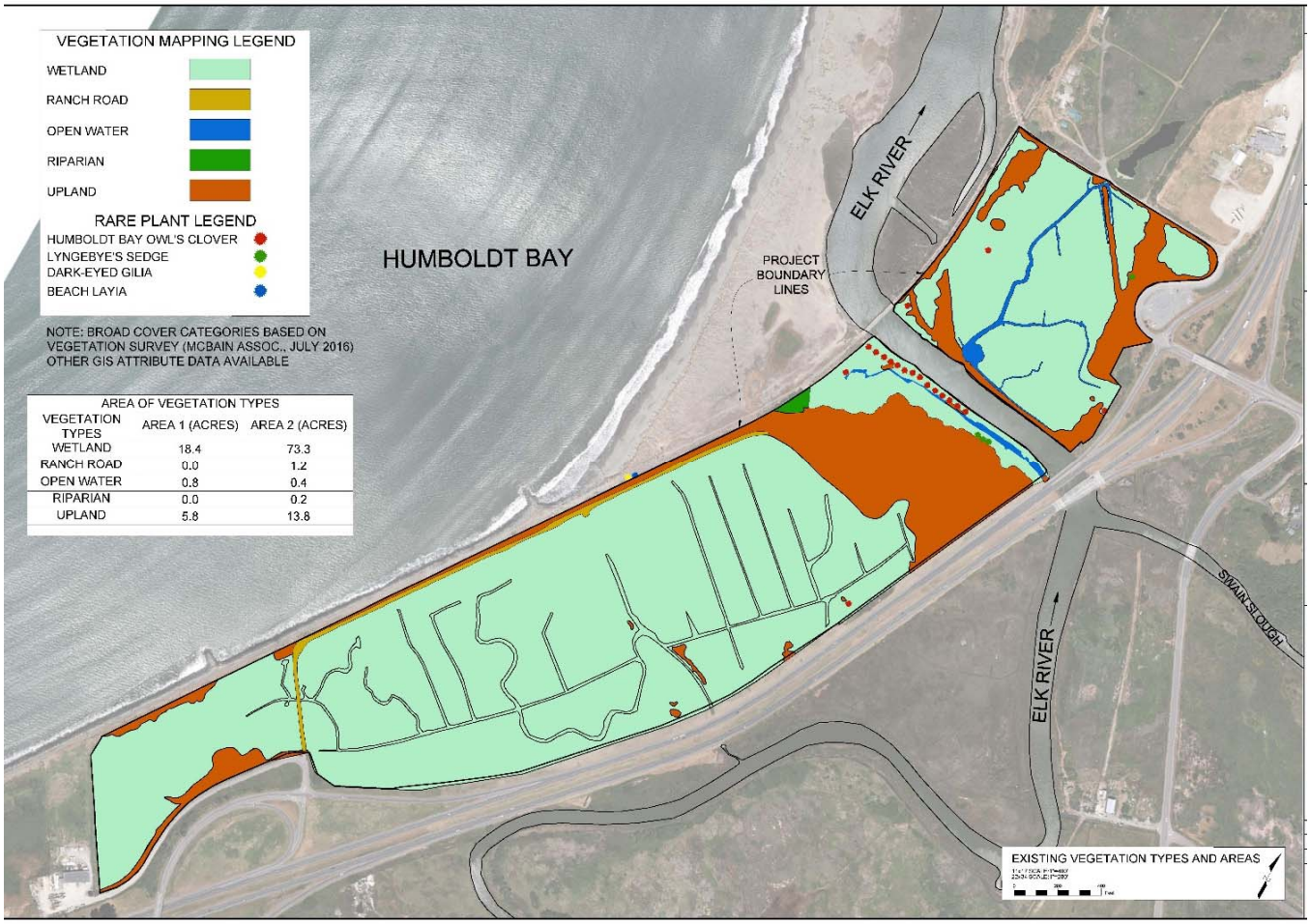


Figure 35. Existing hydrology within Area 1 and Area 2, showing the mainstem Elk River, limited tidal channels restricted by the Area 1 tide gates, and linear inboard ditches.

Vegetation

Vegetation within project Areas 1 and 2 was surveyed and mapped during May 2016 (McBain Associates 2016). A copy of the full report for detailed vegetation mapping methods and results, including rare plant surveys, can be found in Appendix C. A simple classification system of biological habitat types (hereafter “biohabitats”) was developed for permitting purposes. The biohabitats were

grouped into broad categories of open water, wetland, riparian, and upland (Figure 36). These broad biohabitats were further subdivided into vegetation communities shown in Figure 37 and described in Appendix C. A subsequent field survey in the project area established the lower and upper elevations for salt marsh vegetation and lower elevation for riparian vegetation (McBain Associates 2017, Appendix D). Broad categories were operationally defined by approximate elevation: cover types mapped below approximately 9 ft are wetlands, cover types mapped above 9 ft were riparian or upland if they were human disturbed or grazed pasture, mean annual maximum tides rise to nearly 9 ft (Figure 36, Appendix A, Sheet C-6).



AREA OF VEGETATION TYPES

VEGETATION TYPES	AREA 1 (ACRES)	AREA 2 (ACRES)
WETLAND	18.4	73.3
RANCH ROAD	0.0	1.2
OPEN WATER	0.8	0.4
RIPARIAN	0.0	0.2
UPLAND	5.8	13.8

Figure 36. Existing vegetation types mapped in Areas 1 and 2.

Wetlands

Wetlands are defined in Section 30121 of the California Coastal Act (1976) as "…lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, or fens." Wetlands are valuable habitat that provide essential ecosystem services such as water purification, flood control, shoreline stability, and habitat for a plant and animal species. As a result of diking, urban development, and land use practices, the historic footprint of wetland habitat in the Elk River estuary has been severely reduced. While formal wetland delineation has not been conducted within the project area, the location of approximately 110 acres of wetlands in Area 1 and Area 2 was identified based on

the presence of wetland plant species, topographic elevation, and area hydrology. The lower and upper elevational limits for wetland, riparian, and upland plant species were surveyed in Area 1 and 2. All areas less than 9 ft in elevation that were not open water were broadly identified as wetlands (Figure 5). Many of the areas designated as wetlands include several broad categories of wetlands including salt marsh (Area 1) and seasonal freshwater wetland-pasture and brackish water wetland-pasture (Area 2) (Figure 37). Wetlands are regulated by federal, state, and local agencies.

Riparian Habitat

Area 1 and 2 have been heavily impacted by over a 150 years of land uses; native riparian habitat has been cleared to provide space for agricultural uses. Active grazing has prevented riparian vegetation becoming established in Area 2. Riparian habitat dominated by Hooker's willow (*Salix hookeriana*) has only been able to colonize a few patches in Area 1 and 2, but even these areas have been heavily impacted by homeless encampments. Limited tidal influences on areas above 9 ft in elevation allows riparian vegetation to become established in Area 1 and 2, if they are not grazed. Much of the upland area that is grazed will be planted and is expected to support approximately 13 acres of riparian habitat.

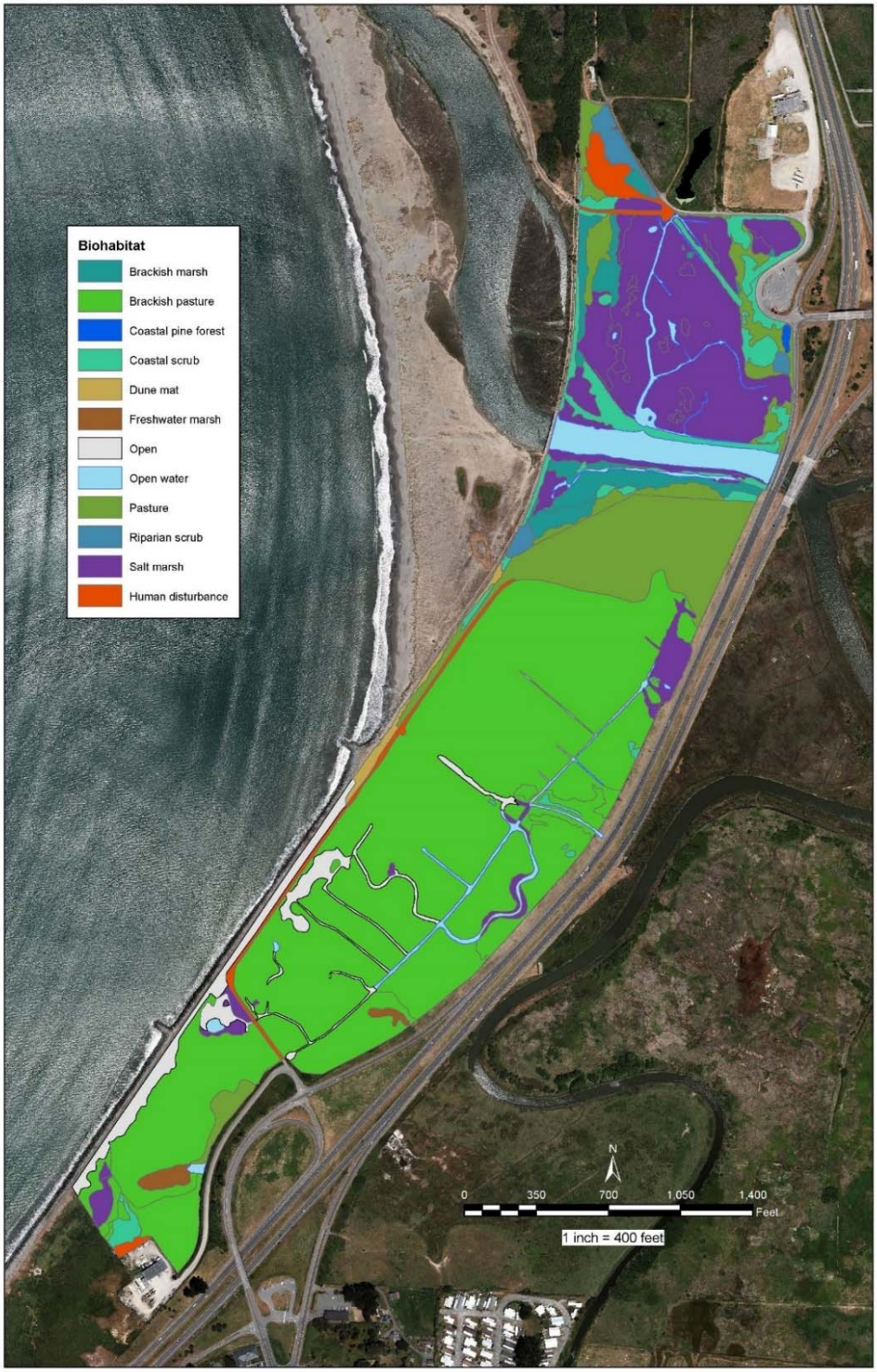


Figure 37. Existing biological land habitats, or "biohabitats," mapped in Areas 1 and 2. Biohabitats are further defined in Appendix B.

Fisheries

Annual surveys conducted by CDFW in the lower mainstem Elk River (Site 3, Figure 38) immediately downstream of the project area identified a variety of marine species including: Threespine Stickleback (*Gasterosteus aculeatus*), Staghorn Sculpin (*Leptocottus armatus*), Starry Flounder (*Platichthys stellatus*), Shiner Surf perch (*Cymatogaster aggregata*), Dungeness Crab, Crangon Shrimp (*Crangon crangon*), Northern Anchovy (*Engraulis mordax*), Pacific Herring (*Clupea pallasii*), and Prickly Sculpin (*Cottus asper*) (Figure 38) (CDFW 2005, CDFW 2006, CDFW 2007. CDFW 2008, CDFW 2009) below. Surveys conducted upstream of the project area (Site 4, Figure 38) identified similar marine species. Small numbers of adult Cutthroat Trout (*Oncorhynchus clarkii clarkii*), and Pacific Lamprey were also observed at Site 4; both are State Species of Concern (Figure 38) (CDFW 2005, CDFW 2006, CDFW 2007. CDFW 2008, CDFW 2009).

Salmonids have also been monitored in Elk River by CDFW. Salmonids use non-natal sloughs and marshes to rear and for migration through Humboldt Bay, including the Elk River Slough (Wallace 2012). Salmonids currently utilizing the estuary include Chinook Salmon, salmon, northern California Steelhead, and Coast Cutthroat Trout (Wallace and Allen 2007, Wallace and Allen 2009, Wallace and Allen 2012). The project area is considered Critical Habitat and Essential Fish Habitat for Chinook and Coho Salmon, as well as northern California Steelhead Trout. These species utilize the Elk River estuary during all life stages (juvenile rearing through adult holding). Wallace et al. (2015) noted the value of estuary habitat for overwintering listed Coho Salmon, in particular. Region-wide overwintering habitat for juvenile coho salmon is considered a limiting factor in species recovery (NOAA 2014). The NOAA Southern Oregon/Northern California (SONC) Coho Recovery Plan (2014) prioritizes restoration actions that will increase overwintering habitat for Coho juveniles.

Tidewater Goby are listed as endangered under the Endangered Species Act. Tidewater Goby is a small fish, rarely exceeding 2” in length (USFWS 2005). Most individuals complete their life cycle in one year, but in northern California fish can live as long as 3 years (Chamberlain 2005). Tidewater Goby are exclusive to brackish habitats for their entire life cycle, and prefer water with salinity less than 12 parts per thousand (ppt), but can be found in water of 0-41 ppt. The project area is considered Critical Habitat for Tidewater Goby. Water samples collected on July 21 and July 27, 2016 by Humboldt State University’s Fisheries Department for eDNA analysis at nine locations in the project area did not detect any Tidewater Goby (Kinziger 2016).

Longfin smelt (*Spirinus thaleichthys*) are an anadromous fish found in California’s bay, estuary, and nearshore coastal environments from San Francisco Bay north to Lake Earl, near the Oregon border, including Humboldt Bay and the project area. Humboldt Bay presently ranks the second highest in abundance of Longfin Smelt. The species has been listed as endangered by the State of California. A small number of longfin smelt were observed by CDFW in the Elk River Estuary between 2005 and 2009 during winter months (CDFW 2005, CDFW 2006, CDFW 2007. CDFW 2008, CDFW 2009).

Green sturgeon (*Acipenser medirostris)* are anadromous and spend most their life cycle in the ocean. The project area is within the distribution range for green sturgeon. NMFS has established federally designated Critical Habitat in the project area for green sturgeon. Green sturgeon were not observed by CDFW during prior monitoring (CDFW 2005, CDFW 2006, CDFW 2007. CDFW 2008, CDFW 2009)

Eulachon (*Thaleichthys pacificus*) are listed as threatened under the Endangered Species Act. According to CDFW distribution of the species does include coastal streams of Humboldt Bay, including the Elk River. However, Humboldt Bay is at the most southern end of the known historic range of the species; eulachon are likely extirpated south of the Klamath River. Humboldt Bay and its tributaries have not been designated as critical habitat for Eulachon. Eulachon were not observed by CDFW during prior monitoring (CDFW 2005, CDFW 2006, CDFW 2007. CDFW 2008, CDFW 2009).

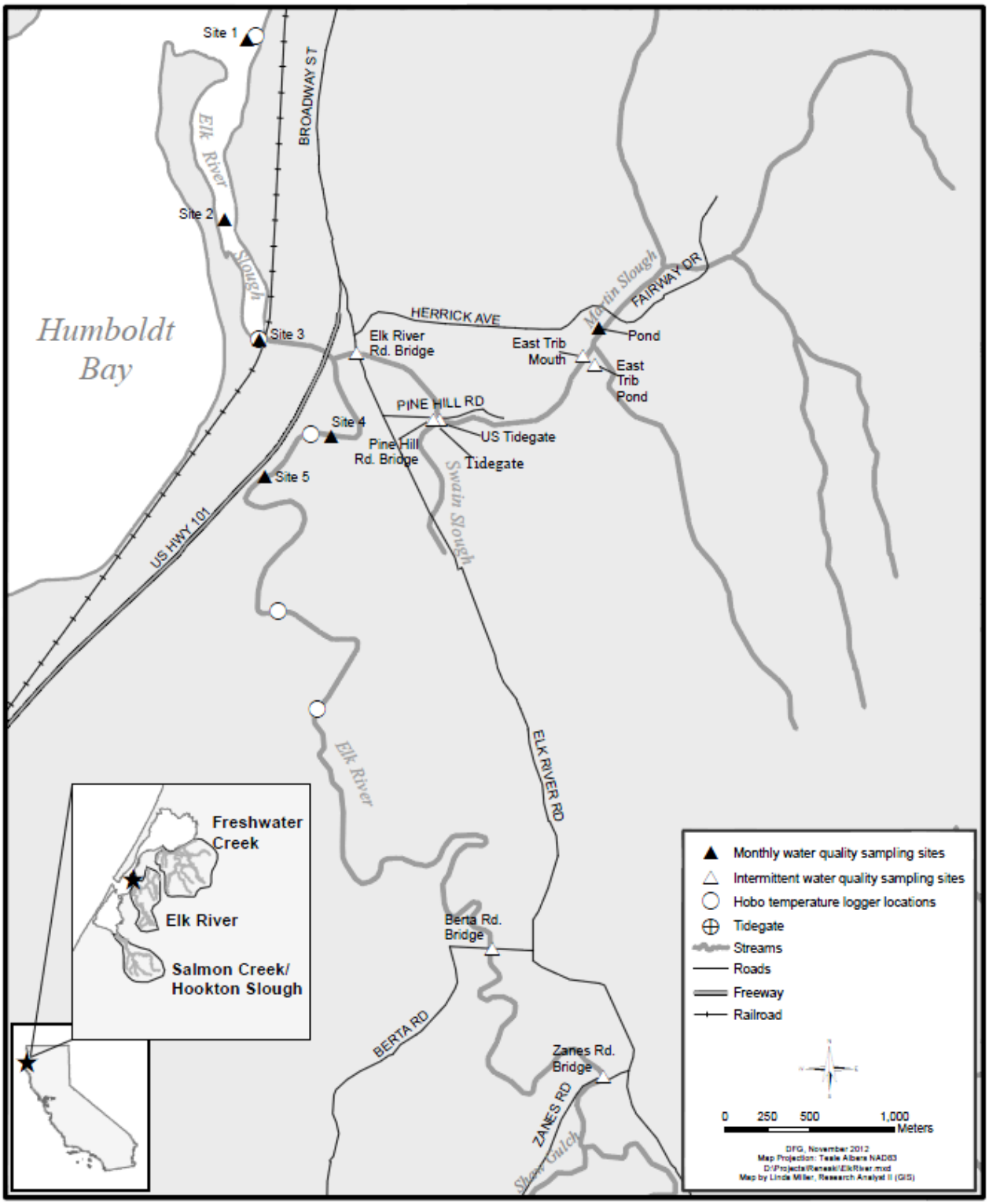


Figure 38. Site location map of CDFW water qualify and fisheries sampling sites in the lower Elk River watershed. Figure from CDFW.

Land Use

Area 1 is in the City's land use jurisdiction and is zoned Natural Resource (NR). Restoration and enhancement of coastal wetlands are allowable uses on NR zoned property. However, pursuant to the Coastal Act, Area 1 is in the State's retained jurisdiction. Therefore, proposed project activities, which are considered developments, will be subject to Coastal Commission authorization. The policies in Chapter 3 of the Coastal Act will apply to the proposed project activities. Existing zoning and regulatory policies are deemed to be compatible with the goal of the proposed project of expanding and enhancing the estuary and inter-tidal wetlands on Elk River. All applicable local, state, and federal regulatory authorizations will be secured for the proposed project prior to commencing work. Area 1 also includes NCRA property, zoned Public Facility, the site of Eureka's proposed extension of its Waterfront Trail. On the City's property and parallel to the railroad is a 30-foot right-of-way easement that HCSD holds for their sewer line.

Area 2 is in the City's land use jurisdiction and is zoned coastal agriculture. Pursuant to the Coastal Act, approximately 12.5 acres of Area 2 is in the State's retained jurisdiction pursuant to the Coastal Act, while the remainder of the area is in the City's Local Coastal Program (LCP) jurisdiction. Development will be subject to both the City's and Coastal Commission authorization. The City leases its property in Area 2 for livestock grazing. The use of Area 2 for livestock grazing also provides seasonal Aleutian goose with grazing habitat. In the past, Area 2 was used for bio-solids disposal; that use was discontinued in 2008. HCSD's forced main sewer line runs parallel to the NCRA's railroad grade in a 30-foot easement on the City's property.

The policies in the City LCP and in Chapter 3 of the Coastal Act apply to the proposed project activities. Existing zoning and regulatory policies are deemed to be supportive of the project goal of expanding and enhancing the estuary and inter-tidal wetlands on Elk River. However, there is an inherent conflict between policies to restore tidal wetlands whenever feasible and protect agricultural lands. As these are former tidelands their restoration can only occur in this location, while agricultural uses are prevalent on areas other than historic tide lands. Further, estuaries are valuable habitat for the recovery of protected Coho salmon, and naturally occur in the lower-most reaches of rivers such as Elk River. On the balance restoring former tidal wetlands and enhancing the estuary on Elk River are of greater priority in this unique coastal location than perpetuating agricultural uses on these public lands.

Caltrans property borders Area 2, but the proposed actions do not encroach on their property.

Environmental Factors Potentially Affected

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

❑ Aesthetics	☒ Agricultural Resources	❑ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology/Soils
❑ Green House Gas Emissions	☒ Hazards/Hazardous Materials	x Hydrology/Water Quality
❑ Land Use/Planning	❑ Mineral Resources	☒ Noise
❑ Population/Housing	❑ Public Services	☒Recreation
❑ Transportation/Traffic	❑ Tribal Cultural Resources	❑ Utilities/Service Systems
☒ Mandatory Findings of Significance		

Determination

On the basis of this initial evaluation:

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

☑ 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 those 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.

Kristen M Goetz

Kristen M. Goetz
Senior Planner
Development Services
City of Eureka

8-11-17

Date

Checklist and Evaluation of Environmental Impacts

An explanation for all checklist responses is included, and all answers take into account the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts. The explanation of each question identifies (a) the significance criteria or threshold, if any, used to evaluate each question; and (b) the mitigation measure identified, if any, to reduce the impact to less than significant. For each question, there are four possible answers:

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

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

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

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

Summary of Recommended Mitigation Measures

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

1. Aesthetics

1.1 After construction, the City will install signage in the Pound Road and Tooby Road parking areas. Signage will indicate that the hours of public use are to be limited to daylight hours only (sunrise to sunset).

2. Agricultural and Forestry Resources

2.1 Once grading is complete, the project will plant 12.8 acres of native riparian forest species.

3. Air Quality

The project will have less than a significant impact on air quality resources, and mitigation measures are therefore not required.

4. Biological Resources

4.1 Construction shall only occur between July 1st and October 31st when freshwater discharge of the Elk River is at its lowest and when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction.

4.2 Prior to dewatering and beginning construction, the Fish Avoidance Plan shall be implemented to passively encourage fish to leave the project area without harming them.

4.3 If water remains present during low tides and/or after sealing the Area 1 tide gates, aquatic habitat will be impacted by pumping for the shortest time necessary to complete construction or excavation. Pumps used to de-water work areas shall utilize a fish screen on the inlet of sufficiently sized mesh to prevent entrainment.

4.4 Surveys of freshwater habitat by a qualified biologist for juvenile red-legged frogs shall occur two weeks prior to disturbance activities in the areas to be de-watered (July through August). Any red-legged frogs found shall be relocated to suitable areas outside of the area of disturbance. Construction activities shall occur only when the area is dry and when adult red-legged frogs are not expected to be present.

4.5 Northwestern pond turtle surveys shall be carried out by a qualified biologist along tidal margins two weeks prior to commencement of ground disturbing activities (July and August). Surveys shall be utilized to locate and flag northwestern pond turtle nests with eggs, or to remove hatchlings and adults that may be present in the stream reaches above the existing tidal zone below first diversion. Any active nests located shall be left undisturbed until hatchlings have emerged or have been relocated to suitable areas outside of the area of disturbance; similarly relocation of any adults found will occur. No existing freshwater ponds shall be impacted by the project.

4.6 Surveys by a qualified biologist for nesting birds 1,000 ft beyond the limits of disturbance shall occur two weeks prior to commencement of ground-disturbing activities. If breeding is confirmed

of any special status birds, construction activities that will degrade or remove breeding habitat shall not occur in the immediate vicinity until the end of the breeding period for that species or until the breeding effort has either been determined to have failed or the young have been determined to have fledged.

4.7 If possible, vegetation clearing activities shall take place between August 16 and March 13, outside of the active nesting season for migratory bird species (i.e., March 14 to August 15).

4.8 If work must be completed during the nesting season, a qualified biologist shall conduct preconstruction surveys of all ground disturbance areas to verify absence of nesting migratory birds in the project area within two weeks prior to vegetation removal and the start of construction. If nesting migratory birds are found in the project construction area during the preconstruction surveys, they shall be avoided with an appropriate buffer area until the young birds have fledged. Buffers shall be 250 ft for raptors, 100 ft for threatened and endangered species, 50 ft for other special-status bird species; however, buffers may be modified after consultation with, and agreement by CDFW. If state listed California Endangered Species Act (CESA), federally listed Endangered Species Act (ESA), or raptors are found outside of the construction area but near the construction area, appropriate buffers shall be implemented. If non-listed state CESA, non-listed federal ESA, including state species of special concern are found near, but outside of the construction area, no buffers will be implemented.

4.9 Vegetative disturbance shall be contained within the limits of grading and kept to a minimum area.

5. Cultural Resources

5.1 If potential archaeological or paleontological resources are encountered during project subsurface construction activities or geotechnical testing, all work within 50 ft of the find shall be stopped, and a qualified archaeologist funded by the City of Eureka shall be contacted to evaluate the find, determine its significance, and identify any required mitigation. The applicant shall be responsible for implementing the mitigation prior to construction activities being re-started at the discovery site.

5.2 If project related geotechnical excavations become necessary, as a result of final design, and those excavations are to be more than one ft deep, then the THPOs of each local native American tribe, as noted above, will be contacted and given the date and time of excavations so that a cultural monitor may be present to observe for the presence of buried archaeological materials.

6. Geology and Soils

6.1 A California registered Geotechnical Engineer shall conduct a design-level geotechnical study for the project. The geotechnical study shall evaluate seismic hazards and provide recommendations to mitigate the effect of strong ground shaking; any unstable, liquefiable, or expansive soils; or settlement in adherence with current California Building Code (CBC) standards for earthquake resistant construction. The seismic criteria shall consider the active faults in the Eureka area and beyond, and ground motions and shaking related to the faults shall be accounted. The geotechnical study shall include evaluation of unstable land in the project area, including areas susceptible to liquefaction, lateral spreading, or settlement, and areas containing expansive soils. The study shall provide measures to repair, stabilize, or avoid such

soils, and include grading, drainage, paving, and foundation design recommendations. The project shall be designed and constructed in conformance with the specific recommendations contained in the design-level geotechnical study, including recommendations for grading, ground improvement, and foundation support. The recommendations made in the geotechnical study shall be incorporated into the final plans and specifications and implemented during construction. Professional inspection of foundation and excavation, earthwork and other geotechnical aspects of site development shall be performed during construction in accordance with the current version of the CBC.

6.2 Construction shall only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when Elk River freshwater inputs are at summer baseflow thresholds.

6.3 Placement of fill in the project area shall occur when the area is not inundated by tide water.

6.4 Dewatering measures shall be in place to bypass any discharge from entering the work site.

7. Greenhouse Gas Emissions

The project will have less than a significant impact on greenhouse gas emissions, and mitigation measures are therefore not required.

8. Hazards and Hazardous Materials

8.1 Heavy equipment used in the project shall be in good condition and shall be inspected for leakage of coolant and petroleum products and repaired, if necessary, before work is started.

8.2 Equipment operators shall be trained in the procedures to be taken should an accidental spill occur.

8.3 Prior to the onset of work the contractor shall prepare a plan for the prompt and effective response to any accidental spills.

8.4 Absorbent materials designed for spill containment and cleanup shall be kept at the project site for use in case of an accidental spill.

8.5 Refueling of equipment shall occur within the staging area. Within the staging area, refueling will occur on a pad to capture any drips or spills.

8.6 If equipment must be washed, washing shall occur off-site.

8.7 Stationary equipment shall be positioned over drip pans.

8.8 Equipment on site during construction shall be required to have emergency spill cleanup kits immediately accessible in the case of any fuel or oil spills.

8.9 Staging, fueling and maintenance of equipment shall be conducted only in in staging areas only and no closer than 150 ft from open water or in any location where hazardous material spills could become entrained in flowing water.

9. Hydrology and Water Quality

9.1 Construction and Spartina eradication shall only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when background Elk River freshwater inputs are at summer baseflow thresholds. Excavated materials shall not be stockpiled overwinter. Sediment control measures shall be in place while materials are being stockpiled to minimize sediment and pollutant transport from the project site.

9.2 Placement of fill in the project area shall occur when the area is not inundated by tide water.

9.3 Excavation shall include handling of saturated soils. Saturated soils shall be dewatered and/or transported saturated in a manner that prevents excess discharge or spillage of soils or water within the construction access areas. A silt fence shall be installed around the perimeter of temporary stockpiles of saturated soils to prevent runoff from leaving the site.

9.4 During construction, a silt fence shall be deployed to isolate work areas from existing channels, and to trap suspended sediment that might leave the construction site if stormwater runoff were to occur. If the silt fence is not adequately containing sediment, the construction activity shall cease until remedial measures are implemented that prevent sediment from entering the waters below.

9.5 No construction materials, debris, or waste, shall be placed or stored where it may be allowed to enter or be washed by rainfall into waters of the U.S./State.

9.6 Following completion of excavation, placement of fill, and grading all ground to the limits of disturbance (except newly constructed streambeds, pond beds, and tidally inundated areas) shall be treated for erosion prior to the onset of precipitation capable of generating run-off or the end of the yearly work period, whichever comes first. Treated areas that are not exposed to tidal influence shall be mulched with at least 2 to 4 inches of certified weed-free straw mulch with wheat or other straw for riparian and wetland areas and rice straw for uplands and use of a seed mix with coverage equivalent to 100 lbs/acre of barley seed and appropriate riparian vegetation for immediate erosion control. No annual (Italian) ryegrass (Lolium multiflorum) shall be used. In places such as stream banks, rush mattresses shall be installed for immediate erosion control.

9.7 All temporary fill, synthetic mats and silt fences shall be removed from wetlands and waters of the U.S./State immediately on cessation of construction. Biodegradable geotextile fabrics shall be used, where possible.

9.8 Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.

9.9 The following BMPs (California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003) shall be implemented to prevent entry of storm water runoff into the excavation site, the entrainment of excavated contaminated materials leaving the site, and to prevent the entry of polluted storm water runoff into coastal waters during the transportation and storage of excavated contaminated materials:

EC-2 Preservation of Existing Vegetation
EC-6 Straw Mulch
EC-7 Geotextile and Mats
EC-9 Earth Dikes and Drainage Swales
EC-10 Velocity Dissipation Devices
SE-1 Silt Fence
NS-2 Dewatering Operations

NS-4 Temporary Stream Crossing
NS-5 Clear Water Diversion
WM-9 Sanitary/Septic Waste Management

Stream diversion and dewatering shall conform to the following BMP (California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003)
NS-2 Dewatering Operations
NS-5 Clear Water Diversion
EC-9 Earth Dikes and Drainage Swales
EC-10 Velocity Dissipation Devices

9.10 Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper drying time prior to tidal inundation. Herbicides shall be applied by a certified applicator and in accordance with application guidelines and the manufacturer label. The project's site specific water quality control plan shall include and obtain coverage for use of herbicides to treat Spartina from the North Coast Water Quality Control Board.

Herbicides shall be applied by or under the direct supervision of trained, certified or licensed applicators. Herbicide mixtures shall be prepared by, or under the direct supervision of trained, certified or licensed applicators. Storage of herbicides and surfactants on or near project sites shall be allowed only in accordance with a spill prevention and containment plan included in the site-specific water pollution prevention plan approved by the NCRWQCD; on-site mixing and filling operations shall be confined to areas appropriately bermed or otherwise protected to minimize spread or dispersion of spilled herbicide or surfactants into surface waters.

9.11 The City of Eureka shall coordinate with the contractor to develop and implement a site-specific water pollution control plan, subject to review and approval by the NCRWQCB.

9.12 To inform trail users of the potential of tsunami run-up inundating the trail area, each trailhead location shall have signage informing the public of what actions to take in the event of seismic activity. Said signage shall be posted to the satisfaction of the City of Eureka and prior to the trail being open to the general public.

10. Land Use and Planning

The project will have no impact on land use and mitigation measures are therefore not required.

11. Mineral Resources

The project will have no impact on mineral resources, and mitigation measures are therefore not required.

12 Noise

12.1 Workers shall be required to wear hearing protection when in the vicinity of or while operating equipment producing noise levels equal to or greater than 85 db.

12.2 Restrict noise from earthmoving and hauling of soils to daytime hours. Hours of construction for outdoor activities exceeding 50 dBA shall be limited to Monday through Friday 7:00 a.m. to 7:00 p.m. and weekends and holidays from 8:00 a.m. to 6:00 p.m. Movement and hauling of material, and associated activities such as re-fueling or maintenance, shall be limited to normal working hours for the area, as specified above. More restrictive operation hours may be specified in the

construction documents and may be property-specific.

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

12.4 A haul-truck route plan shall be developed. Hauling shall minimize passing any substantial collection of noise-sensitive land uses (i.e. occupied houses, schools, hospitals).

12.5 Larger capacity belly and end-dump trucks as well as double-trailers shall be used whenever feasible to minimize the number of truck trips necessary.

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

12.7 Notify commercial property neighbors when activity involving heavy construction equipment is scheduled to occur within 250 ft of occupied structures. Construction personnel shall provide written notification to the adjacent property owners prior to using heavy construction equipment. The written notification shall be provided to each potentially affected property at least 72 hours prior to the start of the activity, and shall indicate the approximate duration of time (dates and hours) during which the noise-generating activity is expected to occur.

12.8 If necessary, limit public access to Pound Road and the Hikshari Trailhead during construction to avoid exposing people to noise levels higher than standards established in the local general plan, or applicable standards of other agencies.

13. Population and Housing

The project will have no impact on population and housing, and mitigation measures are therefore not required.

14. Public Services

The project will have no impact on public services, and mitigation measures are therefore not required.

15. Recreation

The project will have a less than significant impact with successful implementation of mitigation measures. As detailed previously (Agriculture, Biological Resources, Geology and Soils, Hazards and Hazardous Materials, and Hydrology and Water Quality), impacts resulting from constructing public access related structures will be mitigated to less than significant with the successful implementation of mitigation measures.

16. Transportation and Traffic

The project will have less than a significant impact on transportation and traffic, and mitigation measures are therefore not required.

17. Tribal Cultural Resources

The project will have no impact on tribal cultural resources, and mitigation measures are therefore not required.

18. Utilities and Service Systems

The project will have no impact on utilities and service systems, and mitigation measures are therefore not required.

19. Mandatory Findings of Significance

The project will have no additional findings of significance, and mitigation measures beyond those already stated in previous sections are not required.

1 Aesthetics

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

a) Would the project have a substantial adverse effect on a scenic vista?

Thresholds of Significance

Long-term intrusion or alteration of a scenic vista that is visible to the public.

Assessment

The project will have a short-term impact that is less than significant on a scenic vista.

With regard to scenic vistas and scenic resources, the principle purposes of the proposed project are to restore the Elk River Estuary and increase public access. The project area is in the coastal zone, and therefore subject to applicable coastal scenic resource protection measures. The scenic vistas from the project area and the proposed Eureka Waterfront Trail extension include views of Humboldt Bay and Elk River Slough. Views also include a variety of commercial, residential, recreational, light industrial, railroad right of way, and Highway 101.

Enhancement of the Elk River estuary will increase the long-term scenic quality of the project area, attracting additional birds and wildlife species, replacing existing unnatural linear in-board ditches, cement tide gates, and other unsightly landscape attributes with a natural, self-functioning ecosystem.

The proposed Waterfront Trail extension runs near the edge of Humboldt Bay parallel to the NCRA railroad track for the majority of its alignment. The 1,000 ft trail extension in Area 1 will commence at the current end point of Hiksari' trail near the terminal point of Pound Road, west of Highway 101 and extend south to the northern bank of the mainstem Elk River. A second 1-mile trail south of the Elk River in Area 2 will also align parallel the existing NCRA railroad and will be constructed atop a tidal ridge (10 – 14 ft in elevation). A non-motorized boat launch will be constructed near the terminal end of Pound Road in Area 1. Elevated causeways and viewing platforms will be located in both Area 1 and Area 2 to provide scenic and wildlife viewing opportunities to the public. Parking for Area 1 trail and boat launch access will utilize the existing parking area at the end of Pound Round. A new parking area will be constructed at the southern end of the project near the terminus of Tooby Road for Area 2 trail, utility, and emergency vehicle access.

The Bay and Elk River Slough are visible from the proposed trail, causeway, and viewing platform alignments. Views from this area include sloughs, the Elk River and Humboldt Bay. Commercial, residential, public, and recreational uses are also visible, along with Highway 101.

Implementation of the project would not block or alter any of the existing views noted previously. Views of the trail extension itself would be relatively limited as the project consists mostly of a 14 ft ADA

compliant trail (10 ft of which will be paved) surface with few vertical features aside from interpretive signage and benches. Causeways will be 10 ft wide with 4.5 ft railings. The non-motorized boat ramp approximately 15 x 30 ft (Figure 23-Figure 25).

Signs associated with the project would be consistent with the existing signage presently along the existing Waterfront Trail. City Policy 5.B.1 c. calls for the City to "*establish scenic vista points at numerous locations along the waterfront*…" The project will include scenic vista points along Humboldt Bay and the Elk River Slough.

During and immediately after construction, the short-term vista may be impacted by construction activities, temporary access roads and staging areas, and bare earth visible before native vegetation is replanted and/or begins to naturally reestablish. All temporary access roads and staging areas will be removed and replanted prior the conclusion of the project. Once native vegetation has been planted and reestablished, the short-term impact will conclude.

The project would not have a long-term adverse effect on a scenic vista, and will instead have a beneficial effect on scenic vistas in the project area.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

Thresholds of Significance

Permanent adverse change within a State scenic highway to scenic resources' physical, vegetative, or aesthetic elements visible to the public.

Assessment

The project will have no impact, it is not located in a state scenic highway protection corridor.

Based on California Scenic Highway Mapping System information, no designated state scenic highways are found adjacent to or within view of the project alignment (California Department of Transportation). There are no officially designated State Scenic Highways within Humboldt County, although Highway 101 for its entire length in Humboldt County has been identified by the State Scenic Highway Mapping System as eligible for state listing. The project site is visible from Highway 101; however, due to the project's temporary nature of construction, and the fact that Highway 101 is not a designated state scenic highway, no impact has been identified.

c) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

Thresholds of Significance

Long-term alteration or degradation of the existing visible character and quality of a site and its surroundings, which is visible to the public.

Assessment

The project's short-term effects will have a less than significant adverse impact on the visible character and quality of the project site and its surrounding, which are visible to the public.

The project is expected to improve the scenic quality/character of the area by improving the natural integrity of the coastal marsh ecosystem, inter-tidal channels, and habitat for a wide variety of plant, aquatic and wildlife species.

A non-motorized boat ramp at the end of Pound Road will support paddle craft during all tides (even low tides) to support enjoyment of this improved vista. Additionally, extending the Waterfront Trail will further improve the scenic character of the project area via the installation of interpretive signage and native landscaping, by constructing scenic vista points, and removal of illicit dumping sites and unauthorized camping sites. The attraction of multiple trail user groups may have the added benefit of deterring littering and other potentially damaging activities along the Bay and Elk River Slough.

A 16 foot wide tidal ridge/ living shoreline (to contain tidal inundation and provide emergency equipment access for PG&E) will be constructed parallel to the Highway 101 embankment, although not adjacent. This green technology will improve the overall visual integrity of the Elk River Slough area.

Temporary adverse visual impacts may occur from construction activities associated with the project; however, the project area is primarily undeveloped. This impact would be short term and less than significant. In the long-term and after revegetation, the existing visual character along the project alignment would improve for the reasons mentioned above.

d) Would the project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

Thresholds of Significance

Long-term or permanent development that would create a new source of substantial light or glare.

Assessment

The project will have no impact, as it will not create a new source of lighting or glare.

The proposed project does not include new lighting at parking areas or along the trail alignments. The existing Area 1 parking area at the end of Pound Road is presently accessible to vehicles and public during non-daylight hours. The proposed new parking area for Area 2 near the terminus of Tooby Road will also be accessible to vehicles at night. The proposed project does not involve the use of any lights in parking areas or along the Waterfront trail. The proposed project does not include structures that would create a new source of light or glare. With **Mitigation Measure 1.1**, signage will be installed in both parking areas (end of Pound Road and end of Tooby Road) indicating standard hours of public use during daylight hours (sunrise to sunset) to minimize the amount of potential glare caused by vehicle use during non-daylight hours.

Mitigation Measures

1.1 After construction, the City will install signage in the Pound Road and Tooby Road parking areas. Signage will indicate that the hours of public use are to be limited to daylight hours only (sunrise to sunset).

2 Agricultural Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. **Would the project:**	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				✓
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				✓
c) Conflict with existing zoning for, or cause rezoning of, forest land or timberland?				✓
d) Result in the loss of forest land or conversion of forest land to non-forest use?			✓	
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?		✓		

a) Would the project 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?

Thresholds of Significance

Physical changes that prevent the use of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural uses.

Assessment

There is no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance in the project area, therefore the project will have no impact.

Area 1 is zoned Natural Resources (NR) and is not used for any agricultural-related purposes. Area 1 is presently an estuary/salt marsh environment invaded with Spartina and not suitable for grazing or other agricultural applications. Area 2 is zoned Coastal Agriculture (AC) and presently leased for livestock grazing. There are currently 38 cows and 10 calves grazing Area 2. This results in an annual Animal Unit (AU) value of 0.54/year.

Coastal Land Use Policy

The City's Coastal Land Use Policy defines the purpose of the agriculture (A) land use designation as providing protection of agricultural lands, including farmed or grazed wetlands, for long-term productive agricultural and wildlife habitat uses. Conditional uses for AC Zoning include wetland restoration projects, nature study, aquaculture, and similar resource-dependent activities, as well as incidental public purposes which temporarily impact the resources of the area. The project's wetland restoration

goals are consistent with the allowed conditional use of lands designated for agricultural uses within the project area, as defined by the City's Coastal Land Use Plan.

Prime Farmland

According to the State of California, to be considered Prime Farmland, the property must be both irrigated and possess suitable soils. The project meets neither criteria and is thus not considered Prime Farmland. The Humboldt County Web GIS Portal includes a layer for Prime Farmland; none of the project parcels are mapped as Prime Farmland in this database.

Unique Farmland

To be considered Unique Farmland, lesser quality soils are included; however, Unique Farmlands are also irrigated with the exception of certain vineyards and orchards in specific climate zones throughout California. Because the project is not irrigated and does not include vineyards or orchards, it is not eligible to be Unique Farmland.

Farmland of Statewide Importance

Farmland of Statewide Importance is similar to Prime Farmland but with greater slope and less ability to store soil moisture. Additionally, lands must have been used for irrigated agriculture during the prior four years. Because the project area is unirrigated, essentially flat and has a high ability to store soil moisture (the area is largely a wetland), the criteria for Farmland of Statewide Importance is also not met. The Humboldt County Web GIS Portal includes a layer for Farmland of Statewide Importance; none of the project parcels are mapped as Prime Farmland in this database.

STORIE Index for Soils

The Storie Index for soils expresses numerically the relative degree of suitability, or value, of a soil for general intensive agriculture. Grade 1 soils with high Storie Index ratings between 80 – 100 are well suited to general intensive agriculture. Grade 2 Storie Index ratings between 60 – 80 represent soils that are moderately suited to intensive agriculture. Grade 3 Storie Index ratings between 40 – 60 represent soils that are fairly suited for agricultural purposes. Grades 4, 5, and 6 soils have poor suitability for agriculture uses with scores of 40 and lower.

Soils in both Area 1 and Area 2 is attributed as Ba6. The Ba6 category represents Bayside silty clay loam and is very poorly drained, with slopes ranging from zero to three percent. This type of soil is present in very low lying areas around Humboldt Bay and overlies the Hookton formation. Bayside soils are imperfectly to poorly drained, fine-textured basin soils, developed in sedimentary alluvium from the Franciscan and Wildcat formations in the North Coast Range mountains. Ba6 soils occur at low elevations, ranging from sea level to above 50 ft with an approximate 10-mile perimeter surrounding Humboldt Bay. Ba6 soils have a Storie Index rating of 5 and is poorly suited for agriculture, exhibiting one of the poorest Storie Index scores possible.

Summary

The project area does not include Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The project is not formally designated as Prime Farmland or Unique Farmland by the Farmland Mapping and Monitoring Program of the California Resources agency. The land is not irrigated and has poor soils that do not drain, both of which are criteria for categorization as Prime or Unique Farmland. Area 2 is not considered Farmland of Statewide Importance because it has not been irrigated during the past four years. The Storie Index soil classification for the project area indicates the project parcels are among the poorest quality possible for intensive agricultural uses. Thus, there is no conversion Farmland to non-agricultural uses and no impact.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

Thresholds of Significance

Implement land uses that are not allowed and conflict with existing zoning for agricultural use, or a Williamson Act contract.

Assessment

The project will have no impact, as it is located on land zoned Coastal Agricultural, which allows wetland restoration and the project area is not under a Williamson Act contract.

Existing Zoning

Area 1 is zoned Natural Resources and is not compatible with agriculture use. Area 2 is zoned for Coastal Agriculture. The City's Coastal Land Use Plan describes the purpose of AC Zoning as protecting agricultural lands and giving special protection to land which are also farmed or grazed wetlands, for long-term productive agricultural and wildlife habitat use. Conditional uses for AC zoning are defined as wetland restoration projects, nature study, aquaculture, and similar resource-dependent activities, as well as incidental public purposes which temporarily impact the resources of the area.

The California Coastal Act (Section 30001.5 (a)) states the basic goals of the state for the coastal zone are to protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.

Williamson Act

The Williamson Act is a program for counties to protect viable agricultural land by offering a tax incentive to property owners for keeping their land in agricultural production. The Williamson Act contract is an enforceable restriction on land and is binding on successors to both the landowner and the local government. None of the project parcels are currently enrolled in the Williamson Act program, as verified on the Humboldt County Web GIS Portal.

Summary

Project goals for enhancing and restoring wetlands are consistent with the stated Conditional Uses allowable for the AC zoning in Area 2. The project will restore wetland and similar resource-dependent activities such as improving and increasing fish and aquatic habitat for a variety of species, increasing Eelgrass habitat, and restoring natural tidal processes. The project is also consistent with the California Coastal Act, which emphasizes the restoration of the coastal zone environment, and where feasible the restoration of marine resources like estuaries and inter-tidal wetlands (PRC Section 30230). The project area is not presently enrolled in the Williamson Act program and is thus not under contract. This project has no conflicts with existing zoning for agricultural use or a Williamson Act contract.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in PRC Section 12220(g)) or timberland (as defined in PRC Section 4526)?

Thresholds of Significance

Implement land uses that are not allowed and conflict with forest or timber land uses or zoning.

Assessment

The project will have no impact to forest land or timberland zoning as they do not exist at the project location.

The project area is zoned Natural Resources (NR) and Coastal Agricultural (CA). The city does not have forest or timber land zones. The project area is predominately former salt marsh and is not suitable for native tree cover (forest land), although approximately 9 acres of riparian habitat will be restored in higher elevation areas. The restored riparian habitat will support native riparian tree cover, but not commercial species. While it will meet the definition of forest land, it will not be zoned as such. The project would restore riparian habitat (forest land) and will not conflict with timberland uses or zoning, which are absent from this area.

d) Would the project result in the loss of forest land or conversion of forest land to non-forest use?

Thresholds of Significance

Physical changes that would result in the loss of forest land or conversions of forest land to non-forest uses.

Assessment

The project will have a less than significant impact to forest land.

The project proposes to introduce tidal inundation in the project area which contains some areas with sufficient elevation to support native tree cover but due to the grazing of livestock do not. The project will construct a tidal channel (approximately 1.8 acres) through a natural sand formation that has sufficient elevation to support native trees, but does not due in part to ongoing grazing. The project proposes to restore approximately 12.6 acres of forest land by increasing surface elevations and planting native riparian trees and shrubs, resulting in a net gain of forest land. Thus, there will be no significant impact to forest land with the successful implementation of the riparian restoration plan.

e) Would the project 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?

Thresholds of Significance

Physical changes which could convert adjacent farmlands to non-agricultural use or convert adjacent forest lands to non-forest use.

Assessment

The project will have no impact to adjacent Farmlands and will have no significant impact with mitigation to adjacent forest lands.

As discussed in 2a above, the project site is not Farmland and is not located near Farmland. The project is surrounded by transportation infrastructure (Waterfront Trail, NWP Rail Road, US Highway 101, and a frontage road), and to the south the land outside the City limits is zoned Coastal Recreation and NR. The land to the south is used to graze livestock but does have some areas of sufficient elevation (greater than 10 ft) that could support native trees (forest land) absent grazing. These forest lands to the south of the project area could be adversely affected with the introduction of tidal inundation in the project area, which is why tidal ridges will be constructed and a natural topographic divide enhanced to protect these areas from tidal inundation. The project will restore 12.8 acres of riparian habitat (forest land). Therefore, with the absence of Farmland and the construction of tidal ridges and an increase in elevation of the topographic divide on the project’s southern border no adverse impact is anticipated to adjacent potential forest land.

Mitigation Measures

2.1 Once grading is complete, the project will plant 12.8 acres of native riparian forest species.

3 Air Quality

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. **Would the project:**	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?			✓	
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				✓
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)?			✓	
d) Expose sensitive receptors to substantial pollutant concentrations?				✓
e) Create objectionable odors affecting a substantial number of people?				✓

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?

Thresholds of Significance

Project generates pollutants that would prevent attainment of the North Coast Unified Air Quality Management District's (NCUAQMD) long-term air quality objectives.

Assessment

The project will have less than significant impacts on the implementation of the NCUAQMD air quality plan.

The project site is located within the North Coast Air Basin (NCAB), which is under the jurisdiction of the NCUAQMD. The NCAB currently meets all federal air quality standards; however, the entire air basin is currently designated as non-attainment for the state 24-hour and annual average particulate matter smaller than 10 microns in size (PM10) standards. The air basin is designated as unclassified for the state annual PM2.5 standard. Both natural and anthropogenic sources of particulate matter (including vehicle emissions, wind generated dust, construction dust, wildfire and human caused wood smoke, and sea salts) in the NCAB have led to the PM10 non-attainment designation.

To address non-attainment for PM10, the NCUAQMD adopted a Particulate Matter Attainment Plan in 1995. This plan presents available information about the nature and causes of PM10 standard exceedances and identifies cost-effective control measures to reduce PM10 emissions to levels necessary to meet California Ambient Air Quality Standards. These rules and regulations are set forth to achieve, maintain, and protect health-based State and Federal Ambient Air Quality Standards and prevent deterioration of levels of air quality which may jeopardize human health and safety; prevent injury to plant and animal life; avoid damage to property; and preserve the comfort, convenience, and enjoyment of the natural attractions of the NCAB.

Pursuant to Air Quality Regulation 1, Chapter IV, Rule 400 – General Limitations, a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or

which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property. Visible emissions include emissions that are visible to the naked eye, such as smoke from a fire.

The project's construction activities are of limited scope and duration and do not involve any stationary sources of pollutants. During construction, the operation of vehicles and equipment as well as excavation and grading activities will generate pollutants in the short-term such as fugitive dust (particulate matter less than 10 microns [PM10]). While the short-term operation of vehicles and diesel powered construction equipment does release PM 10 and nitrogen oxides (NOx) pollutants, these releases are not expected to result in a substantial adverse effect as all equipment will be equipped with state approved exhaust systems, and maintained in good working order. Fugitive dust, less than PM 10, associated with grading in the project's 114-acre restoration area will be generated for a limited time but will only affect a localized area during project activities until tide water inundation is restored. Mulching and seeding with grass is normally used to minimize the generation of dust. However, this method is not considered viable in tidally inundated areas. While the NCUAQMD does not require a permit for excavation and grading activities, the City will coordinate with the NCUAQMD.

To summarize, the project would not directly contribute any air emissions once the project is in full operation, because only non-motorized use is allowed from the new boat ramp and Waterfront Trail extension. The project would temporarily generate a minor amount of particulate emissions over the duration of construction in the form of dust and vehicle emissions as a result of earthwork, grading, paving, and other construction activities. The project would not cause any long-term increase in the emissions of particulate matter or other air pollutants. To further reduce potential impacts to air quality to a level below the thresholds of significance, state law requires the construction contractor to operate in accordance with Air Quality Regulation 1 – Air Quality Control Rules, which will reduce potential fugitive dust emission impacts.

The project will not result in adverse air quality impacts including exceeding or violating an air quality plan. Based on the conclusions above and adherence to the NCUAQMD's rules and regulations, the project will not result in any significant adverse air quality impacts; therefore, impacts would be less than significant.

b) Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Thresholds of Significance

Release of pollutants that violate an air quality standard, or substantially contribute to an existing air quality violation

Assessment

The project will have no impact to any air quality standards nor substantially contribute to an existing air quality violation.

While the short-term operation of vehicles and diesel powered construction, equipment does release PM 10 and NO_x pollutants, these releases are not expected to result in a substantial adverse effect as all equipment will be equipped with state approved exhaust systems, maintained in good working order. Fugitive dust, less than PM 10, will be generated for a limited time but will only affect a localized rural area during Project activities and until the newly disturbed salt marsh restoration area becomes saturated or vegetated.

There are no existing air quality violations in the project area.

c) Would the project 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)?

Thresholds of Significance

Production of pollutants by the project that would result in a cumulatively considerable net increase in pollutants for which the NCAB is in non-attainment.

Assessment

The project will have a less than significant impact.

The project involves a relatively low level of construction activity, limited in scope and duration, with respect to air quality, and the net increase to PM10 will be minor and temporary. These ordinary construction emissions will not result in violations or attainment plan conflicts. Although minor potential impacts are expected, they will be less than significant with adherence to the NCUAQMD's rules and regulations.

The project would not directly contribute any air emissions once the project is in full operation, because only non-motorized use is allowed from the boat ramp and Waterfront Trail extension. The proposed project would not obstruct implementation of the NCUAQMD Particulate Matter Attainment Plan, violate air quality standards, or contribute substantially to an existing or projected air quality violation. However, the project may result in an increased number of vehicle trips to the project vicinity to make use of the trail (see **Section 16 Transportation** for further discussion on increased traffic). When viewed together with background vehicle emission levels, and considering that any increase in motor vehicles trips is likely to cause a corresponding increase in non-motorized activity on the trail, PM10 emissions related to the project are expected to be less than significant.

d) Would the project expose sensitive receptors to substantial pollutant concentrations?

Thresholds of Significance

The project would result in a substantial increase of pollutants that are capable of reaching sensitive receptors.

Assessment

The project will have no impact on sensitive receptors.

Sensitive receptors include school-aged children (schools, daycare, playgrounds), the elderly (retirement community, nursing homes), the infirm (medical facilities/offices), and those who exercise outdoors regularly (public and private exercise facilities, parks).

The project is in an undeveloped area separate from the urban development of Eureka. There are no schools, day cares, nursing homes, or medical facilities nearby. The existing Waterfront trail does presently terminate at Pound Road at the northern boundary of Area 1. The trail is currently utilized by members of the public who are exercising and recreating outdoors. Users of the Waterfront Trail are the only sensitive receptors located adjacent to, or near, the project. Therefore, the existing trailhead at the end of Pound Road and the southern portion of the Waterfront (Hikshari) Trail will be closed during construction in Area 1, so as to remove sensitive receptors from the project site when vehicular emissions would contribute to local pollutant levels. The NCUAQMD has advised that, generally, an activity that individually complies with the state and local standards for air quality emissions will not

result in a cumulatively considerable increase in the countywide PM10 air quality violation. With the required compliance with NCUAQMD standards and regulations, the project will not result in adverse air quality impacts, nor result in a cumulatively considerable increase in the PM10 non-attainment status. With temporary closure of the Waterfront Trail during construction there will be no impacts to sensitive receptors.

e) Would the project create objectionable odors affecting a substantial number of people?

Thresholds of Significance

The project would result in a substantial increase of objectionable odors that are capable of reaching substantial number of people.

Assessment

The project will have no impact on a substantial number of people as a result of increasing objectionable odors.

The project would create odors that could reasonably be considered objectionable by the general public but only for a limited time during construction from exhaust fumes associated with gas or diesel powered equipment. However, the construction areas will be closed to the public using Waterfront Trailhead and Trail. There are no residences near the project area. Area 1 of the project is adjacent (downwind) of a wastewater treatment plant and objectionable odors sometimes emanate from this facility. Humboldt Bay and its tidal and non-tidal wetlands, adjacent to and in the project area can generate objectionable odors associated with decaying organic matter from time to time, but only because of natural decomposition. These odors are not expected to increase because of the project's estuary and inter-tidal wetland restoration and enhancement. With temporary closure of the Waterfront Trail during construction there will be no impacts to a substantial number of people from objectionable odors.

4 Biological Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		✓		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			✓	
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?			✓	
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?				✓
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				✓
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?				✓

a) Would the project 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?

Thresholds of Significance

Direct impacts on individuals of any protected species or species of concern or substantial adverse impacts to their habitat functions or values.

Assessment

This project will have a less than significant impact, with the successful implementation of mitigation measures, on protected species and species of special concern, or the habitats that support these species.

Project activities are designed to restore and enhance aquatic habitats and restore a mosaic of inter-tidal wetlands. Most of the protected species or species of concern potentially affected by this project utilize tidal waters and inter-tidal wetlands. This section therefore will evaluate potential impacts on open water, salt marsh, seasonal farmed wetlands, riparian, and upland pasture habitat types and an analysis of the protected species or species of concern that may occupy these habitat types.

Presence of Special Status Species

Special status species are legally protected pursuant to the California Environmental Quality Act (CEQA) Section 15380, and include species protected under California and federal Endangered Species Acts, and California's "Fully Protected Species" statutes (Fish and Game Code Sections 3503.5, 3505, 3511, 4700, 5050, and 5515). The species list assembled for the Elk River includes species that are likely to be present or were found to be present during field surveys conducted by qualified scientific staff. This list has been developed from field surveys, online databases maintained by the CDFW and U.S. Fish & Wildlife Service (USFWS) for a standard nine-quadrangle search focused on the project location (USGS "Eureka" and "Fields Landing" quadrangles) and additional adjacent USGS quadrangles (Tyee City, Arcata North, McWhinney Creek, Arcata South, and Cannibal Island) (see Appendix G) and from DFW's List of Special Animals and List of Special Plants. Note the USGS quadrangles reported sum to seven (not nine) due to the adjacency of the Pacific Ocean. The list of target plant species was compiled by querying the California Native Plant Society (CNPS) Online Database, the California Natural Diversity Database (CNDDB), and the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) website for rare, threatened, and endangered species known to occur within the project area. A summary of special status species and associates analysis can be found in Appendix G.

Project Habitats

The 114-acre project area has been heavily manipulated over the last 150 years of land use. Area 1 (25 acres) is diked former tidelands that is currently tidally connected to Elk River through two tide gates that the City has kept open. Area 2 (89 acres) is also diked off from Elk River but there are only 3.7 acres of salt marsh connecting to Elk River by an in-board ditch. The remainder of Area 2 (~85 acres) is grazed pasture, which is composed of seasonal wetlands and a dirt access road. The project area presently has only 1.2 acres of open tidal water habitat, 20.8 acres of salt marsh, 70.9 acres of seasonal wetlands, 0.2 acres of riparian, and 20.8 acres of upland/roads (Table 3).

Table 3. Existing conditions broad habitat categories based on vegetation cover types were delineated for Areas 1 and 2. Categories were defined by vegetation and approximate elevation (NAVD 88): wetland habitats occur below 9 ft, riparian habitat occurs between 8 and 10 ft, and upland habitat above 10 ft.

Broad Habitat Types	Area 1	Area 2	Total Acres
Open Water	0.8	0.4	1.2
Wetlands	18.4	73.3	91.7
Riparian	0.0	0.2	0.2
Upland (Pasture, Coastal Scrub, road, and others)	5.8	15.0	20.8
Total	*25.0*	*88.9*	*113.9*

Salt marsh is dominated by Spartina, an invasive exotic species slated for eradication. There are multiple water control structures that during winter discharge stormwater into Area 1. The City has been

releasing freshwater from its ponds to the north into Area 1 through an existing tide gate along Pound Road. Area 2 is predominately seasonal or farmed wetlands that has been used as pasture to graze livestock, and seasonally Aleutian geese. There is very little riparian habitat (0.2 acres), which unfortunately is currently heavily impacted with homeless camps. There are no perennial channels traversing Area 2—only seasonal drainage ditches that connect to Elk River to the east through tide gates. In late summer and fall Area 2 is dry, overgrazed, and without any wetlands expect for a 4.5-acre salt marsh adjacent to Elk River.

Project Area Habitat Types and Special Status Species

The standard nine-quadrangle species search generates a list of many species that may be present in a very large geographic area (Appendix G). However, the smaller 114-acre project area supports a limited number of habitats, which will be used to filter the species list to just those species likely to occur in the project area. Project habitats are: inter-tidal channels, salt marsh, seasonal farmed (fresh and brackish water) wetlands, riparian, and upland pasture.

Open Water/Inter-Tidal Channels

There are 1.2 acres of tidal channels (Area 1: 0.8 acres and Area 2: 0.4 acres) behind tide gates and culverts. There are approximately, 3,385 ft of tidal channels/inboard ditches in Area 1 that drain on ebbing tides except for a residual pool behind the tide gates. In Area 2, there is a single tidal channel which is an in-board ditch, the outlet is through a 12-in culvert without a tide gate. The ditch does not drain on ebbing tides, when depths range from 1.0 to 1.5 feet. The City releases freshwater from its ponds north of Area 1 into the main channel draining Area 1 to the tide gates. Seasonally, there are also four other culverts that discharge stormwater runoff to Area 1. There is no freshwater inflow or stormwater discharge into Area 2.

With proposed mitigation measures the open water/inter-tidal channel habitat will be allowed to recede to a residual wetted channel area of just 0.25 acres during an ebbing tide before being sealed off from tidal inundation from Elk River Slough. Impacts to fish species will be limited to those species that might have remained in the residual wetted channel area.

- **Area 1 Open Water Habitat Description**

Open water habitat in Area 1 is presently limited by two tide gates that restrict tidal processes and fish movement into Area 1 (Figure 9, Figure 39). There is presently a gap between the tide gate doors and the cement housing structure that allows water, and potentially aquatic organisms, to pass even when the tide gates are lowered.

Tidal channels behind the tide gates are dominated by a silt-clay substrate with overhanging salt marsh banks (Figure 39 - Figure 42). Salt marsh vegetation is dominated by invasive Spartina. There are 3,385 ft of existing tidal channels in Area 1, many of which consist of simple, linear inboard ditches. At high tide (MHHW) there is approximately 0.8 acres of open water and at low tide (MLLW) approximately 0.25 acres: 0.15 acres in a residual pool located behind the tide gates, and an additional 0.10 acres of residual channel upstream from the tide gates (Figure 5).

Water quality varies throughout the year. Salinity is lower during winter and spring months when freshwater inflow to the site via several culverts on the northern boundary of Area 1 is greater. This freshwater inflow dissipates in summer and fall, resulting in higher levels of salinity in a fully tidal environment. The City has released freshwater from it ponds north of Area 1 into the main channel draining Area 1, thus likely creating brackish water conditions during low tides. Recent water quality sampling during a minus tide in the residual pool behind the tide gates found that conditions were marginal for salmonids with DO levels/temperature edging into stress causing range (TGA 2017).

Figure 39. Side view of the Elk River tide gates fully raised during a minus 1.3-foot tide.

Figure 40. Main tidal channel behind Elk River tide gates in Area 1.

Figure 41. Residual west-side pool behind the Elk River tide gates, looking north.

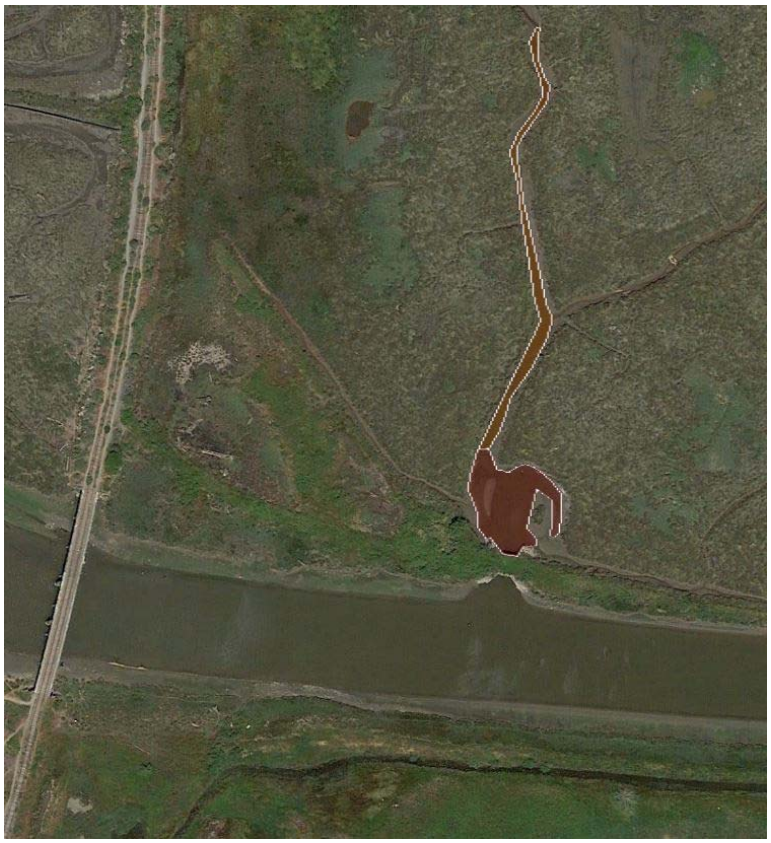


Figure 42. Figure 5 Residual wetted area estimated at 0.25 acres for Area 1 once the Elk River tide gates are sealed on a minus ebb tide, shown in brown.

- **Area 2 Open Water Habitat Description**

Area 2 primarily consists of a grazed pasture but there is an in-board ditch approximately 1,000 ft long, with depths ranging from 8 to 16 inches during low tide, with a wetted area of 0.4 acres behind the dike on the southern bank of the Elk River (Figure 43). There is a small amount of connectivity to the mainstem Elk River through a 12-inch culvert near Highway 101 that maintains open water with an in-board ditch, even during low tide. Recent water quality sampling during a minus tide found that the stagnant, high salinity, low dissolved oxygen conditions that characterized the in-board ditch system appear to be intolerable for salmonids (TGA 2017).

Figure 43. Area 2, In-board ditch, looking east.

- Fish:

Assessment:

Project impacts to protected fish species or fish species of concern, if present, with the successful implementation of mitigation measures will be less than significant. Project activities will substantially increase fish habitat functions or values, in the project area.

Special Status Species

Special status fish species that may occur in or adjacent to the project area were identified through a USGS nine-quadrangle search (Table 4, Appendix G). Impacts to fish will be avoided by sequencing construction to excavating new inter-tidal channels before they are connected to the existing estuary's channel network, timing construction to coincide with low tides, and closing the tide gates in Area 1 to

minimize fish presence. New channels will be inundated for the first time as a final step, eliminating any possible impacts or take. Species may be present within the mainstem Elk River; however, the mainstem Elk River is not included in Area 1 or Area 2 and is thus not in the project area.

Table 4. *List of fish species potentially found based on a nine USGS quadrangle search from the CDFW BIOSExport web mapping tool.*

Common Name	Scientific Name	Status	Habitat Present in Project Area
Chinook salmon-California Coast ESU	*Oncorhynchus tshawytscha*	Federal Threatened, Critical Habitat, Essential Fish Habitat	Yes
Coast cutthroat trout	*Oncorhynchus clarkii clarkii*	State Species of Concern	Yes
Coho salmon - southern Oregon / northern California ESU	*Oncorhynchus kisutch*	Federal Threatened, State Threatened, Critical Habitat, Essential Fish Habitat	Yes
Eulachon	*Thaleichthys pacificus*	Federal Threatened	Yes
Green sturgeon	*Acipenser medirostris*	Federal Threatened, Critical Habitat (Humboldt Bay)	Yes
Longfin smelt	*Spirinus thaleichthys*	Federal Candidate, State Threatened, State Species of Concern	Yes
Pacific Lamprey	*Entosphenus tridentatus*	State Species of Concern	Yes
Steelhead - northern California DPS	*Oncorhynchus mykiss irideus*	Federal Threatened, Critical Habitat, Essential Fish Habitat	Yes
Summer-run steelhead trout	*Oncorhynchus mykiss irideus*	State Species of Concern	Yes
Tidewater goby	*Eucyclogobius newberryi*	Federal Endangered, Critical Habitat	Yes

Current habitat is largely limited to the mainstem Elk River habitat as a result of existing dikes and tide gates in Area 1 that limit fish access into tributary slough channels and in-board ditches in Area 1. Fish entry into Area 2 is presently not possible, with the exception of a small in-board ditch parallel to the Elk River.

Protected species and species of concern during various life stages are likely to occupy open water

habitats in the project area, at various times of year. According to CDFW monitoring ((Wallace and Allen 2007, Wallace and Allen 2009, Wallace and Allen 2012), salmonids currently utilizing the estuary include:

- Chinook Salmon -- federally threatened,
- Coho Salmon -- federally and state endangered,
- Northern California Steelhead) -- federally threatened, and
- Coast Cutthroat Trout -- state species of concern.

The project area has been designated by NMFS as Critical Habitat and Essential Fish Habitat for Chinook and Coho Salmon, as well as northern California Steelhead Trout. These species utilize the Elk River estuary during all life stages (juvenile rearing through adult holding).

A primary goal of this project is to increase the quantity and quality of available salmonid habitat in the Elk River estuary to benefit the watershed (and region) as a whole. Region-wide overwintering habitat for juvenile Coho Salmon is considered a limiting factor in species recovery (NOAA 2014). The NMFS Southern Oregon/Northern California (SONC) Coho Recovery Plan (2012) prioritizes restoration actions that will increase overwintering habitat for Coho juveniles. This project will significantly increase the amount of estuary habitat available for overwintering coho salmon juveniles, as well as other juvenile salmonid species.

A Tidewater Goby eDNA survey was conducted by Humboldt State University at 9 locations throughout the project area in July 2016. Survey results indicated the area is not presently utilized by Tidewater Goby (Kinzinger 2016). According to USFWS (2005), Tidewater Goby is a small fish, rarely exceeding two inches in length. Most individuals complete their life cycle in one year, but in northern California fish can live as long as three years (Chamberlain 2005). Tidewater Goby are exclusive to brackish habitats for their entire life cycle, and prefer water with salinity less than 12 parts per thousand (ppt), but can be found in water of 0-41 ppt. The project area is considered Critical Habitat for Tidewater Goby. While not currently present, the project will result in the expansion of Tidewater Goby habitat, currently limited under existing conditions, to expand their future utilization of the Elk River estuary.

Longfin smelt are a state-listed species. Monitoring conducted by CDFW between 2005 and 2009 in the lower Elk River estuary detect a small number of longfin smelt present during winter months only. Once complete, this project will increase the availability of the type of estuary habitat preferred by the longfin smelt and may benefit the species greatly. While Longfin smelt will utilize areas of high salinity, they are rarely observed when water temperatures exceed 20.5 degrees C. Distribution patterns for Longfin smelt are consistent with temperature-limitations, including the summer emigration from the estuary. Since water temperatures approach 20 degrees in the Lower Elk River at the end of June, it seems unlikely that Longfin smelt would select either the inboard ditch system in Area 2, the lower mainstem Elk River, or the tidal slough habitats upstream of the tide gates in Area 1 during late summer through early fall months (TGA 2017).

Eulachon, green sturgeon, and Pacific Lamprey may be present in the mainstem Elk River but will not be impacted because construction will not occur within the wetted footprint of the mainstem channel. There is a small chance these species may be present in small tributary slough channels or in-board ditches located in Area 1; however, protection measures outlined, in combination with standard BMPs, will ensure these species are also unharmed during project implementation. There is federally designated Critical Habitat in the project area for green sturgeon.

Summary of Existing Fisheries Data

The most recent fisheries data in the Elk River results from CDFW's juvenile salmonid monitoring from 2005 through the middle of 2009 (Wallace and Allen 2007, 2009 and 2012.) Through this monitoring, crews made single hauls at specific sites in the mainstem Elk River estuary using a 9.1 m x 1.8 m and 6.4 mm mesh beach seine deployed by hand or boat. The bag was 1.5 m deep with 6.4 mm mesh. Sites were sampled as varying frequency over the monitoring period, at times limited by high streamflows. CDFW conducted sampling in both the lower and upper Elk River estuary; this summary focuses on results from the lower estuary only (Figure 44). The monitoring effort included a limited amount of PIT tagging, but not enough data exists to develop population estimates for the Elk River.

Young of year (YOY) and 1+ Coho were the most abundantly observed across all years (Table 5). The highest number of observed individuals were consistently observed in the month of May. Smaller numbers were observed during almost all other months of the year.

YOY Chinook (123 total observations) were less common than Coho and were observed from late May through early September (Table 6). Work conducted by Wallace and Allen (2007, 2009, and 2012) also noted 33 total juvenile Steelhead and 25 total Coastal Cutthroat Trout (Table 6). Steelhead were observed in all months except for December; Coastal Cutthroat Trout were observed from late April through early November.

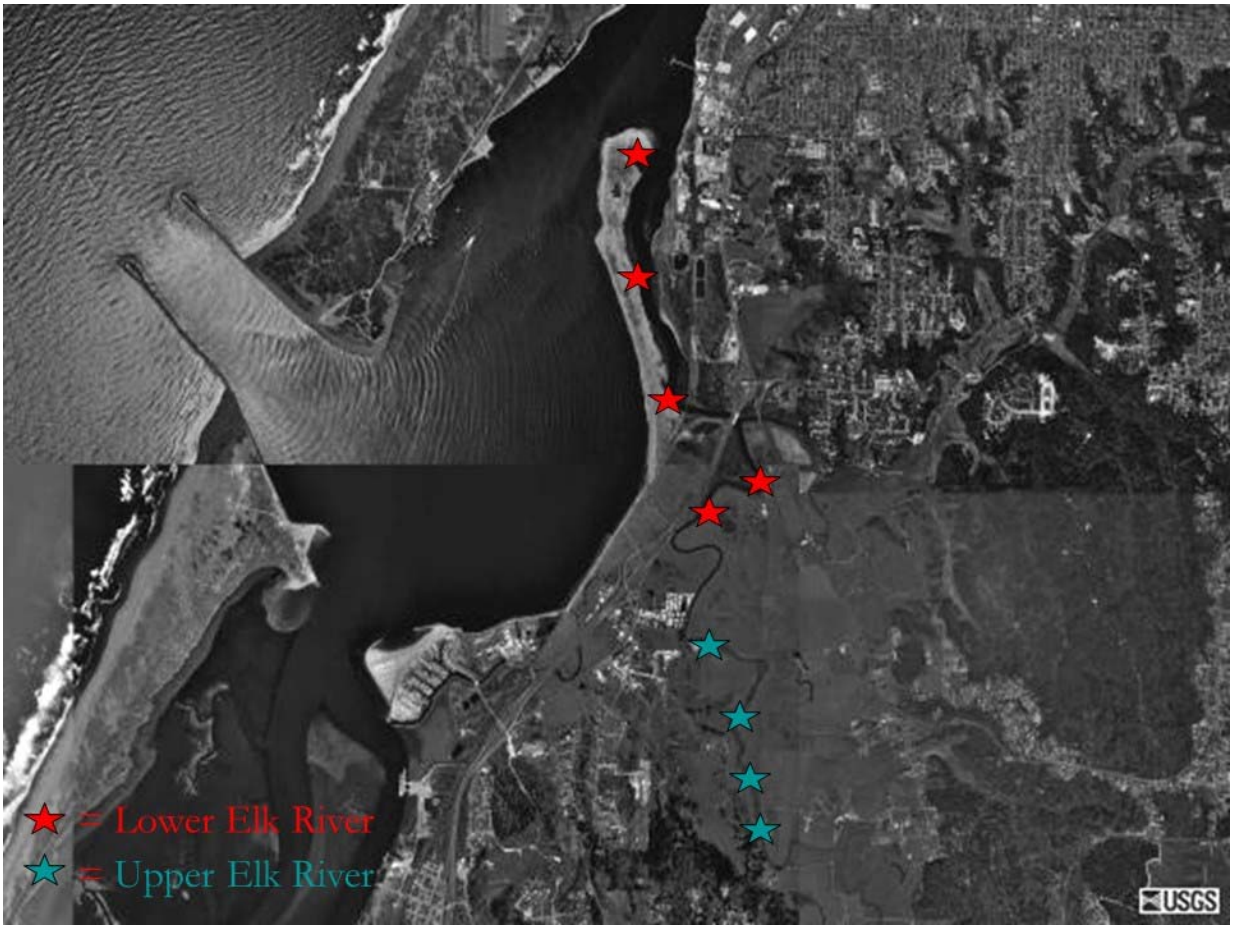


Figure 44. Location of CDFW sampling sites in the lower Elk River. Note the center red star (Site #3) is the closest in location to the project area. Figure from Mike Wallace, CDFW.

Table 5. *Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2005-2009*

	No. Observed Individuals					
	2005	**2006**	**2007**	**2008**	**2009**	**TOTAL**
Coho YOY	28	24	10	0	0	62
Coho 1+	138[+]	150 *	267	131	71	757[1,2]
Chinook YOY	35	12	26	49	1	123
Steelhead Juveniles	5	8	19	1	0	33
Coastal Cutthroat Trout	4	8	10	0	3	25

[1]An unspecified number of YOY Coho were caught in the lower estuary, but 138 individuals were noted as PIT tagged.

[2]Includes Upper Estuary catch as well.

While the monitoring conducted by CDFW focused on juvenile anadromous salmonids, they did document other captured species, including a wide variety of marine species. When observed, adult salmonids, Longfin Smelt, Pacific Lamprey, and Tidewater Goby were also documented (Table 6). The CDFW data indicates adult Coho were not observed. Adult Chinook were not included in the list of observed species and presumably also not observed. A single adult Steelhead was observed in 2005 at the mouth of the Elk River. Numbers of Longfin Smelt were observed in winter months only. A single Pacific Lamprey was observed upstream of the project area in July 2007. Several other Pacific Lamprey were observed the following winter. Tidewater Goby were not observed during any year.

Table 6. *Summary of additional species documented by CDFW in the lower Elk River estuary.*

	2005	**2006**	**2007**	**2008**	**2009**
Adult Coho	0	0	0	0	0
Longfin Smelt[1]	Yes	11	0	1	0
Pacific Lamprey[2]	0	0	1	3	0
Tidewater Goby	0	0	0	0	0
Adult Steelhead[3]	1	0	0	0	0

[1]In 2005, an unspecified number of Longfin Smelt were observed upstream of the project area at CDFW Site 5 and CDFW Site 4 in February and March, respectively. In 2006, the 11 observations span all CDFW lower estuary sites. The 2008 observation of a single Longfin Smelt occurred at CDFW Site 3 (closest to the project area) in January.

[2]In 2007, a single Pacific Lamprey was observed at CDFW Site 4 (upstream of the project area) in July. In 2008, a single Pacific Lamprey was observed at Site 3, Site 4, and Site 6 in the month of February.

[3] In 2005, a single adult steelhead was observed at the mouth of the Elk River during the month of March.

Fish Avoidance Plan

A fish avoidance plan has been developed to minimize risk of impacting fish, if present, to two small areas. Potentially direct impacts or take of protected or special status species would be limited to dewatering: 0.25-acre residual pool and channel in Area 1, and a 0.05-acre (200 ft) in Area 2 which is an

in-board ditch, at a minus tide during the summer. The full fish avoidance plan is included in Appendix H.

Construction will begin in the month of July after freshwater inflows to Area 1 diminish. Site preparation and initial dewatering will be scheduled to occur during a low tide to minimize the amount of wetted channel and potential fisheries impacts. Site preparation and initial dewatering will be scheduled to occur during a minus tide to minimize the amount of wetted channel and therefore potential fisheries impacts.

Before construction begins, the City will close tide gates along the northern boundary of Area 1 to minimize/eliminate freshwater inflow, reducing the residual volume of water in the pool behind the Elk River tide gates at a low tide to 0.25 acres. This will occur 30 days prior to construction and will result in the gradual change in salinity in Area 1. As the salinity increases, fish will likely exit Area 1 on ebbing tides voluntarily before the start of construction. Immediately before construction during an ebbing minus tide, a seine net will be used to passively herd any fish present in the residual pool out of Area 1 through the Elk River tide gates and into the Elk River. One to two people will hold the seine net on each edge of the channel. Starting at the upstream end of the wetted channel, the seine net will slowly be dragged downstream until it is against the tide gate structure to slowly and gently herd fish out of the Elk River tide gate and into the mainstem channel. This will be repeated twice (two passes).

The tide gates will be then sealed for the duration of construction activities in Area 1 and dewatering will commence. At the completion of the restoration of inter-tidal habitats in Area 1 the tide gates will be demolished and removed, to restore full tidal inundation. During removal, fish utilizing nearby habitat in the mainstem Elk River may be subject to loud vibrations. Fish are expected to thus voluntarily avoid this area and seek habitat upstream or downstream of the project area, where vibrations will not cause impact.

In Area 2, excavation and grading will occur when the ground is dry. The final step in the restoration of an inter-tidal habitat/estuary complex in Area 2 will be during an ebbing tide to block off the 200-foot reach of the in-board ditch that will be excavated to connect the new main tributary channel to Elk River. Excavators will remove the dike separating the in-board ditch from Elk River. As the dike is removed water in the in-board ditch will merge with Elk River, thus providing any fish present an opportunity to move into the main channel. The excavators will complete the connection of the new tidal channel with Elk River in less than a day, allowing rising tides to inundate the new channel network and the existing in-board ditch, eliminating the possibility for impacts or take of any fish species. Indirect short-term impact on water quality from increases in suspended sediment and turbidity may occur in Elk River Slough following the introduction of flow into newly constructed channels, ponds, and salt marsh.

- Plants:

Assessment:

Project actions will have no impact on Eelgrass, the only protected plant species that occupy tidal water habitats.

Eelgrass beds are considered essential fish habitat under the Magnuson-Stevens Act and environmentally sensitive habitat areas (ESHA) under the CalCA (HBHRCD 2015). Any impacts to Eelgrass generally requires mitigation in the form of transplanting the Eelgrass and/or creating new Eelgrass habitat.

The open water habitat in Area 1 and 2 is tidal with suitable channel elevations to support Eelgrass, an aquatic annual plant. However, observations during 2017 indicate that Eelgrass is not present in the inter-tidal channels of Area 1, Area 2, or in Elk River Slough adjacent to the project. The project will increase the amount of open water habitat from 1.2 acres to 12.5 acres, which is estimated to support up to 9.7 acres of Eelgrass in the future.

- Animals (amphibians, reptiles, and mammals)

Assessment:

Project actions will have no impact on animals.

The open water habitat in Area 1 and 2 is tidal. The majority of the project's tidal channels will be naturally dewatered prior to construction during an ebbing tide. The tide gates will be sealed to prevent inundation of the project area. Animals that would utilize these inter-tidal open waters will temporally avoid the project area during construction, including during the removal of the tide gates which will require loud vibratory noises. The project will increase the amount of open water habitat from 1.2 acres to 12.5 acres.

- Birds

Assessment:

Project actions will have no impact on birds.

The open water habitat in Area 1 and 2 is tidal. The majority of the project's tidal channels will be naturally dewatered prior to construction during an ebbing tide. The tide gates will be sealed to prevent inundation of the project area. Birds that would utilize these inter-tidal open waters will temporally avoid the project area during construction, including during the removal of the tide gates which will require loud vibratory noises. The project will increase the amount of open water habitat from 1.2 acres to 12.5 acres.

Salt Marsh

- Plants:

Assessment:

Project actions, with the successful implementation of mitigation measures, will have less than significant impacts to protected and special status plant species.

Special status plant species in the project's salt marsh habitat are: Humboldt Bay owl's clover, Lyngbye's sedge, Point Reyes bird's-beak, and Sea-watch (McBain 2016). Humboldt Bay owl's clover was found in several locations, but the largest occurrence was on the south bank of Elk River in Area 2, where it grew in a continuous band along the 3.7-acre salt marsh. Lyngbye's sedge was found in only two locations, one each in Area 1 and 2, but it is suspected of being more widely distributed. One of the project's objective is to restore salt marsh. The project's salt marsh restoration design will enhance and expand salt marsh 20.8 to 57.6 acres. Salt marsh expansion will allow for substantial increase of special status plant species coverage; these species may be temporarily impacted during project construction.

The project's existing 20.8 acres of salt marsh and special status plants will be impacted by heavy equipment accessing tidal channels and the placement of fill and grading to increase surface elevations for salt marsh establishment and resiliency to sea level rise. Physical impacts to special status plants are also likely from mechanical or chemical Spartina removal methods, approved under the *Humboldt Bay Regional Spartina Eradication Plan* (HBHRCD 2015*)*. However, given the overall net benefit for special status plant species after removing invasive Spartina, with implementation of Mitigation Measure 4.13, impacts are less than significant.

- Animals (amphibians, reptiles, and mammals)

Assessment:

Project actions will have no impact on protected and special status animal species.

Animals that would utilize these salt marsh areas will temporally avoid the project area during construction. The project will increase the amount of salt marsh habitat from 20.8 to 57.6 acres.

- Birds

Assessment:

Project actions will have no impact on protected and special status bird species.

Birds that would utilize these salt marsh areas will temporally avoid the project area during construction. The project will increase the amount of salt marsh habitat from 20.8 to 57.6 acres.

Seasonal Farmed (brackish water) Wetlands

- Plants:

Assessment:

Project actions will have no impacts on protected and special status plant species.

No special status plant species were found or are suspected of occurring in the heavily grazed pasture. The project area farmed wetland biohabitats (pasture) include severely degraded seasonal freshwater and brackish water wetlands.

Brackish wetlands dominated the ditched portion of Area 2. Because they were actively grazed, a complete description of species occurring in brackish pastures was not possible. However, commonly encountered species included Kentucky bluegrass (*Poa pratensis*), Timothy-grass (*Phleum pretense*), brass buttons (*Cotula coronopifolia*), buttercups (*Ranunculus repens* and *R. muricata*), rushes (*Juncus effusus*, *J. patens, J. balticus*, and *J. lescurii*), velvet grass (*Holcus lanatus*), and manycolored lupine (*Lupinus variicolor*).

- Animals (amphibians, reptiles, and mammals)

Assessment:

Project actions will have no impact on protected and special status animal species.

Animals that would utilize these farmed wetland areas will avoid the project area during construction. The project will eliminate farmed wetland habitat in the project area.

- Birds

Assessment:

Project actions will have no significant impact on protected and special status bird species.

Aleutian geese seasonally graze the farmed wetlands (pasture) through the winter and spring. The project will not commence construction until July when geese will no longer be using the pasture for grazing. Birds that would utilize these farmed wetland areas will avoid the project area during construction. While the project will eliminate farmed wetland (pasture) habitat in Area 2, there is significant areas of such habitat immediately to the east in Elk River valley and to the south on the Humboldt Bay National Wildlife Refuge.

Riparian

- Plants:

Assessment:

Project actions will have no impacts on protected and special status plant species.

No special status plant species were found or are suspected of occurring in the heavily impacted (homeless encampments) riparian areas. The riparian scrub areas (0.2 acres) are dominated by Hooker's willow (*Salix hookeriana).*

- Animals (amphibians, reptiles, and mammals)

Assessment:

Project actions will have no impact on protected and special status animal species.

Animals that would normally utilize the riparian areas have likely been displaced by the homeless encampments, and would otherwise avoid the project area during construction. The project will substantially expand riparian habitat by 12.6 acres and increase its distribution in both Area 1 and Area 2.

- Birds

Assessment:

Project actions will have no impact on protected and special status bird species.

Birds that would normally utilize the riparian areas have likely been displaced by the homeless encampments, and would otherwise avoid the project area during construction. The project will substantially expand riparian habitat by 12.6 acres and increase its distribution in both Area 1 and Area 2.

Upland (Pasture)

- Plants:

Assessment:

Project actions will have no impacts on protected and special status plant species.

No special status plant species were found or are suspected of occurring in the heavily grazed pasture. Pasture biohabitats consisted of two cover types: tall fescue and annual grassland. Tall fescue (*Festuca arundinacea*) occurred throughout Area 1 on higher areas adjacent to salt and brackish marsh. Annual grassland occurred on a vegetated sand deposit on the south bank of the Elk River in Area 2 and extended along the road along the northwest boundary of Area 2. It was dominated by annual meadow grass (*Poa annua*), rat's tail fescue (*Vulpia myuros*), soft chess (*Bromus hordeaceous*), mouse barly (*Hordeum murinum*), and redstem stork's-bill (*Erodium cicutarium*).

- Animals (amphibians, reptiles, and mammals)

Assessment:

Project actions will have no impact on protected and special status animal species.

Animals that would utilize this pasture area will avoid the project area during construction. While the project will eliminate pasture habitat in Area 2, there are significant areas of such habitat immediately to the east in Elk River valley.

- Birds

Assessment:

Project actions will have no impact on protected and special status bird species.

Birds that would utilize this pasture area will avoid the project area during construction. While the project will eliminate pasture habitat in Area 2, there are significant areas of such habitat immediately to the east in Elk River valley.

Summary of Potential Impacts to Protected Species and Special Status Species

The project will temporarily impact most of the project area with its excavation, grading, and Spartina eradication activities. However, the project will restore, enhance and increase estuarine and inter-tidal wetland areas by restoring full tidal exchange to 93 acres of the project area, with possibly 9.7 acres of Eelgrass habitat and 12.6 acres of riparian habitat. The complex of inter-tidal and riparian habitats will greatly increase species diversity, particularly for aquatic and salt marsh protected and special status species.

Overall, any of the short-term effects on species and their habitat is expected to be more than compensated for by the long-term improvement in estuarine habitat complexity and increases in salt-marsh and riparian habitat.

Impacts are expected to be less then significant with the incorporation of **Mitigation Measures 4.1 – 4.9.** Refer also to **Section 8, Hydrology and Water Quality**, for an assessment of BMPs.

Mitigation Measures

4.1 Construction shall only occur between July 1st and October 31st when freshwater discharge of the Elk River is at its lowest and when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction.

4.2 Prior to dewatering and beginning construction, the Fish Avoidance Plan shall be implemented to passively encourage fish to leave the project area without harming them.

4.3 If water remains present during low tides and/or after sealing the Area 1 tide gates, aquatic habitat will be impacted by pumping for the shortest time necessary to complete construction or excavation. Pumps used to de-water work areas shall utilize a fish screen on the inlet of sufficiently sized mesh to prevent entrainment.

4.4 Surveys of freshwater habitat by a qualified biologist for juvenile red-legged frogs shall occur two weeks prior to disturbance activities in the areas to be de-watered (July through August). Any red-legged frogs found shall be relocated to suitable areas outside of the area of disturbance. Construction activities shall occur only when the area is dry and when adult red-legged frogs are not expected to be present.

4.5 Northwestern pond turtle surveys shall be carried out by a qualified biologist along tidal margins two weeks prior to commencement of ground disturbing activities (July and August). Surveys shall be utilized to locate and flag northwestern pond turtle nests with eggs, or to remove hatchlings and adults that may be present in the stream reaches above the existing tidal zone below first diversion. Any active nests located shall be left undisturbed until hatchlings have emerged or have been relocated to suitable areas outside of the area of disturbance; similarly

relocation of any adults found will occur. No existing freshwater ponds shall be impacted by the project.

4.6 Surveys by a qualified biologist for nesting birds 1,000 ft beyond the limits of disturbance shall occur two weeks prior to commencement of ground-disturbing activities. If breeding is confirmed of any special status birds, construction activities that will degrade or remove breeding habitat shall not occur in the immediate vicinity until the end of the breeding period for that species or until the breeding effort has either been determined to have failed or the young have been determined to have fledged.

4.7 If possible, vegetation clearing activities shall take place between August 16 and March 13, outside of the active nesting season for migratory bird species (i.e., March 14 to August 15).

4.8 If work must be completed during the nesting season, a qualified biologist shall conduct preconstruction surveys of all ground disturbance areas to verify absence of nesting migratory birds in the project area within two weeks prior to vegetation removal and the start of construction. If nesting migratory birds are found in the project construction area during the preconstruction surveys, they shall be avoided with an appropriate buffer area until the young birds have fledged. Buffers shall be 250 ft for raptors, 100 ft for threatened and endangered species, 50 ft for other special-status bird species; however, buffers may be modified after consultation with, and agreement by CDFW. If state listed California Endangered Species Act (CESA), federally listed Endangered Species Act (ESA), or raptors are found outside of the construction area but near the construction area, appropriate buffers shall be implemented. If non-listed state CESA, non-listed federal ESA, including state species of special concern are found near, but outside of the construction area, no buffers will be implemented.

4.9 Vegetative disturbance shall be contained within the limits of grading and kept to a minimum area.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Thresholds of Significance

A net reduction in area or ecological functions or values in riparian habitat or other sensitive natural communities.

Assessment

Less than significant impact on riparian and other sensitive natural communities (Eelgrass habitat) distribution and extent with the successful implementation of project design.

Riparian and other sensitive biohabitats (wetlands) were mapped by McBain Associates (2016). Project impacts to wetlands will be assessed in the next section (4c). Riparian habitat is currently limited to Area 2 where a small area (0.2 acre) is located at the base of the NWP railroad fill to the south of Elk River. Unfortunately, this pocket of riparian habitat has been severely degraded by an active homeless encampment. The extension of the City's Waterfront Trail will impact this riparian area with the placement of fill during the construction of the trail prism. Agricultural land uses, primarily grazing livestock, has prevented the establishment of riparian vegetation in Area 2 on those surfaces above 9 ft in elevation (NAVD 88). The project proposes to substantially expand the distribution of riparian habitat

in Area 2 to approximately 8.7 acres, and to 4.1 acres in Area 1 with its proposed fill and planting activities. Therefore, there will the successful implementation of the project resulting in a significant net gain (12.6 acres) of riparian habitat.

Eelgrass is a sensitive and important habitat/natural community. The distribution of Eelgrass in Humboldt Bay is not consistent year to year. Distribution may be affected by sedimentation or the physical removal of Eelgrass by wind or wave erosion. (Schlosser and Eicher 2012). Elk River does experience flood flows during the winter, which can increase turbidity, sediment transport, bed scour and reduce salinity. The distribution of Eelgrass in Elk River Slough adjacent to the project if present may have been reduced following flood events in 2016-17. The most recent Eelgrass mapping (Schlosser and Eicher 2012) did not extend up Elk River Slough to the reach adjacent to the project area; Eelgrass was mapped downriver of the project area. Eelgrass has not been observed in the inter-tidal channels located in Area 1 or 2. Recent observations (2017) have located Eelgrass in Elk River below the NWP railroad bridge but not in the reach of Elk River between Areas 1 and 2. The project post construction may have a temporary impact to Eelgrass downriver in Elk River Slough if turbidity levels increase while the new inter-tidal surfaces stabilize during tidal inundation in the fall months immediately following project implementation. However, the project, if successfully implemented, could create up to 9.7 acres of Eelgrass habitat.

There are no other sensitive natural communities in the project area other than waters of the US and State, which are assessed under Section 4(c).

c) <u>Would the project 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?</u>

Thresholds of Significance

Adversely affect wetlands or waters of the state and U.S., resulting in a net reduction of area, functions, or values.

Assessment

The Project will have less than significant effect on state and federally protected waters or wetlands with the successful implementation of the restoration of 91.8 acres of inter-tidal wetlands (open water, Eelgrass, and salt marsh) and 12.8 acres of riparian habitat.

The project will result in a significant increase in state and federally protected waters and wetland functions and values with the conversion of 68.9 acres of seasonal farmed wetlands (Area 2 brackish and freshwater) to inter-tidal wetlands. The project will significantly increase riparian habitat by 12.6 acres, which is a type of state and federally protected wetland discussed in the previous section 4(b). Overall the project will have a net increase in state and federally protected waters and wetland acreage of 11.5 acres.

The project is in the Coastal Zone and Chapter 3 Section 30121 of the Coastal Act defines wetlands as “lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens. The Coastal Commission regulations utilize a “one parameter” definition/evidence for wetland determinations.

> *Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly*

developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow. Turbidity or high concentrations of salts or other substances in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deep-water habitats (14 CCR Section 13577).

Wetlands are also defined in the City's General Plan as an Environmentally Sensitive Habitat Area (ESHA). Local LCP [Zoning Ordinance Section 10-5.2942.4] and California Coastal Act regulations (Section 30240) require the protection of ESHA. The project will have less than significant effect with the successful implementation of the restoration of tidal wetlands and enhancement of existing freshwater and brackish water wetlands, resulting in a diverse tidal marsh complex in the project area (Table 7).

Vegetation and habitat types in the project area were surveyed and mapped by a professional botanist (McBain 2016). The extent of wetlands in the project area was quantified based on mapping of wetland vegetation types and inter-tidal/open water channels. Based on a project specific vegetation survey the upper and lower range of salt marsh vegetation was determined to be from 5.25 ft to 8.91ft (McBain Associates 2017). Within the project area, mudflats range from MLLW elevation of -0.34 ft to MHW elevation of 5.8 ft, and riparian vegetation can range from 9.0 ft to above 14 ft (NAVD 88) based on precipitation, absent livestock grazing. These elevation parameters were utilized in the project's inter-tidal wetlands restoration design.

The project will restore a diverse inter-tidal wetland and estuary complex (Table 7). Restoration of open water and Eelgrass habitats will result in a net increase of 11.5 acres. Restoration of salt marsh habitat will result in a net increase of 57.6 acres, mostly from the conversion of seasonal farmed wetlands (fresh and brackish water). Restoration of riparian habitat will result in a net increase of 12.6 acres. The conversion of seasonal farmed wetlands to inter-tidal wetlands and riparian habitat will likely result in a significant increase in wetland functions and values. Overall with the successful implementation of the restoration design the total project area minus upland/road/trail areas will result in a net increase in wetland acreage of 11.5 acres.

Table 7. *Area 1 and Area 2 Land Cover by Category Before and After Restoration*

Land Cover Type	Acres Before Restoration	Acres After Restoration
Open Waters	1.2	3.0
Eelgrass	0.0	9.7
Wetlands	91.7	79.1
Freshwater	*0.7*	*0.7*
Brackish Marsh/Pasture	*70.2*	*0.0*
Salt Marsh	*20.8*	*78.4*
Riparian	0.2	12.8
Upland	19.6	0.0
Road/Trail	1.2	9.3
TOTAL	**113.9**	**113.9**

d) Would the project 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?

Thresholds of Significance

Long-term disruption 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. This includes physical alterations to topography, hydrology or vegetation that fragment contiguous habitat areas.

Assessment

The Project will have no impact on the movement of fish or wildlife, nor impede the use of wildlife nursery sites.

The project will increase the movement of fish and aquatic species with the expansion of the inter-tidal channel areas. Wildlife movement corridors are areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, or areas with vegetative cover provide wildlife corridors. Wildlife movement corridors are important because they provide access to mates, food, and water; allow the dispersal of individuals away from high population density areas, and facilitate the exchange of genetic traits between populations.

The project does not include any features that would interfere 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. The project would not preclude wildlife mobility, breeding, or reproduction.

The project will enhance the movement of fish species by increasing the connectivity of channels in the project area with Elk River Slough and Humboldt Bay. It is expected that restoration of tidal influence and connection of inter-tidal channels within the Elk River Slough complex and nearby Humboldt Bay may provide an opportunity for the movement of fish, including endangered salmonids, Tidewater Goby and, Longfin Smelt into the enhanced estuary and upstream reaches of Elk River from Humboldt Bay.

The project's restoration and expansion of salt marsh and riparian habitats will increase the use and movement of wildlife that frequent these habitats. The project's conversion of approximately 70 acres of pasture (seasonal farmed wetlands) will cause Aleutian geese who used this area seasonally for grazing to utilize other pasture areas. The displacement of Aleutian geese from this grazing habitat is not regionally significant. Aleutian goose grazing is dependent on continued management for short-grass pasture, which is not the City's long-term priority for their property.

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Thresholds of Significance

Failure to comply with local policies or ordinances with jurisdiction over the project that protects biological resources.

Assessment

The project will have no impact.

The project has been designed and would be constructed consistent with and in compliance with applicable City policies or ordinances protecting biological resources, including all applicable policies of the City Local Coastal Program (Policies 6.A.3, 6.A.7, 6.A.8, 6.A.13, 6.A.14, and 6.A.23).

- *Policy 6.A.3.—"The City shall maintain and, where feasible, restore biological productivity and the quality of coastal waters, streams, wetlands, and estuaries appropriate to maintain optimum populations of aquatic organisms and for the protection of human health through, among other means, minimizing adverse effects of wastewater and stormwater discharges and entrainment, controlling the quantity and quality of runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining naturel vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams."*
- Policy 6.A 7.— *"Within the Coastal Zone, the City shall ensure that environmentally sensitive habitat areas are protected against any significant disruption of habitat values, and that only uses development in areas adjacent to environmentally sensitive habitat areas be sited and designed to prevent impacts which would significantly degrade such areas, and be compatible with the continuance of such habitat areas."*
- Policy 6.A8.— *"Within the Coastal Zone, prior to approval of a development, the City shall require that all development on lots or parcels designated NR (Natural Resources) on the* Land Use Diagram *or within 250 feet of such designation, or development potentially affecting an environmentally sensitive habitat area, shall be found to be in conformity with the applicable habitat protection policies of the General Plan. All development plans, drainage plans, and grading plans submitted as part of an application shall show the precise location of the habitat(s) potentially affected by the proposed project and the manner in which they will be protected, enhanced, or restored."*
- Policy 6.A13.—*"The City shall require that diking of filling of a wetland that is otherwise in accordance with the policies of this General Plan, shall, at minimum , require the following mitigation measures:*
    a. *A detailed restoration plan shall be required as part of the project application for each specific restoration site. The restoration plan shall include provisions for purchase, if required, and restoration of an equivalent area of equal or greater biological productivity, and dedication of the land to a public agency or other method which permanently restricts the use of the site to habitat and open space purposes. The restoration site shall be purchased or otherwise made available prior to any permitted diking or filing;*
    b. *Areas adequate to maintain functional capacity shall be opened to tidal action or other sources of surface water shall be provided. This provision shall apply to diked or filled areas which themselves are not environmentally sensitive habitat areas, but would become so if, as part of a restoration program, they are opened to tidal action or provided with other sources of surface water. All of the provisions for restoration, purchases (if necessary), and dedication described under item a. of this policy shall apply to any program or activity performed pursuant to this policy.*
    c. *Mitigation shall, to the maximum extent feasible, be of the same type as the wetland to be filled (i.e., freshwater marsh for freshwater marsh, saltwater marsh for saltwater marsh, etc.),*
    d. *Where no suitable private or public restoration or enhancement sites are available, an in-lieu fee may be required to be paid to an appropriate public agency for use in the restoration or enhancement of an area of equivalent product value or surface area."*
- Policy 6.A14.— *"Consistent with all other applicable policies of this General Plan, the City shall limit development or uses within wetlands that are neither farmed nor grazed, or within estuaries, to the following:*
    a. *Port facilities,*
    b. *Energy facilities*
    c. *Coastal-dependent industrial facilities, including commercial fishing facilities*

d. Maintenance of existing or restoration of previously dredged depths in navigation channels, turning basins, vessel berthing and mooring areas, and boat launching ramps,
e. Incidental public service purposes which temporarily impact the resources of the area, such as burying cables or pipes, inspection of piers, and maintenance of existing intake an outfall lines,
f. Restoration projects,
g. Nature study, aquaculture, or similar resource-dependent activities,
h. New or expanded boating facilities in estuaries, consistent with the demand for such facilities,
i. Placement of structural piling for public recreation piers that provide public access and recreational opportunities."

- Policy 6.A23— *"Within the Coastal Zone, where there is a question regarding the boundary, buffer requirements, location, or current status of an environmentally sensitive area identified pursuant to the policies of this General Plan, the City shall require the application to provide the City with the following:*
  a. Base map delineating topographic lines, adjacent roads, location of dikes, levees, of flood control channels and tide gates, as applicable;
  b. Vegetation map, including identification of species that may indicate the existence of non-existence of sensitive environmental habitat area;
  c. Soil map delineating hydric and non-hydric soils; and
  d. Census of animal species that may indicate the existence or non-existence of the sensitive environmental habitat area."

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?

Thresholds of Significance

Obstruct or prevent the recovery of any listed species covered in an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan

Assessment

The project will have no impact.

The project will not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan because none exists for the project area.

- According to the Arcata USFWS' Habitat Conservation Plan website, there are no Habitat Conservation Plans covering the project area.

- According to DFW's Natural Community Conservation Planning website, there are no Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plans covering the project area.

The project does comply with NOAA's adopted South Oregon/Northern California Coho Recovery Plan (2014) and the Coastal Multi-Species Plan for California Coastal Chinook Salmon, Northern California Steelhead, and Central California Coast Steelhead (2016). Both plans support estuary and riparian habitat restoration activities. NOAA (2016) specifically recommends that estuary habitat in Humboldt

Bay be restored to improve rearing habitat, restore access to tidal sloughs, and create off-channel velocity refugia for winter rearing; the goals of the proposed project are consistent with this recommendation. However, recovery plans are not a regulatory HCP pursuant to state or federal ESA regulations.

5 Cultural Resources

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

The following information and analysis is based on a cultural resources investigation for the project by William Rich and Associates. William Rich and Associates also contacted the Wiyot Tribes as part of their investigation. Consultation was initiated with the Native American Heritage Commission and correspondence with representatives of the Wiyot Tribe, Blue Lake Rancheria and the Bear River Band of the Rohnerville Rancheria. Archaeological field surveys of the project and surrounding areas were completed during September 2016. Rich and Associates' investigation report is not included in this Initial Study because of its confidential nature (CEQA Guidelines Section 15120 (d)). This report is available for review by qualified persons (archaeologists, Tribal Historic Preservation Officers, etc.) at the City of Eureka Development Services Department at 531 K Street, Eureka.

a) Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

Thresholds of Significance

Result in physical changes in the significance of a historical or cultural resource as defined in CEQA Guidelines Section 15064.5.

Assessment

The project will have no impact on any historic or cultural resource.

During the cultural resource investigation, a cow feeding shed/barn, and a segment of the former Bucksport & Elk River Railroad were identified in the project area. Aside from the recorded cow feeding shed/barn, there are no buildings in the project area. Additionally, a segment of the NWP Railroad was identified that is immediately adjacent to the project area. All three resources were recorded and an evaluation of historical significance was conducted. It was recommended that these features no longer retain the requisite integrity to qualify for inclusion in the National Register of Historic Places (NRHP) (36 CFR 800 (c)(2)). These structures were also recommended ineligible for inclusion in the California Register of Historic Resources (CRHR). The earthen dikes in Area 1 were not considered to be historical resources. The investigation therefore supported a determination that the project would not affect historic properties and no significant impacts to historic resources, as defined by CEQA.

b) Would the project Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Thresholds of Significance

Result in physical changes in the significance of an archaeological resource defined in CEQA Guidelines Section 15064.5

Assessment

The project will have a less than significant impact with the implementation of mitigation measures.

The project alignment lies within the traditional territory of the Wiki division of the Wiyot tribe. Wiyot occupied the lands adjacent to Humboldt Bay and typically lived in villages that were close to water and wetlands where they had ample access to food (fish, shellfish, marine mammals, waterfowl, deer, elk, and small land animals), and traveled by water.

Archaeological field surveys were completed in September 2016. Survey conditions were considered fair with sporadic access to mineral soil over much of the ground surface. This allowed for ample opportunity to identify archaeological site indicators. Due to the flat topography closely spaced 10 to 15 meters apart, pedestrian transects were utilized. The sand dunes west of the railroad grade and the project were intensively surveyed.

Despite an intensive survey at some locations, no Native American archaeological materials associated with tribal settlements were encountered in this project area. Due to an extensive history of flooding, silt deposits, and changes to the mouth of Elk River, it is possible, that buried archaeological materials could be encountered during implementation of this project. This would be most likely to occur along the margins of Elk River and Humboldt Bay. Therefore, the City will coordinate with appropriate Tribal representatives to support archaeological resource monitoring during construction. Impacts will be less than significant with the inclusion of **Mitigation Measures 5.1 and 5.2**.

Mitigation Measures

5.1 If potential archaeological or paleontological resources are encountered during project subsurface construction activities or geotechnical testing, all work within 50 ft of the find shall be stopped, and a qualified archaeologist funded by the City of Eureka shall be contacted to evaluate the find, determine its significance, and identify any required mitigation. The applicant shall be responsible for implementing the mitigation prior to construction activities being re-started at the discovery site.

5.2 If project related geotechnical excavations become necessary, as a result of final design, and those excavations are to be more than one ft deep, then the THPOs of each local native American tribe, as noted above, will be contacted and given the date and time of excavations so that a cultural monitor may be present to observe for the presence of buried archaeological materials.

c) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Thresholds of Significance

Result in physical changes or destruction of a unique paleontological resource or site or unique geologic feature.

Assessment

The project will have no impact on a unique paleontological resource or sites or unique geologic feature as there are none in the project area.

According to an 1858 U.S. Coast Survey (Figure 3), most of the project area was composed of salt marsh and tidal channels, with a wind blown sand/riparian reach parallel to Elk River. There will be no project impacts to a unique paleontological resource or sites or unique geologic features.

d) Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Thresholds of Significance

Disturbance of human remains.

Assessment

The project is expected to have no impact on human remains as interment of human remains in tidelands was/is not a normal practice.

According to an 1858 U.S. Coast Survey (Figure 3), most of the project area was composed of salt marsh and tidal channels, with a wind blown sand/riparian reach parallel to Elk River. The project area has been used for grazing; however, the area was frequently flooded by Elk River and therefore was an unlikely area for human burial.

On the remote chance that human burial or remains are uncovered all work will cease and the County Coroner will be contacted to address the disposition of such remains. The City and contractors would also refer to a recently written document by Blue Lake Rancheria THPO J. Eidsness, “Protocols for Inadvertent Archaeological Discoveries” for guidance and direction.

6 Geology and Soils

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				✓
ii) Strong seismic ground shaking?		✓		
iii) Seismic-related ground failure, including liquefaction?		✓		
iv) Landslides?				✓
b) Result in substantial soil erosion or the loss of topsoil?		✓		
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?				✓
d) Be located on expansive soil, as defined by the California Building Code (2007), creating substantial risks to life or property?				✓
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				✓

a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

I. **Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42)**
II. **Strong seismic ground shaking?**
III. **Seismic-related ground failure, including liquefaction?**
IV. **Landslides?**

Thresholds of Significance

Project is located in a known active earthquake fault zone.

Assessment

Less than significant impact from strong seismic ground shaking or liquefaction as a result of the project with the implementation of mitigation measures.

The project is not located in an active earthquake fault zone (Alquist Priolo) or in a landslide hazard zone. Alquist-Priolo Earthquake Fault Zones are mapped in the Division of Mines and Geology Special Publication 42. The California Department of Conservation shares Probabilistic Seismic Hazard Maps are used to determine seismic shaking hazards. The North Coast map indicates the project area is vulnerable to the highest level of earthquake hazard.

The California Department of Conservation has maps intended to assist local governments through their Seismic Hazard Zonation Program. Available data for the project area in the USGS Fields Land quadrangle link to a Little Salmon and Yeager Fault Evaluation Report (1982), which indicates the faults should not be zoned based on inconclusive information. Thus, map-based information for seismic-related ground failure, including liquefaction, is not presently available for the project area. However, given the high earthquake hazard level, the probability of seismic-related ground failure and liquefaction may also be high.

The California Department of Conservation also mapped landslide hazards for the entire Elk River watershed. The map indicates the project area is located in the Geologic Unit Q which is defined as alluvium consisting of sand, silt, clay, and gravel along major stream channels. The map indicates mass wasting (landslides) are not an issue because of the location of the material, although in certain location, in-stream alluvium can be incorporated into debris torrents traversing the channel.

Humboldt County is in a very active tectonic region subject to seismic ground shaking from earthquakes as a result of close proximity to the triple junction fault zone. However, the project area does not occur on any fault zones and an Alquist-Priolo Earthquake Fault Zone has not been mapped in the City of Eureka. The closest faults are the Freshwater fault to the north and Little Salmon-Yager fault to the south, according to the California Geological Survey 2010 Fault Activity Map of California (CGS 2010a). The only project components that would likely present a hazard in the event of a seismic incident are: Waterfront Trail extension, associated scenic viewing causeways and platforms, and the tidal ridge/emergency vehicle access road. All constructed features would comply with the 2007 California Building Code (CBC), including the requirements of the special Seismic Design Category zones (SDC). The project area does not have the potential for landslides.

Considering the distance from known faults to the project, and adherence to CBC and SDC requirements, potential impacts resulting from seismic events are anticipated to be less than significant. However, a geotechnical investigation shall be conducted to identify and modify final project designs to mitigate any potentially significant impacts from seismic ground shaking, liquefaction, and other related events. **Mitigation Measure 6-1** will be implemented.

Mitigation Measures

6.1 A California registered Geotechnical Engineer shall conduct a design-level geotechnical study for the project. The geotechnical study shall evaluate seismic hazards and provide recommendations to mitigate the effect of strong ground shaking; any unstable, liquefiable, or expansive soils; or settlement in adherence with current California Building Code (CBC) standards for earthquake resistant construction. The seismic criteria shall consider the active faults in the Eureka area and beyond, and ground motions and shaking related to the faults shall be accounted. The geotechnical study shall include evaluation of unstable land in the project area, including areas susceptible to liquefaction, lateral spreading, or settlement, and areas containing expansive soils. The study shall provide measures to repair, stabilize, or avoid such

soils, and include grading, drainage, paving, and foundation design recommendations. The project shall be designed and constructed in conformance with the specific recommendations contained in the design-level geotechnical study, including recommendations for grading, ground improvement, and foundation support. The recommendations made in the geotechnical study shall be incorporated into the final plans and specifications and implemented during construction. Professional inspection of foundation and excavation, earthwork and other geotechnical aspects of site development shall be performed during construction in accordance with the current version of the CBC.

b) Would the project result in substantial soil erosion or the loss of topsoil?

Thresholds of Significance

Substantial acceleration of the rate of soil erosion at the project site or the loss of top soil.

Assessment

Less than significant impact with the successful implementation of mitigation measures.

Proposed actions (Spartina eradication, excavation, and grading) will temporarily disturb most of the project's 114 acres, and have the potential to accelerate the rate of soil erosion at the project site.

There is potential for an increase in soil erosion and a resulting decrease in salt marsh elevation due to soil disturbing Spartina control methods. For example, in a study by Pickart (2011, cited by H.T. Harvey and GHD 2013), a "light grind" method resulted in a slightly greater elevation decrease (0.26 in) than a "deep grind" method (0.18 in). Elevation in treated areas fully recovered elevation losses within a year and a half after treatment, after which there were no significant differences in elevation between treated and control plots. Results of this study may not represent what will occur throughout the project area. (H. T. Harvey & Associates and GHD 2013). Other Spartina control methods which directly disturb the soil such as tilling, disking and digging/excavating may also result in erosion and marsh elevation changes. The erosion effects of soil disturbing Spartina control methods are likely more significant in areas that are prone to wave action along Humboldt Bay proper and does not include sloughs and channels (H. T. Harvey & Associates and GHD 2013). Thus, significant wave action within the project area is minimal.

Excavation, placing fill and grading necessary to implement the restoration designs have the potential to cause soil erosion, but with the successful implementation of mitigation measures soil erosion will be limited. Final grading, riparian planting and passive colonization of salt water vegetation of inter-tidal wetland areas will limit soil erosion or loss in the project area. Temporary soil erosion or loss is not expected to be significant; as the design grades are achieved the project area soils will stabilize, and impacts are expected to be less than significant because of the project**. Mitigation Measures 6.2-6.4** will be implemented.

Mitigation Measures:

6.2 Construction shall only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when Elk River freshwater inputs are at summer baseflow thresholds.

6.3 Placement of fill in the project area shall occur when the area is not inundated by tide water.

6.4 Dewatering measures shall be in place to bypass any discharge from entering the work site.

c) Would the project 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?

Thresholds of Significance

Substantially de-stabilize an otherwise stable soil or geologic unit.

Assessment

The project will have no impact on stability of the underlying soil, nor have any potential to initiate landslides, lateral spreading, subsidence, liquefaction or collapse.

The project is located on both existing and diked former tidelands, and a windblown sand deposit underlain with former tideland soils. Tideland soils are characterized as dense clay. The project area is relatively flat, except for fill related to transportation structures, no historic landslides are in the project area and there are no occurrences of liquefaction. The project area is classified as being relatively stable as to seismic safety, and is not in Alquist Priolo fault zone. The proposed restoration of tidal inundation, inter-tidal wetlands, and riparian habitat will not cause the project area to become unstable. Construction of fill structures (less than 10 ft of fill) to contain tidal inundation and provide non-motorized public access will not introduce instability to the project area as is evident from existing transportation fill structures in the project area. The proposed project will not create situations that could cause the underlying geologic material to become any more unstable than it is inherently; any project impacts would be less than significant.

d) Would the project be located on expansive soil, as defined by the California Building Code (2007), creating substantial risks to life or property?

Thresholds of Significance

Located on expansive soils.

Assessment

The Project will have no impact. The project is not located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994).

The project is located on Bayside loam soil, located in a transitional setting between floodplains and tidal salt marsh. The project is not located on expansive soils; therefore, no project impact is expected to life or property.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

Thresholds of Significance

Located on underlying soils that are not capable of adequately filtering wastewater or alternative waste water disposal systems.

Assessment

The Project will have no impact.

The proposed project does not include septic tanks or other alternative wastewater disposal systems, and no impact related to wastewater disposal in soils would result. The project area is served by existing municipal wastewater disposal infrastructure. No project impact is expected.

7 Greenhouse Gas Emissions

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

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Thresholds of Significance

Substantial generation of GHG emissions due to project implementation.

Assessment

The project will have a less than significant impact in terms of generating GHG emissions.

- Use of heavy equipment necessary to implement the project will contribute to GHG emissions in the short term.
- The long-term benefits of improved carbon sequestration in the tidal marsh may contribute to an overall reduction in GHG emissions. The project is likely to result in a cumulative net increase in carbon sequestration and potential for reduction in methane production.

The long-term effect of the project on carbon sequestration in the project area was evaluated by comparing the estimated carbon flux in existing and post-project land cover types. A recent summary of existing data (Philip Williams and Associates 2009) suggests that freshwater wetlands, riparian forest, brackish wetlands, and salt marsh all have high rates of carbon sequestration. However, wetlands also produce methane, which is a potent GHG, during anaerobic decomposition in low-salinity, saturated soils. Methods for measuring carbon sequestration and methane production in wetlands are just becoming standardized.

Carbon budgets of this range of habitats may vary based on site specific conditions; however, the following relationships give us an estimate of the effect of this restoration on GHG emissions. The carbon sequestration benefit of freshwater wetlands is offset by their production of methane. Seasonal wetlands and riparian habitat produce less methane than perennial freshwater wetlands as they dry out during summer when methane production in saturated soils is greatest, due to anoxic conditions (Philip Williams and Associates 2009). While mudflats produce little methane, they also sequester little carbon. Therefore, restoring tidal salt marsh wetlands is an effective means to sequester carbon while reducing methane emissions.

The project will convert dikes, upland habitat, and pasture to inter-tidal wetland habitats. These habitat conversions will eliminate approximately 70 acres of brackish wetlands (pasture) and create an additional 57 acres of salt marsh, and 13 acres of riparian habitat (Table 7). This conversion will significantly change the project area's emission of methane, with the conversion of approximately 70 acres of brackish wetland that have high potential for methane emission (Table 8). The acreage of salt

marsh will also increase by approximately 57 acres, resulting in a more significant rate of carbon sequestration after project implementation. The long-term net effect of the project is to significantly increase carbon sequestration by enhancing and restoring 78 acres of salt marsh and reducing methane gas emissions by eliminating approximately 70 acres of brackish wetlands.

Table 8. *Summary of the project's habitat conversions and GHG emissions. The carbon column represents the habitat's estimated ability to sequester the GHG carbon dioxide. The methane column represents the estimated ability to release the GHG methane. A high level of carbon sequestration and either a medium or low level of methane production represent a net reduction in GHG emissions.*

Land Cover Type	Acres Before Restoration	Acres After Restoration	Carbon Sequestration	Methane Emission
Eelgrass	0.0	9.7	Low	Low
Open Waters	1.2	3.0	Low	Low
Wetlands	91.7	79.1		
Freshwater	0.7	0.7	Low	Low
Brackish Marsh/Pasture	70.2	0.0	High	High
Salt Marsh	20.8	78.4	High	Low
Riparian	0.2	12.8	Low	Low
Upland	19.6	0.0	Low	Low
Road/Trail	1.2	9.3	Low	Low

The 78.8 acres of salt marsh restored by the project would sequester carbon, at rates likely to be higher than carbon sequestration in existing marsh and pasture habitat, which emits methane at higher rates than salt marsh. Estimated rates of carbon sequestration in salt marshes range from 0.5-3.2 tons/ac/yr (Crooks 2009; Whittlesey et al. 2013). While it is difficult to estimate the net change in carbon sequestration due to the project, reductions in methane emissions are likely to result in a reduction in the GHGs emitted by the project and an increase in carbon sequestration. Over the long term, carbon sequestration in habitats restored by the project is expected to slightly reduce the impacts from the project due to construction-related greenhouse gas emissions. Because the construction-related emissions will be temporary, the long-term impact of project GHG emissions is considered less than significant.

Estimates of equipment and associated diesel fuel consumption required for project construction include:

- One medium-sized excavator will be able to excavate and load approximately 1,500 CY/day and will burn approximately 150 gallons/day of diesel fuel.
- One medium-sized bulldozer will be able to grade approximately 5,000 CY/day and will burn approximately 500 gal/day of diesel.
- One 10 CY dump truck will be able to move approximately 1,000 CY/day and will burn approximately 50 gal/day.

- A dewatering pump will run 24 hrs/day for the duration of the project and will burn 10 gal/day of gasoline.

Area 1

To excavate, move, and grade approximately 20,000 CY in Area 1, the following equipment days and fuel consumption has been estimated:

- 13.3 excavator days (2,000 gallons of diesel)
- 4 bulldozer days (2,000 gallons)
- 20 dump truck days (1,000 gallons)
- Assuming 7 working days for the dewatering pump (70 gallons of gasoline)

Area 2

To excavate, move, and grade approximately 125,000 CY in Area 2, the following equipment days and fuel consumption have been estimated:

- 83.3 excavator days (12,500 gallons of diesel)
- 25 bulldozer days (12,500 gallons)
- 125 dump truck days (6,250)
- Assuming 40 working days for the dewatering pump (400 gallons of gasoline)

Potential impacts to air quality and GHG emissions were analyzed utilizing the California Emissions Estimator Model (CalEEMod) Version 2016.3.1 (www.CalEEMod.com). CalEEMod is a statewide computer model developed in cooperation with air districts throughout the state, to quantify criteria pollutant and GHG emissions associated with the construction and operational activities from a variety of land use projects. The program was designed in part for use in analyzing air quality and GHG impacts in CEQA documents. Construction emissions estimated for the proposed project were modeled over the course of one 67-day construction season.

Long-term maintenance of the project could result in a slight increase in GHG emissions over the existing baseline, but this increase is not expected to be significant as the project is expected to result in a self-sustaining tidal marsh, which will be a carbon sink, as discussed above. As addressed herein, the primary GHG contributions from the project are short term and temporary, resulting from construction, and are offset by the long-term carbon sequestration in the restored tidal marsh. Project-related GHG emissions would result primarily from construction using diesel-powered construction equipment. There would be no net long-term emissions (permanent sources) of GHG from the project. The combustion of diesel fuel in off-road construction equipment and on-road vehicles (trucks, etc.) would emit GHGs consisting mainly of carbon dioxide (CO_2), along with small amounts of methane (CH_4) and nitrous oxide (N_2O).

The emissions-based carbon footprint for the construction of the project was estimated using:

- estimated construction equipment needed, their fuel consumption, and total hours of operation; and
- estimated number of days for construction.

Using this methodology, the estimate for construction-related emissions for the project is 101.97 of CO2-equivalent. Methods used for this estimate can be found in Appendix J.

- Use of heavy equipment necessary to implement the project will contribute to GHG emissions in the short term.
- The project would contribute to GHG primarily through the use of diesel-powered construction equipment. There would be no net long-term emissions (permanent sources) of GHG from the project. The combustion of diesel fuel in off-road construction equipment and on-road vehicles (trucks, etc.) would emit GHGs consisting mainly of carbon dioxide (CO2), along with small amounts of methane (CH4) and nitrous oxide (N2O).
- The long-term benefits of improved carbon sequestration in the tidal marsh may contribute to an overall reduction in GHG emissions. The project is likely to result in a cumulative net increase in carbon sequestration and potential for reduction in methane production.

While no mitigation is required, the project will implement BMPs to minimize construction-related GHGs, which may include the following:

- Use emission control devices at least as effective as the original factory-installed equipment,
- Maintain all diesel-powered equipment in a manner to minimize visible soot emissions, and
- Minimize unnecessary idling time through application of a “common sense” approach to vehicle use, so that idling is reduced as far as possible below the maximum of five consecutive minutes required by California law.

b) Would the project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

Thresholds of Significance

Project results in a cumulatively considerable net increase in GHG emissions for which California pursuant to Assembly Bill (AB) 32 desires to reduce California’s GHG emissions to 1990 levels by 2020.

Assessment

The Project will have a less than significant impact with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

The City has not adopted a Climate Action Plan or set a goal to meet AB 32 GHG emissions reductions. To facilitate an assessment of the project’s GHG emissions we have utilized Humboldt County’s Draft Climate Action Plan (2012). The County has set a goal of reducing long term annual GHG emissions of the unincorporated County by 31,658 tons. This reduction would meet the goal of AB 32 of reducing GHG emissions to 1990 levels by 2025. Humboldt County’s Plan seeks to achieve this reduction

primarily by reducing vehicle miles traveled through more compact, higher density urban development.

Project implementation is expected to result in a short-term increase in GHG emissions during construction, and a small long-term net increase in carbon storage (7a). Short-term construction related emissions for project implementation will not interfere with the City's efforts to achieve reductions in GHG emissions by reducing vehicle miles traveled through more compact development. Therefore, the project would not conflict with any plans, policies or regulations aimed at reducing GHG emissions.

8 Hazards and Hazardous Materials

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?		✓		
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?		✓		
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				✓
d) Be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				✓
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?			✓	
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?				✓
g) Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?			✓	
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized area or where residences are intermixed with wildlands?				✓

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Thresholds of Significance

Storage or use of large quantities of hazardous materials that could be released into the environment.

Assessment

The project will have a less than significant impact with the successful implementation of mitigation measures, as it does not involve storage or use of large quantities of hazardous materials.

Project construction would require the use of hazardous materials such as fuels, lubricants, and solvents. Following construction, the project would not require use, storage, or transport of hazardous materials. The project's use of heavy equipment and vehicles contains a potential risk of an accidental release of small quantities of fuel, oil and coolant.

Mitigation Measures

8.1. Heavy equipment used in the project shall be in good condition and shall be inspected for leakage of coolant and petroleum products and repaired, if necessary, before work is started.

8.2 Equipment operators shall be trained in the procedures to be taken should an accidental spill occur.

8.3 Prior to the onset of work the contractor shall prepare a plan for the prompt and effective response to any accidental spills.

8.4 Absorbent materials designed for spill containment and cleanup shall be kept at the project site for use in case of an accidental spill.

8.5 Refueling of equipment shall occur within the staging area. All refueling within the staging area, will occur on a pad to capture any drips or spills.

8.6 If equipment must be washed, washing shall occur off-site.

8.7 Stationary equipment shall be positioned over drip pans.

b) <u>Would the project 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?</u>

Thresholds of Significance

Project involves the use of large quantities of hazardous materials.

Assessment

Less than significant impact with the successful implementation of mitigation measures discussed in Section 8 (a) and **Mitigation Measures 8.8-8.9.**

The project has a low potential for 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. The project would utilize heavy equipment and machinery for grading, excavation, paving, removal of tide gate structure and transportation of materials. There is always the possibility when equipment is operating that an accident could occur and fuel could be released onto the soil or into surface or groundwater.

Mitigation Measures

8.8 Equipment on site during construction shall be required to have emergency spill cleanup kits immediately accessible in the case of any fuel or oil spills.

8.9 Staging, fueling and maintenance of equipment shall be conducted only in in staging areas and no closer than 150 ft from open water or in any location where hazardous material spills could become entrained in flowing water.

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Thresholds of Significance

Project is located within one-quarter of mile of a school and involves the use of large quantities of hazardous materials.

Assessment

The project will have no impact.

There are no schools located within 1/4 mile of the project site. The closest school is South Bay Elementary School approximately 0.8 mile southeast of the project site on Loma Avenue. The project will not emit hazardous materials within ¼ mile of the school. The project does not involve the use of large quantities of hazardous materials.

d) Would the project be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Thresholds of Significance

The project is located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

Assessment

The project will have no impact.

The project is not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

Area 1 of the project is near one site listed in the California Environmental Protection Agency (Cal/EPA) list of hazardous materials facilities or sites which meet “Cortese List” requirements under Government Code Section 65962.5. The site is located adjacent to Area 1 and is the former Eureka Tallow Company T0602300322, 4900 Broadway, Eureka. The Cleanup Status of the site is Closed, and the site is not located within the project area. The project will not impact the adjacent property.

A portion of Area 2 that is currently leased to a farmer for cattle grazing was formerly used by the City of Eureka for bio-solids disposal. Soil testing was conducted in this area and confirmed that metals and other substances were not present at levels above background (Appendix E). Area 2 is not in Cal/EPA list of hazardous materials facilities or sites which meet “Cortese List” requirements under Government Code Section 65962.5.

e) If applicable, would the project be 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?

Thresholds of Significance

Project is 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.

Assessment

The project will have a less than significant impact.

The project is located approximately 1.5 miles from the City's Samoa Field Airport. The Samoa Field Airport is located across Humboldt Bay on the Samoa Peninsula. The airport facilitates recreational and private aviation. The airport does not operate at night; there are no lights on the runway and no aviation services are provided. Although Samoa Field Airport is classified as a Community General Aviation Airport, it does not meet all the minimum standards of this airport class. The airport's longest runway, 2,700 feet by 60 feet, does not reach the minimum length, width, or weight-bearing standards. Additionally, the airport does not have visual aid equipment, 24-hour on-field weather services, or an instrument approach procedure (HCAOG 2013). The inter-tidal wetlands restoration and public access project will not impact airport use, airport operations, or aircraft safety. The project would not result in airport-related safety hazards for people residing or working in the project area.

f) If applicable, would the project be located within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

Thresholds of Significance

Project is located within the vicinity of a private airstrip.

Assessment

The project will have no impact.

The project is not located within the vicinity of a private airstrip.

g) Would the project impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Thresholds of Significance

Project would prevent alerting and warning citizens, conducting evacuations, short-term feeding and sheltering, conducting search and rescue operations or using emergency evacuation routes.

Assessment

The project will have a less than significant impact.

The project areas are located entirely within the Tsunami Inundation Area according to the Tsunami Inundation Map for Emergency Planning for the Eureka quadrangle (CalEMA et al. 2009). In the event of a tsunami warning, the City of Eureka and County of Humboldt Emergency Operations employees are trained in disaster preparedness including broadcasting an emergency tsunami warning (and sirens) and giving direction to the public on the actions they should take in the event of a potential tsunami in Humboldt Bay. To help inform trail users of tsunami hazards and evacuation procedures, the proposed project would include adequate signage to notify the public of tsunami hazards and evacuation routes. Because there are existing tsunami evacuation plans for the area, and the project includes additional tsunami hazard signage, the project would not interfere with any existing emergency response plans. Therefore, the project will have a less than significant impact.

h) Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized area or where residences are intermixed with wildlands?

Thresholds of Significance

Project is located in an area shown on a map used to identify wildland fire hazard areas. Potential exists for a significant risk of loss, injury or death involving wildland fires.

Assessment

The project will have no impact.

The project is currently located in an area of low fire rating. The project area is mostly flat topography that will become predominately inter-tidal wetlands that have “nil” fire rating. There are no habitable structures in the project area. The project area is bounded by transportation corridors and open water, with very little opportunity for wild fire to spread.

9 Hydrology and Water Quality

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?		✓		
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)?				✓
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?		✓		
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?				✓
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?				✓
f) Otherwise substantially degrade water quality?				✓
g) Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map?				✓
h) Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?				✓
i) Expose people or structures to a significant risk or loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				✓
j) Result in inundation by seiche, tsunami, or mudflow?		✓		

a) <u>Would the project violate any water quality standards or waste discharge requirements?</u>

Thresholds of Significance

Exceed any state water quality standards or waste discharge requirements.

Assessment

The project will have a less than significant impact if mitigation measures are successfully implemented and will not violate any water quality standards or waste discharge requirement, which will ensure that any potentially significant impacts are avoided or mitigated to below a level of significance.

Earth work necessary to construct the project will be conducted in accordance with the BMPs described in the Eureka Municipal Code, CBC, California Stormwater Quality Association (CASQA) BMP guidelines and the regulations of the RWQCB.

Lower Elk River is listed as Section 303(d) Indicator Bacteria impaired Waterbody. The water quality of Elk River and Humboldt Bay has naturally elevated levels of suspended sediment and turbidity, and the upper Elk River (upstream of Berta Road) is listed as sediment impaired under Section 303(d). After project implementation and dike removal, tidewater entering the project area from Elk River Slough will inundate the project area. Any short-term project-related increases in suspended sediment or turbidity should not be significant given the background water quality of the tide water entering from Elk River Slough.

The project should not violate any state water quality standards or waste discharge requirements, with the implementation of mitigation measures to avoid and minimize erosion (see Mitigation Measures 6.2-6.5) and to prevent the release of hazardous materials associated with construction equipment (see Mitigation Measures 8.1-8.9). The project can only proceed if a water quality certification is secured from the NCRWQCB; the certification will require the development of a site-specific water pollution control plan.

During project implementation (July through October), the project area will be isolated from Elk River and short-term increases in suspended sediment-turbidity in Elk River should not occur because of project construction activities (excavation, placement of fill, and grading) to create new channels, and restore salt marsh habitat. Any turbid water pumped from the construction zone will be contained within the project area until the dikes are breached and tide gates removed.

Increases in suspended sediment-turbidity in the Elk River Slough and Humboldt Bay could occur because of project excavation and grading if exposed soil surfaces are left unprotected from rainfall and stormwater runoff occurs before these surfaces are vegetated. New inter-tidal channels and salt marsh wetlands when inundated will be a short-term source of sediment, suspended sediment in tidal discharges may increase background levels of turbidity down river of the project.

The sequence of Spartina eradication and construction has been phased to facilitate water management, erosion and sediment control and reduce impacts to natural resources. Erosion and sediment control shall comply with the California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003.

Physical and chemical treatment methods for Spartina eradication could result in potential impacts to water quality associated with application of herbicides, spills of petroleum products (from machinery, vehicles, and boats) or herbicides, and erosion and mobilization of marsh sediments. Treatment methods could create temporary erosion of marsh sediment, bank erosion due to Spartina removal along tidal channels, accumulation of organic detritus from physical/mechanical control in tidal channels, potentially induce stagnation and causing reductions in DO levels, and/or increased turbidity and suspended solids (H.T. Harvey and GHD 2013).

Spartina treatment methods involving the use of herbicides (imazapyr) have the potential to degrade water quality and subsequently affect beneficial uses of waters in the Elk River estuary. Water quality could be affected by spills of herbicides or other hazardous materials, such as fuel, as previously assessed under Section 8. Potential impacts to water quality will be avoided or reduced to less than significant by the implementation of mitigation measures listed below.

Using various application methods, herbicides (imazapyr) would be applied directly onto the foliage or stems of non-native Spartina during low tides when the sediment is exposed, as assessed in the programmatic EIR for Spartina management (H.T. Harvey and GHD 2013). Herbicide mixtures may be directly released to surface waters when the incoming tide could wash remaining herbicide mixture off the foliage and/or from exposed sediment (H.T. Harvey and GHD 2013). Herbicides will be applied during the time of year when rainfall is unlikely to occur; application of herbicides will not occur during or within forecast periods of rain or during periods of high winds.

The potential for concentrations of herbicides to be present in water will depend on canopy interception of the applied herbicide, uptake into the plants, uptake into the root zone, and aerial drift, if any. Since application of herbicides would take place during low tide and low wind conditions, the herbicide would likely be absorbed by plants for a minimum of several hours (up to several weeks in high marsh) following application, resulting in lower potential for imazapyr or surfactants to enter water (H.T. Harvey and GHD 2013).

Analysis of potential impacts to using herbicides to treat Spartina in Humboldt Bay (H.T. Harvey and GHD 2013) relied, in part, on similar previous work lead by the San Francisco Estuary Institute. The 2007-2010 Water Quality Monitoring Report for the San Francisco Estuary Institute Invasive Spartina Project (SFEISP) reported concentrations of imazapyr, the primary herbicide utilized, in receiving waters post-treatment to be consistent with published literature that it is short lived in estuarine environments (Kerr pers. comm., 2011, cited by H.T. Harvey and GHD 2013).

Under typical environmental conditions, imazapyr is highly soluble in water and does not adsorb to sediment particles. In aquatic systems, it is not expected to biodegrade rapidly via photolysis (Patten 2003 and Pless 2005, cited by H.T. Harvey and GHD 2013) with a half-life ranging from three to five days (Durkin and Follansbee 2004, cited by H.T. Harvey and GHD 2013), and volatilization from water or plant surfaces is insignificant. Residual imazapyr on the plants that has not completely dried or did not get absorbed by the plants, and that has the potential to be inundated by the incoming tide, will presumably be solubilized (H.T. Harvey and GHD 2013).

A number of field studies demonstrated that imazapyr rapidly dissipated from water within several days and no detectable residues of imazapyr were found in either water or sediment within two months (Pless 2005, cited by H.T. Harvey and GHD 2013). In estuarine systems, dilution of imazapyr with the incoming tides contributes to its rapid dissipation (Kegley 2008 and Pless 2005, cited by H.T. Harvey and GHD 2013). Degradation rates in turbid and sediment-laden waters, common in estuarine environments and in the project area, are expected to be lower than laboratory conditions. Kegley (2008, cited by H.T. Harvey and GHD 2013).

The SFEISP's NPDES water quality monitoring at treatment sites between 2009 and 2010 has found a mean reduction in imazapyr in the adjacent surface water of 95% one-week after treatment over the amount present immediately after the application (Kerr, pers. comm. 2011, cited by H.T. Harvey and GHD 2013). There are no state or USEPA-based numeric objectives or criteria for imazapyr (H.T. Harve and GHD 2013). Therefore, project permits would not have receiving water limitations for imazapyr. However, the City will be required to monitor their application (SWRCB 2004, cited by H.T. Harvey and GHD 2013).

Impacts to water quality from herbicide application depend on a variety of factors including the application methods, degradation rates of active agents, environmental conditions, and decomposition products of the specific herbicides used (H.T. Harvey and GHD 2013). The primary route by which herbicide solution may contact water is by overspray directly onto the water surface, or by washing off from plants due to tidal inundation or precipitation (H.T. Harvey and GHD 2013). Studies of surfactants applied in tidal marshes and mudflats in Willapa Bay, Washington found that that the highest average maximum concentrations of aerially applied glyphosate and X-77 Spreader surfactant in water dispersed

from sprayed estuarine mud with the first flooding tide were 26 g/L and 16 g/L, respectively (SFEI 2003, cited by H.T. Harvey and GHD 2013). These conditions represent the maximum concentrations of exposure for aquatic invertebrates or fish swimming into freshly sprayed sites (H.T Harvey and GHD 2013). This “worst case” concentration of glyphosate and surfactants is inherently short-lived in high energy tidal environments (H.T Harvey and GHD 2013). The same study found that concentration of glyphosate and surfactants were below analytic detection limits (0.5 ppb) during the first high tide after treatment (SFEI 2003, cited by H.T. Harvey and GHD 2013).

Describing work by the San Francisco Estuary Institute, Kerr (pers. comm., 2011, cited by H.T. Harvey and GHD 2013) concluded that concentrations detected in the receiving waters are up to four orders of magnitude below those reported in the toxicology literature as a concern to humans or the animals that inhabit the associated tidal marsh system, including the benthic invertebrates at the foundation of the food web. The four-year mean imazapyr concentration from the treatment event sampling was 60.64 ppb, with the annual means from 2007 through 2010 all within the relatively narrow range from 49.51 ppb to 71.17 ppb. The one-week post-treatment sampling results were also consistent with the published literature and confirmed that imazapyr is short-lived in an estuarine environment. Between 2007 and 2010, the San Francisco Estuary Institute observed the mean reduction in the imazapyr concentration after one week was 95.8% no matter what concentration was previously measured from the treatment event. Further, for two later two years (2009 and 2010), the mean reduction for that year was even higher at 99% (H.T. Harvey and GHD 2013).

With rapid degradation of this herbicide in the tidal marsh, as measured by the concentration in the water at the study site one week after treatment, residual imazapyr would likely be below detectable levels (H.T. Harvey and GHD 2013). Additionally, monitoring of conventional water quality parameters (water temperature, DO, pH, conductivity, turbidity and salinity) verified that there is no indication that the herbicide application to invasive Spartina resulted in impacts to other estuary surface water quality parameters (H.T. Harvey and GHD 2013).

The San Francisco Estuary Institute’s prior analysis as well as the EIR for the Humboldt Bay Regional Spartina Eradication Plan (H.T. Harvey and GHD 2013) supports the conclusion that imazapyr is not persistent in the estuarine environment and unlikely to degrade the water quality of the project area under normal application, and this potential impact would remain less than significant. Potential impacts to water quality and beneficial uses of waters of the State caused by spraying imazapyr mixtures in intertidal environments are likely to be small and temporary. Therefore, controlled applications (i.e., following label instructions) of registered herbicides are not expected to degrade water quality, except for to a very limited temporal and spatial extent. With implementation of the **Mitigation Measure 9-10**, this impact is less than significant.

If spilled, large volumes of herbicide or surfactant could degrade water quality and cause temporary toxicity, as described in the Humboldt Bay Regional Spartina Eradication EIR (H.T. Harvey and GHD 2013). Controlled applications of registered herbicides (i.e., following label instructions) are not expected to degrade water quality because these materials degrade rapidly in the environment and do not represent high potentials for toxicity or bioaccumulation in marine or terrestrial organisms. However, if large volumes of herbicide or surfactant are spilled near the treatment site in an undiluted (neat) form, or misapplied, these events could degrade water quality and cause temporary toxicity (H.T. Harvey and GHD 2013). Impacts to water quality associated with large volume spills would be potentially significant. Implementation of mitigation will reduce this potential impact to less than significant.

Treatment of Spartina can potentially result in decreased dissolved oxygen in receiving waters during the decay period, depending on where and how the wrack is deposited (H.T. Harvey and GHD 2013). This potential for dissolved oxygen impacts are greatest in areas of low tidal circulation. Because the project will be significantly increasing tidal circulation prior to Spartina removal to a fully-tidal condition,

potential dissolve oxygen impacts are not likely. There will be no significant impact to dissolved oxygen resulting form Spartina removal.

The project will have less than a significant effect, with the incorporation of **Mitigation Measures 9.1 - 9.10.**

Mitigation Measures

9.1 Construction and Spartina eradication shall only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when background Elk River freshwater inputs are at summer baseflow thresholds. Excavated materials shall not be stockpiled overwinter. Sediment control measures shall be in place while materials are being stockpiled to minimize sediment and pollutant transport from the project site.

9.2 Placement of fill in the project area shall occur when the area is not inundated by tide water.

9.3 Excavation shall include handling of saturated soils. Saturated soils shall be dewatered and/or transported saturated in a manner that prevents excess discharge or spillage of soils or water within the construction access areas. A silt fence shall be installed around the perimeter of temporary stockpiles of saturated soils to prevent runoff from leaving the site.

9.4 During construction, a silt fence shall be deployed to isolate work areas from existing channels, and to trap suspended sediment that might leave the construction site if stormwater runoff were to occur. If the silt fence is not adequately containing sediment, the construction activity shall cease until remedial measures are implemented that prevent sediment from entering the waters below.

9.5 No construction materials, debris, or waste, shall be placed or stored where it may be allowed to enter or be washed by rainfall into waters of the U.S./State.

9.6 Following completion of excavation, placement of fill, and grading all ground to the limits of disturbance (except newly constructed streambeds, pond beds, and tidally inundated areas) shall be treated for erosion prior to the onset of precipitation capable of generating run-off or the end of the yearly work period, whichever comes first. Treated areas that are not exposed to tidal influence shall be mulched with at least 2 to 4 inches of certified weed-free straw mulch with wheat or other straw for riparian and wetland areas and rice straw for uplands and use of a seed mix with coverage equivalent to 100 lbs/acre of barley seed and appropriate riparian vegetation for immediate erosion control. No annual (Italian) ryegrass (Lolium multiflorum) shall be used. In places such as stream banks, rush mattresses shall be installed for immediate erosion control.

9.7 All temporary fill, synthetic mats and silt fences shall be removed from wetlands and waters of the U.S./State immediately on cessation of construction. Biodegradable geotextile fabrics shall be used, where possible.

9.8 Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.

9.9 The following BMPs (California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003) shall be implemented to prevent entry of storm water runoff into the excavation site, the entrainment of excavated contaminated materials leaving the site, and to prevent the entry of polluted storm water runoff into coastal waters during the transportation and storage of excavated contaminated materials:

EC-2 Preservation of Existing Vegetation
EC-6 Straw Mulch

EC-7 Geotextile and Mats
EC-9 Earth Dikes and Drainage Swales
EC-10 Velocity Dissipation Devices
SE-1 Silt Fence
NS-2 Dewatering Operations
NS-4 Temporary Stream Crossing
NS-5 Clear Water Diversion
WM-9 Sanitary/Septic Waste Management

Stream diversion and dewatering shall conform to the following BMP (California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003)
NS-2 Dewatering Operations
NS-5 Clear Water Diversion
EC-9 Earth Dikes and Drainage Swales
EC-10 Velocity Dissipation Devices

9.10 Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper drying time prior to tidal inundation. Herbicides shall be applied by a certified applicator and in accordance with application guidelines and the manufacturer label. The project's site specific water quality control plan shall include and obtain coverage for use of herbicides to treat Spartina from the North Coast Water Quality Control Board.

Herbicides shall be applied by or under the direct supervision of trained, certified or licensed applicators. Herbicide mixtures shall be prepared by, or under the direct supervision of trained, certified or licensed applicators. Storage of herbicides and surfactants on or near project sites shall be allowed only in accordance with a spill prevention and containment plan included in the site-specific water pollution prevention plan approved by the NCRWQCD; on-site mixing and filling operations shall be confined to areas appropriately bermed or otherwise protected to minimize spread or dispersion of spilled herbicide or surfactants into surface waters.

b) <u>Would the project 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)?</u>

Thresholds of Significance

Substantially deplete groundwater supplies or interfere with groundwater recharge or lowering of the local groundwater table.

Assessment

The project will have no impact.

The project will not affect groundwater supplies or interfere with groundwater recharge or lower the local groundwater table.

The project is located next to Humboldt Bay and is not near any groundwater wells. If a freshwater aquifer exists at the project site, it does not supply any local water use. The project area does not contribute to any local groundwater supplies. Therefore, the project will have no impact on groundwater supplies.

The existing ground water composition and elevation in the project area, which is composed of former tidelands, is most likely dominated by the hydrology of Humboldt Bay. The project will expand the tidally influenced area of Humboldt Bay by approximately 69 acres. The existing area of tidal influence in Area 1 will increase slightly with the removal of the tide gate and dikes. Area 2 currently has very little tidal influence (4.1 acres), but after construction, most of Area 2 (71.5 acres), will become tidally influenced. The impervious surface areas created by the project because of the Waterfront Trail extension, trailhead parking lot, and emergency access on the eastern tidal ridge for PG&E equipment will drain stormwater runoff to the inter-tidal wetlands and therefore not affect groundwater recharge.

c) Would the project 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?

Thresholds of Significance

Substantially alter existing drainage, increasing surface runoff and/or resulting in substantial erosion or siltation on or off site.

Assessment

The project will have less than significant impact to erosion or siltation on or off site with successful implementation of mitigation measures.

The project will substantially alter existing drainage as it removes tide gates and dikes as well as restores pasture to inter-tidal wetlands but it will not increase surface runoff and will only temporarily increase siltation on or off site.

The Project will expand the tidal prism of Humboldt Bay by restoring tidal inundation on approximately 92 acres, but this is not an increase in storm water runoff and will not increase erosion or siltation on or off site once the inter-tidal wetlands have stabilized following re-introduction of daily ebb and flow of the tides. There will likely be short-term increase is siltation as the newly graded surfaces are initially tidally inundated. The newly constructed tidal channels have been sized to the project's tidal prism to not result in any channel adjustments; on site erosion is not expected to occur.

The project will be authorized by the CDFW who regulates alterations to existing drainages such as tributaries to Elk River. The project will also be authorized by the NCRWQCB and U.S. ACE who regulate discharges to waters of the State and US pursuant to the Clean Water Act. The project will develop and implement an approved water pollution prevent plan (see Mitigation Measure 9.11).

During construction Area 1 and Area 2 will be dewatered to minimize construction impacts to water quality. Sump pumps will maintain dry conditions at excavation sites at several locations. Water pumped out of the construction area, including groundwater and tidal recharge, will be first pumped into temporary settling basins before it can seep back into the ground or return to the Elk River slough in order to minimize potential short-term fine sediment siltation impacts.

Drainage into Area 1 will be unchanged as a result of project actions. Existing culverts and tide gates draining into Area 1 will be retained or replaced depending on their condition. The removal of the tide gates in Area 1 and the dikes will allow for unrestricted tidal inundation and ebbing flows with a larger tidal prism may increase the time that tide gates are open on culverts discharging to Area 1.

The project's most significant change to existing drainage patterns is the addition of a new tidal network into Area 2, originating from the mainstem Elk River, and the elimination of discharging through two culverts under Highway 101 to Elk River. This new channel network will restore a full tidal cycle to Area 2, increasing the frequency and duration of inundation into a new salt marsh ecosystem. This new drainage pattern, however, will not result in erosion or off-site siltation beyond short term construction

impacts that will be avoided through **Mitigation Measures 9-1 through 9-10** and the preparation of a site-specific water pollution control plan (**Mitigation Measure 9-11**) and adherence to the NCWQCB's requirements. A less than significant impact on stormwater-related siltation and erosion on- or off-site would result.

Mitigation Measures

9.11 The City of Eureka shall coordinate with the contractor to develop and implement a site-specific water pollution control plan, subject to review and approval by the NCRWQCB.

d) Would the project 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?

Thresholds of Significance

Increase the volume of surface runoff that potentially could cause localized flooding.

Assessment

The project will have no impact.

The project will substantially alter the existing drainage pattern of the site but it will not increase the rate or amount of storm water runoff that could cause localized flooding.

The project will restore tidal inundation to former tidelands and will alter the existing drainage pattern of the Elk River estuary, on-site flooding is an existing and desirable condition for tidal wetlands.

Existing tide gates on several small culverts in Area 1 currently protect adjacent properties from tidal inundation originating from Area 1; upstream drainage patterns will not be altered.

In Area 2, tidal ridges on the western and eastern boundaries and a topographic divide at the southern boundary, ranging in elevation from 10 to 14 ft, will prevent tidal inundation (flooding) of adjacent properties.

e) Would the project 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?

Thresholds of Significance

Runoff exceeds the capacity of existing or planned stormwater drainage systems or provides substantial additional sources of polluted runoff.

Assessment

The project will have no impact on the capacity of existing or planned stormwater drainage systems and will not provide substantial additional sources of polluted runoff.

In Area 1 the project is downstream of existing stormwater drainage systems, and it will not increase stormwater runoff to these systems. Removing the tide gates and dikes in Area 1 will increase the exchange of stormwater runoff with Elk River. In Area 2, the project will collect all runoff, which will be directed through the project's inter-tidal channel network to Elk River.

f) Would the project otherwise substantially degrade water quality?

Thresholds of Significance

Exceed any state water quality standards not previously assessed in Section 9 (a).

Assessment

The project will have no impact.

Potential water pollutants that could be released from the project site include construction-related pollutants. Impacts from these potential pollutants were adequately addressed in Sections 9 a), c) and e) of this Initial Study. The project can only proceed if a water quality certification is secured from the NCRWQCB; there will be no otherwise substantial degradation to water quality.

Once construction and Spartina eradication is complete and the first tidal cycle inundates the project area, the newly disturbed bare ground will become inundated for the first time and result in an unavoidable initial turbidity release to the Elk River and Humboldt Bay. This turbidity event is expected to be short in duration, allowing the project area to return to background turbidity levels once the bare earth becomes wetted and settles into its new tidal environment. A substantial water quality degradation is not expected.

g) Would the project place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map?

Thresholds of Significance

Placing housing within the 100-year flood plain, or other area subject to flooding.

Assessment

The project will have no impact; it does not include housing.

h) Would the project place structures within a 100-year flood hazard area structures, which would impede or redirect flood flows?

Thresholds of Significance

Construction of structures in the 100-year flood hazard area which would impede or redirect flood flows.

Assessment

The project will have no impact.

The project will not construct structures that would impede or redirect flood flows. The project is in FEMA's designated 100-year floodplain, with a Special Flood Hazard Area with high flood risk. The construction of the Waterfront Trail extension will parallel the existing NWP railroad grade and therefore not change existing conditions related to impediments or redirection of flood flows. Similarly, the construction of a tidal ridge parallel to Highway 101 would not change existing conditions related to impediments or redirection of flood flows. The viewing causeways and platforms are elevated structures and will not impede or redirect flood flows.

i) Would the project expose people or structures to a significant risk or loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Thresholds of Significance

Project is in a flood hazard area exposing people or structures to risk of loss, injury or death involving flooding.

Assessment

The project will have no impact.

The project is in FEMA's designated 100-year floodplain, with a Special Flood Hazard Area with high flood risk. However, the project will only be providing passive recreational opportunities for people to enjoy during the day. The project area would be closed pending any forecasted flood event.

j) Would the project result in inundation by seiche, tsunami, or mudflow?

Thresholds of Significance

Project results in inundation by seiche, tsunami or mudflow.

Assessment

The project will have a less than significant impact with the successful implementation of mitigation measures.

The project is located in an area designated as a Tsunami Evacuation Area, and is likely also subject to seiche, but with the implementation of mitigation measure there should be no risk to people using the area. The project is not located in an area subject to mudflows. Mitigation Measure 9-12 will require adequate signage to notify the public of tsunami hazards and evacuation routes. Because there are existing tsunami evacuation plans for the area (including tsunami sirens), and the project includes additional tsunami hazard signage, the tsunami risk is anticipated to be less than significant. The project is therefore not expected to expose people to significant risk, loss, injury or death from tsunami inundation.

With the incorporation of **Mitigation Measure 9-12,** impacts will not be significant.

Mitigation Measures

9.12 To inform trail users of the potential of tsunami run-up inundating the trail area, each trailhead location shall have signage informing the public of what actions to take in the event of seismic activity. Said signage shall be posted to the satisfaction of the City of Eureka and prior to the trail being open to the general public.

10 Land Use and Planning

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?				✓
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?				✓
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				✓

a) Would the project physically divide an established community?

Thresholds of Significance

Physically divide an established community.

Assessment

The Project will have no impact.

There are no established communities at the site. The project is in areas of open space that are isolated from any established communities by U.S. Highway 101. The Project will not create a physical barrier that would limit access to an area that was previously accessible, in-fact the project will increase public access to coastal areas.

b) Would the project 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?

Thresholds of Significance

Failure to comply with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project.

Assessment

The Project will have no impact. The project complies with the City's Local Coastal Program (LCP), and local/state/federal resource protection regulations.

Underlying all resource regulations is the City's Land Use Plan (LUP) and Implementation Plan (IP) designations in the project area, which includes Natural Resources (NR), and Coastal Agriculture (AC). Wetland restoration is an allowable use in both NR and AC designated areas. The City of Eureka's certified LUP identifies multiple natural resources and public access related goals and policies within the waterfront areas of Eureka. The proposed inter-tidal wetland and riparian restoration project is consistent with the following LUP goals and policies:

Natural Resource Policies

- *Policy 6.A.1 — "The City shall maintain, enhance, and where feasible, restore valuable aquatic resources, with special protection given to areas and species of special biological or economic significance."*
- *Policy 6.A.3.—"The City shall maintain and, where feasible, restore biological productivity and the quality of coastal waters, streams, wetlands, and estuaries appropriate to maintain optimum populations of aquatic organisms and for the protection of human health through, among other means, minimizing adverse effects of wastewater and stormwater discharges and entrainment, controlling the quantity and quality of runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining naturel vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams."*
- *Policy 6.A.9 — "The City shall permit the diking, filling, or dredging of open coastal waters, wetlands, or estuaries only under the following conditions: (a) The diking, filling or dredging is for a permitted use in that resource area; (b) There is no feasible, less environmentally damaging alternative; (c) Feasible mitigation measures have been provided to minimize adverse environmental impacts; and (d) The functional capacity of the resource area is maintained or enhanced."*
- *Policy 6.A.11 — "The City shall require that diking, filling, or dredging of a wetland or estuary maintain or enhance the functional capacity of these resources." " In order to establish that the functional capacity is being maintained, all of the following must be demonstrated: (a) Presently-occurring plant and animal populations in the ecosystem will not be altered in a manner that would impair the long-term stability of the ecosystem, i.e., natural species diversity, abundance and composition are essentially unchanged as the result of the project; (b) A species that is rare, threatened, or endangered will not be significantly adversely affected; and (c) Consumptive (e.g., fishing, aquaculture, and hunting) or non-consumptive (e.g., water quality and research opportunity) values of the wetland or estuary ecosystem will not be significantly reduced."*
- *Policy 6.A.15 — "The City shall limit uses and development in grazed or farmed wetlands to the following; …" "(c) Restoration projects, including the PALCO on-site restoration and enhancement program."*
- *Policy 6.A. 17 — "The City shall require that any uses that involve substantial alterations of stream and rivers incorporation the best mitigation measures feasible and shall be limited to the following: ..." "(b) Developments where the primary function is the improvement of fish and wildlife habitat."*
- *Policy 6.c.2 — "The City shall protect critical habitat areas and preserve the ecosystem of existing natural areas within the city."*

Trail-Related Policies

- *Goal 3.C – "To encourage the use of the bicycle as an alternate, energy efficient mode of transportation within the city and to develop a system of bikeways and bicycle parking facilities which will safely and effectively serve those wishing to utilize the bicycles for commute or recreational trips."*
- *Policy 3.C.6 – "The City shall pursue development of a system of local bikeways that extends throughout the urban sections of the City and which is interconnected with the regional bikeway system."*
- *Goal 3.D – "To encourage and facilitate walking throughout the City.*
- *Policy 3.D.1 – "The City shall provide for the extension of sidewalks, trails, and walking facilities throughout the City to allow for convenient and safe pedestrian movement.*

- *Policy 3.D.3 – "The City shall ensure that pedestrian walkways are separated, safe, and protected from automobile traffic."*
- *Policy 5.B.7 – " The City shall establish a coordinated continuous public access system throughout its Coastal Zone, consisting of pedestrian walkways, nature walks, and bikeways with necessary support facilities."*

The project is consistent with the City of Eureka LCP policies noted above.

The project is within the Coastal Zone, Area 1 and the northern portion of Area 2 are within the State's retained jurisdiction and the remainder of Area 2 is in the City's LCP jurisdiction. Development in the State's retained jurisdiction is subject to applicable policies and regulations of Chapter 3 of the Coastal Act and development in the remainder of the project is in the City's LCP jurisdiction. The City will likely request a consolidated CDP so that only one CDP needs to be prepared, rather than separate CDPs for the State and City of Eureka, however the CDP will be subject to Chapter 3 of the Coastal Act, not the policies and regulations of the City's LCP.

The project will secure authorization from the following agencies with jurisdiction over the proposed actions (Table 9).

c) Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?

Thresholds of Significance

If the project is in an area with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan, is it inconsistent with the applicable Plan?

Assessment

The project will have no impact.

As detailed in Section 4f (Biological Resources), there are no habitat or natural community conservation plans that cover the project area, therefore, no impact has been identified.

Table 9. *Summary of local, state, and federal agencies with jurisdiction over the proposed project.*

Agency	Statute	Permits
City of Eureka (Lead CEQA agency)	Local Coastal Program; State Planning and Zoning law (CGC Sections 65000 et. seq.)	Use Permit; Grading Permit
Humboldt Bay Harbor, Recreation, and Conservation District	Administers State sovereign tidelands beneath Humboldt Bay and the Elk River estuary	Shoreline Development Permit
California Department of Fish and Wildlife	Streambed Alteration Program (SAP) (Fish and Game Code (FGC) Section 1600 et seq.), California Endangered Species Act (CESA) (FGC Section 2050, et seq	Streambed Alternation Agreement; Safe Harbor Agreement
North Coast Water Quality Control Board	California Porter-Cologne Water Quality Control Act (WQCA) of 1969 (CWC Section 13000 et seq.)	Water Quality Certification; Water Pollution Prevention Plan
California Coastal Commission	California Coastal Act of 1976 (CCA) PRC Section 30000 et seq.; State Executive Order W-59-93 that established a State Wetland Conservation Policy (WCP), often referred to as the *"no-net loss of wetlands policy"*	Coastal Development Permit
U.S. Army Corps of Engineers	Rivers and Harbor Act (RHA) of 1899 (33 U.S.C. 401 et seq.), Clean Water Act (CWA) of 1972 (33 U.S.C. 1341 et seq.	Individual Permit
National Oceanic and Atmospheric Administration	Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536 et seq.), Fish and Wildlife Coordination Act (FWCA) of 1934 (16 U.S.C. 661 et seq.), Magnuson-Stevens Act (MSA) of 1996 (16 U.S.C. 1801 et seq.), Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 et seq.), National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470 et seq.), and the National Environmental Policy Act (NEPA) of 1970 (42 U.S.C. 4332 et seq.).	Consultation with the US. Army Corps of Engineers on the federal Individual Permit
U.S. Fish and Wildlife Service	Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536 et seq.), Fish and Wildlife Coordination Act (FWCA) of 1934 (16 U.S.C. 661 et seq.), Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 et seq.), National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470 et seq.), and the National Environmental Policy Act (NEPA) of 1970 (42 U.S.C. 4332 et seq.).	Consultation with the US. Army Corps of Engineers on the federal Individual Permit

11 Mineral Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?				✓
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?				✓

a) Would the project 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?

Thresholds of Significance

Development of land overlying a mineral resource that would physically preclude future access to that resource.

Assessment

The Project will have no impact on future availability of a mineral resource.

The proposed project is located for the most part on diked former salt marsh; there are no mineral resources underlying this area. There is a sand deposit formation in Area 2 of the project but it is considered an ESHA in the coastal zone, which would preclude it from being developed as a mineral resource.

b) Would the project 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?

Thresholds of Significance

Loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Assessment

No impact, as no such delineation exists for the project area.

12 Noise

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		✓		
b) Expose persons to or generate excessive ground borne vibration or ground borne noise levels?			✓	
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				✓
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		✓		
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?				✓
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?				✓

a) Would the project expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Thresholds of Significance

Generating noise and exposing people to noise in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Assessment

Less than significant impact with successful implementation of mitigation measures.

The City of Eureka includes residential noise exposure policies in the General Plan Policy Document, Part II, Section 7 (February 1997). The overall goal under “Residential Noise Exposure” is “To protect Eureka residents from the harmful and annoying effects of exposure to excessive noise.” For non-transportation related noise, the maximum allowable noise at the property line of lands designated for noise-sensitive uses cannot exceed 65dB (nighttime, 10 p.m. to 7 a.m.) to 70dB (daytime, 7 a.m. to 10 p.m.). Transportation noise sources are defined as “public roadways, railroad line operations, and aircraft in flight.”

The project area and surrounding area is characterized by undeveloped land (estuary and wetland pasture), Highway 101 and local roadways, with local and commuter traffic. There are no residential uses (single family and multifamily) adjacent to the project area. Noise near the project is primarily

associated with vehicular traffic along Highway 101. Additional noise sources in the vicinity include the Bay, water and shore birds, and commercial and recreational boating activities.

There is public access at the Waterfront Trail trailhead immediately adjacent to the northern boundary of the project area. For a limited time during construction (July through October) visitors to the Waterfront Trailhead and parking lot may hear construction-related noise during daytime hours. Construction activities will be limited to the hours of 7:00 AM to 7:00 PM on weekdays and 8:00 AM to 6:00 PM on Saturdays, Sundays, and Holidays, except in emergencies or with prior approval from the City of Eureka. Alternatively, the City could limit public access to Pound Road and the Hikshari Trailhead during construction to avoid exposing people to noise more than standards established in the local general plan, or applicable standards of other agencies.

The project may temporarily generate noise at the work site that exceeds 85 db for a short-term period when using heavy equipment. Workers in close proximity to operating equipment and equipment operators will be exposed to noise levels in excess of 85 db.

With mitigation incorporated, the minor incremental increase in noise associated with the restoration project and trail construction, use, and maintenance activities would not expose persons to noise levels in excess of applicable standards and would not represent a significant increase in noise. The impact is less than significant with **Mitigation Measures 12.1 - 12.8** incorporated.

Mitigation Measures

12.1 Workers shall be required to wear hearing protection when in the vicinity of or while operating equipment producing noise levels equal to or greater than 85 db. .

12.2 Restrict noise from earthmoving and hauling of soils to daytime hours. Hours of construction for outdoor activities exceeding 50 dBA shall be limited to Monday through Friday 7:00 a.m. to 7:00 p.m. and weekends and holidays from 8:00 a.m. to 6:00 p.m. Movement and hauling of material, and associated activities such as re-fueling or maintenance, shall be limited to normal working hours for the area, as specified above. More restrictive operation hours may be specified in the construction documents and may be property-specific.

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

12.4 A haul-truck route plan shall be developed. Hauling shall minimize passing any substantial collection of noise-sensitive land uses (i.e. occupied houses, schools, hospitals).

12.5 Larger capacity belly and end-dump trucks as well as double-trailers shall be used whenever feasible to minimize the number of truck trips necessary.

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

12.7 Notify commercial property neighbors when activity involving heavy construction equipment is scheduled to occur within 250 ft of occupied structures. Construction personnel shall provide written notification to the adjacent property owners prior to using heavy construction equipment. The written notification shall be provided to each potentially affected property at least 72 hours prior to the start of the activity, and shall indicate the approximate duration of time (dates and hours) during which the noise-generating activity is expected to occur.

12.8 If necessary, limit public access to Pound Road and the Hikshari Trailhead during construction to avoid exposing people to noise levels higher than standards established in the local general plan, or applicable standards of other agencies.

b) Would the project expose persons to or generate excessive ground borne vibration or ground borne noise levels?

Thresholds of Significance

Generate excessive ground borne vibration or noise levels.

Assessment

Less than significant impact.

Demolition of the concrete tide gate structure with excavators with jack hammers can generate ground vibrations, but only a limited number of people would be exposed for a limited time if they were traversing the Waterfront Trail, which is 425 ft away. However, the City will temporarily close the Pound Road trailhead for the Waterfront Trail until the project is complete, including the demolition of the tidegate structure. Therefore, the public would not be exposed to excessive ground borne vibration or noise. Workers on site would use protective hearing devices and limit their exposure time. Fish, animals, and birds utilizing the project area may be temporarily impacted by exposure to loud vibrations and are expected to temporarily seek quieter habitats in the nearby area, as discussed in Section 4a. Project related activities would not involve the use of explosives or other intensive construction techniques that could generate significant ground borne vibration or noise.

The remainder of project activities will not require construction that requires pile driving or other ground borne vibration. Instead, viewing platforms and elevated walkways will be installed using helical anchors which are instead screwed into the ground to avoid pile driving and noisy ground penetrating activities.

c) Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Thresholds of Significance

Substantial permanent increase of ambient noise levels in the project vicinity.

Assessment

The project will have no impact.

The project areas are currently used for passive recreation uses and livestock grazing. The project will expand the area of passive recreation uses. It does not involve any operational feature that would cause any permanent increase to noise levels. The project will, therefore, not result in any permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

d) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Thresholds of Significance

Substantial temporary or periodic increase of ambient noise levels.

Assessment

Project impact will be less than significant with the successful implementation of mitigation measures.

Construction activities would result in a minor temporary increase in ambient noise levels from construction equipment and construction-related traffic. The project will involve the use of heavy equipment which may operate at the same time and only for short-term duration. Construction will include using heavy equipment for earth moving, grading and compaction, paving, and hauling. Back-up beepers on heavy equipment vehicles will cause temporary noise in excess of ambient levels during daylight hours, but project construction is of short duration and this noise increase is not considered substantial.

Spartina eradication in Area 1 and a limited portion of Area 2 will initially be removed with the use of an aquatic tracked vehicle ("Marsh master") and heavy equipment during construction to disturb the upper 6 inches of soil while excavating channel areas and grading fill areas. Remaining Spartina areas will be treated with mechanical and hand labor, or herbicide eradication methods currently utilized on Humboldt Bay and approved under the Humboldt Bay Regional Spartina Eradication Plan (CCC 2014). Approved methods included in the eradication plan that will be applied to Area 1 include mowing, grinding, tilling, excavating, or treating the invasive Spartina with approved herbicides. Noise levels generated by Spartina eradication will be less than that of heavy equipment used for excavation and grading.

Although construction-related noise is unavoidable, it will be temporary and intermittent and construction hours will be limited, as required by Mitigation Measure 12.10 below. The proposed project will comply with all applicable City policies discussed above to abate construction-related noise impacts. Alternatively, the City could limit public access to Pound Road and the Hikshari Trailhead during construction to avoid exposing people to noise levels higher than standards established in the local general plan, or applicable standards of other agencies (Mitigation Measure 12.8). The impact on ambient noise levels will be less than significant with incorporation of mitigation already described in Section 12a (see Mitigation Measure 12-2).

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?

Thresholds of Significance

Expose people to excessive noise levels within the vicinity of a public airport.

Assessment

The project will have no impact.

The project site is approximately 6.5 miles south of Murray Field Airport and is located outside the airspace analysis zone identified in the 1993 Airport Land Use Compatibility Plan for Murray Field. The northern portion of the proposed project is approximately 1.5 miles southeast across the Bay from the City-owned Eureka Municipal Airport in Samoa. Murray Field is relatively distant to the project and the

project will not expose people in the project area to excessive noise levels from this airport. The Eureka Municipal Airport in Samoa is rarely used. It services very small aircraft only. The project will not expose people in the project area to excessive noise levels from this airport.

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?

Thresholds of Significance

Expose people to excessive noise levels within the vicinity of a private airport.

Assessment

The project will have no impact.

There are no private airstrips within the project vicinity.

13 Population and Housing

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

a) Would the project induce substantial population growth in an area, either directly (e.g., by proposing new homes and/or businesses) or indirectly (e.g., through extension of roads or other infrastructure)?

Thresholds of Significance

Result in substantial population growth in the area.

Assessment

The project will have no impact.

The project involves inter-tidal wetland and riparian habitat restoration in the Elk River estuary, as well as non-motorized recreational trail and boat launch development in the immediate vicinity of the project. The project will not involve construction of any facility that will directly or indirectly induce population growth. Therefore, the project will have no impact on population growth.

b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

Thresholds of Significance

Displace significant housing units in the area.

Assessment

The project will have no impact.

Not applicable, the Project is limited to restoring tidal wetlands in NR and AC zoned property and will not displace any existing housing.

c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

Thresholds of Significance

Displace a significant number of people.

Assessment

The project will have no impact.

The project is limited to inter-tidal wetland and riparian habitat restoration, and a non-motorized trail extension and boat launch, and will not displace any people. There is not presently any housing located in or adjacent to the project area. The closest housing is across Highway 101 off of Herrick Avenue or Elk River Road, southeast of the project in the Humboldt Hill area, or south of the project in King Salmon. The project will not result in displacement of people from these, or any other, community.

14 Public Services

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

a-e) <u>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.</u>

Thresholds of Significance

Result in increased need for public services such as fire and police protection, schools, and parks.

Assessment

Police and Fire

The project will have no impact.

The City of Eureka Police and Humboldt Bay Fire Departments currently serve the project area. The project purpose is to enhance and restore wetlands and inter-tidal marshes, increase recreation opportunities via a non-motorized boat ramp, as well as an extension of the existing Waterfront trail southward. The project will not necessitate any related new or altered facilities. The project will not result in adverse effects on service ratios for the police or fire departments. The proposed project will facilitate improved pedestrian access on trails and vehicle access on maintenance roads and parking areas for law enforcement and emergency services personnel. The project is not expected to increase the need for patrols by local law enforcement or emergency services. The project may have a beneficial effect on reducing the need for patrol by encouraging more public use and discouraging unwanted uses of the area.

The project does not involve the construction of new or physically altered police or fire facilities in order to maintain acceptable service ratios, response times or other performance service ratios or objectives

for any public services. Therefore, the project will not have an adverse physical effect on the environment because the project does not require new or significantly altered services or facilities to be constructed.

Schools

The project will have no impact.

The proposed project is in an area served by the Eureka City Schools District and will not necessitate additional school facilities. The proposed project has no relation to school district service ratios or school facilities and no impact to schools will occur.

Parks and Other Public Facilities

The project will have no impact.

The proposed project would provide recreational opportunities and access to the City's inter-tidal wetlands properties, Elk River Slough, Elk River Spit and Humboldt Bay by extending the Waterfront Trail and creating: a new trailhead and parking area, non-motorized boat launch, and wildlife viewing platforms. The project is expected to enhance recreation opportunities within the City. Additional recreational opportunities and increased recreational presence along the waterfront may reduce other less desirable uses that currently occur in the project vicinity. The project will not require additional services beyond the normal maintenance capacity of the service providers.

15 Recreation

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

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?

Thresholds of Significance

Increased use of parks or other recreational facilities in the area resulting in substantial deterioration of facilities.

Assessment

The project will have no impact.

The project will have a long-term positive effect on recreation by increasing recreational opportunities in the area. The proposed extension of the Waterfront Trail represents a segment of a regional trail system that has potential not only to significantly increase non-motorized transportation, but also link coastal areas, communities and other recreational facilities.

The proposed project may lead to an increase in the use of the City's Waterfront Trail but will not contribute to the physical deterioration of trail facilities. In fact, the project's enhanced use of the existing trail system will have an overall beneficial impact to the regional trail system. Increasing visibility and usage among public use facilities may deter illegal activity, such as illegal dumping or camping, thereby enhancing public safety and the overall health of the Elk River estuary corridor. Trails are generally low maintenance facilities and the additional wear-and-tear will be minimal.

During construction, the Pound Road trail head for the southern end of the Waterfront (Hikshari) Trail will be temporarily closed to the public. This will create a short-term reduction in existing public access to the trail, although two other Waterfront (Hikshari) Trail access points in the immediate area will remain open to the public at the end of Truesdale and Hillfiker avenues.

b) Would the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Thresholds of Significance

Include or require the construction or expansion of recreational facilities in the area.

Assessment

Less than significant impact with successful implementation of mitigation measures.

The proposed project includes a one mile extension of the Waterfront Trail, construction of a new trailhead and parking area, non-motorized boat launch, and elevated viewing causeways and platforms, which are recreational facilities. As discussed previously (Agriculture, Biological Resources, Geology and Soils, Hazards and Hazardous Materials, and Hydrology and Water Quality), impacts resulting from constructing public access related structures will be mitigated to less than significant with the successful implementation of mitigation measures.

16 Transportation/Traffic

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?			✓	
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?				✓
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?				✓
d) Substantially increase hazards due to design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			✓	
e) Result in inadequate emergency access?				✓
f) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				✓

a) Would the project exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

Thresholds of Significance

Substantial increase in the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections.

Assessment

Less than significant impact.

The project will not need to import a substantial volume of fill for the proposed grading design, therefore there will not be an increase in truck traffic to construct the project. The project is expected to increase recreational use of the Waterfront Trail and coastal areas, which could result in additional vehicle trips and motorized traffic. However, the existing Waterfront Trail project's parking capacity was designed to accommodate the anticipated traffic level and includes the use of the existing parking area at the Park and Ride located at the end of Pound Road. The City already has an encroachment permit from CalTrans for nine parking spaces in the Park and Ride area to maintain access to the existing Waterfront Trail. Existing parking/trailhead facilities for trail users will be upgraded at the terminus of

Pound Road to support trail and recreation usage. A small paved parking area is planned for Area 2 off Tooby Road at the southeastern corner of the project area (Figure 31).

During construction of the proposed project, construction equipment may cause minor delays on local roadways and local detours on Pound Road and Tooby Road. The use of heavy equipment on public roadways will be relatively minor and will only occur during short intervals during construction. The related traffic delays or disturbances are expected to be less than significant.

Once complete, the proposed project is not expected to significantly increase vehicle traffic on City streets, as it is not intended to increase the area's population or redirect traffic patterns. The project may decrease vehicle trips within the City by encouraging non-motorized forms of travel (walking, bicycling, etc.). Any potential increase in traffic generated by public visitation to the proposed Waterfront Trail extension and associated access areas will likely be offset by increased non-motorized travel to and from the area by trail users. The proposed multi-use Waterfront Trail extension will provide increased opportunities and routes for safe non-motorized travel within the City. The proposed Waterfront Trail extension will generally be accessed from the Park and Ride, and from Tooby Road trailhead parking area.

b) Would the project 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?

Thresholds of Significance

Conflict with applicable congestion management program.

Assessment

The project will have no impact.

The project area is not subject to a Congestion Management Program (CMP) as one does not exist for the project area. The project will not contribute to a congestion problem; therefore, there will be no impact.

c) Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?

Thresholds of Significance

Change air traffic patterns that would result in a safety risk.

Assessment

The project will have no impact.

The proposed project does not contain any component that involves air transportation. Therefore, the project will not cause a change in air traffic patterns.

d) Would the project substantially increase hazards due to design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Thresholds of Significance

Substantially increase hazards due to transportation design features or incompatible uses.

Assessment

Less than significant impact.

The project will not change the geometry of the street or roadway network. Therefore, no potentially hazardous roadway design features will be introduced by the project.

The Waterfront Trail extension will continue south parallel to the shoreline of Humboldt Bay on either side of the Elk River, so there will be no crossing of the highway or local roads by bicyclists or pedestrians.

If determined necessary by the City, the trail extension will include yellow centerline striping and additional warning signage. In addition, signage will be added along the trail warning users of curves, bends, and other hazardous situations. Speed control can only be maintained through signage and striping and other visual cues; surface irregularities will also be incorporated into trail design to control the speed of bicycles and other non-motorized vehicles.

The proposed trail extension may have potential conflicts between users who are stationary, such as birdwatchers, and bicyclists due to the difference in these activities. However, since the proposed trail extension will have striping, signage, unpaved shoulders on both sides, and scenic vista viewing areas, which could be used by birdwatchers and other users who want to get out of the main travel lanes, substantial safety related conflicts between trail users and birdwatchers (or other stationary individuals) will be avoided.

e) Would the project result in inadequate emergency access?

Thresholds of Significance

Result in inadequate emergency access.

Assessment

The project will have no impact.

Emergency vehicular access to the proposed project already exists via Pound Road and Tooby Road. The project will provide a new access point at the southern Waterfront Trailhead parking area. The one mile extension of the Waterfront Trail will provide emergency vehicle access the length of the project area as will the eastern tidal ridge in Area 2. Emergency access will increase to Elk River Spit, Elk River Slough, and to underground and above ground utilities with the implementation of the project.

Removable bollards shall be placed at trail extension intersections and entrances to prevent all but emergency and maintenance vehicles from entering.

f) Would the project conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?

Thresholds of Significance

Conflict with plans or policies regarding alternative modes of transportation.

Assessment

The project will have no impact.

The proposed project will significantly enhance alternative transportation by extending the Waterfront Trail south by one mile. The project is consistent with several adopted City policies, plans, and programs aimed at supporting alternative transportation. For additional discussion regarding City policies, refer to Section 10b, above. The project is consistent with City policies and plans for continuation of the

Waterfront Trail along Humboldt Bay and will therefore have a beneficial effect on alternative transportation in the City.

17 Tribal Cultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a 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:				✓
i) 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				✓
ii) 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.				✓

a) 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:

I. **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**
II. **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.**

Threshold of significance

Adversely alter tribal cultural resources.

Assessment

The project will have no impact.

Public Resources Code section 21074 defines tribal cultural resources and includes sites, features, places, cultural landscapes, sacred places, and object with cultural values to a California native American tribes. Tribal cultural resources are cultural resources that may be eligible for listing in the

California Register of Historic Resources or similar registers or is determined eligible by the lead agency.

Upon project initiation, the City did engage in formal consultation with all potentially affected tribes in the greater Humboldt Bay Area. Through consultation, project information was shared, and a field tour of the project area was conducted. Tribal cultural resources were not identified by participating tribes through consultation.

Through ongoing consultation efforts, affected tribes will be notified of project construction dates and arrangements can be made to accommodate tribal personnel wishing to observe project excavation activities, and THPOs will be contacted immediately should potential cultural resources be discovered during construction (See Section 5, Mitigation Measure 5.2).

Consultation with California Native American tribes traditionally and culturally affiliated with the project area has occurred pursuant to Public Resources Code section 21080.3.1.

Date Consultation Offered: June 29, 2016 (Invitation Distributed)

Date Consultation Begun: August 5, 2016 (Field Tour)

Consultation occurred early in the CEQA process to allow tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (Public Resources Code section 21083.3.2.) Information was requested from the California Native American Heritage Commission’s Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation.

18 Utilities and Service Systems

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				✓
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?				✓
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?				✓
d) Have insufficient water supplies available to serve the project from existing entitlements and resources (i.e., new or expanded entitlements are needed)?				✓
e) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				✓
f) Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs?				✓
g) Violate any Federal, State, and local statutes and regulations related to solid waste?				✓

a) Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

Thresholds of Significance

Exceed wastewater treatment requirements of the RWQCB.

Assessment

The project will have no impact.

The proposed project does not involve the use or construction of any facilities that will require water or wastewater infrastructure and will therefore have no impact.

b) Would the project 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?

Thresholds of Significance

Require or result in a substantial demand for new water or wastewater facilities affecting existing entitlements and resources.

Assessment

The project will have no impact.

The proposed project does not involve the use or construction of any facilities that will require water or wastewater infrastructure and will therefore have no impact.

c) Would the project 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?

Thresholds of Significance

Require construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Assessment

The project will have no impact.

As discussed in Hydrology and Water Quality, above, there are no proposed new storm water facilities or expansion of existing facilities.

d) Would the project have insufficient water supplies available to serve the project from existing entitlements and resources (i.e., new or expanded entitlements are needed)?

Thresholds of Significance

Have insufficient water supplies available to serve the project.

Assessment

The project will have no impact.

The project will provide the public with non-motorized public access to coastal areas and recreational opportunities. Drinking water supply facilities are not required and will not be provided. Restoration of inter-tidal wetlands and riparian habitats will rely on naturally occurring hydrology and precipitation.

e) Would the project result in a determination by the wastewater treatment provider, which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Thresholds of Significance

Result in inadequate wastewater treatment capacity.

Assessment

The project will have no impact.

The proposed project does not involve the use or construction of any facilities that will require water or wastewater infrastructure and will therefore have no impact.

f) Would the project be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs?

Thresholds of Significance

Result in an insufficient provision for solid waste disposal.

Assessment

The project will have no impact.

The solid waste provider is the Humboldt Waste Management Authority (HWMA). The project is not expected to generate a significant increase for solid waste disposal service needs. The proposed Waterfront trail extension will generate limited solid waste during both construction and operation.

Construction solid waste will include the one-time temporary generation of construction waste associated with the proposed development of the trail. Recyclable construction materials (e.g. scrap metal, wood, concrete, glass) will be shipped to local businesses for reuse, with non-recyclable materials sent to the HWMA transfer station in Eureka.

The project includes waste receptacles, spaces for recycling bins, and pet waste stations. Solid waste disposal service needs are included in the City's franchise agreement for waste collection with Recology.

g) Would the project violate any Federal, State, and local statutes and regulations related to solid waste?

Thresholds of Significance

Violate any regulations related to solid waste.

Assessment

The project will have no impact.

Solid waste collected as a part of the project will be disposed of at the Humboldt Waste Management Authority (HWMA). HWMA trucks solid waste produced in the County to State licensed landfills located in Anderson, California and Medford, Oregon in compliance with local, state, and federal regulations pertaining to solid waste disposal.

19 Mandatory Findings of Significance

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				✓
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).				✓
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?				✓

a) <u>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?</u>

Thresholds of Significance

Project has impacts associated with any of the environmental topics identified in the Initial Study (Appendix G CEQA Guidelines) that cannot be mitigated to less than significant levels.

Assessment

The project will have a less than significant impact with the successful implementation of mitigation measures.

As discussed herein (aesthetics, agricultural, biological, cultural resources, geology, hazardous materials, hydrology and water quality, noise and recreation), the project, with the successful implementation of mitigation measures, does not 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.

Degrade the quality of the environment

The project will not degrade the quality of the environment.

Please refer to previous discussions of no impact (land use, mineral resources, housing, public services, and utilities), less than significant impact (aesthetics, air quality, greenhouse gases, and transportation), and less than significant impact with successful implementation of mitigation measures (agricultural, biological, cultural resources, geology, hazardous materials, water quality, noise and recreation), in this initial study.

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

Overall this project will provide a long-term benefit to the environment, as it will enhance estuary conditions in Elk River, restore an inter-tidal wetland complex including a tidal channel network and tidal ponds, greatly increasing aquatic and wetland habitat diversity relative to the existing condition, which consists of diked inter-tidal wetlands infested with Spartina and over grazed pasture. The project will provide long-term benefits to resident and migratory fish, wildlife and waterfowl. By constructing living shorelines, treating invasive Spartina, enhancing the structural complexity of tidal marshes and increasing channel network complexity and connectivity, the project will improve the landscape capacity to adjust to midrange predictions of sea level rise. The project will change land management practices by eliminating livestock grazing, which has maintained short grass pasture that are also used seasonally by migrating Aleutian geese. The elimination of approximately 69 acres of pasture will not substantially reduce the amount of available gazing habitat for Aleutian geese on Humboldt Bay or in Elk River valley.

Substantially reduce the number or restrict the range of a rare or endangered plant or animal.

The project has the potentially to substantially expand the number and range of protected fish species and several rare salt marsh plants as discussed under Biological Resources Section 4a.

Eliminate important examples of the major periods of California history or prehistory.

As discussed under Cultural Resources Section 5a and Tribal Cultural Resources section 17a, the project will have no impact on any historic, cultural, or tribal cultural resources. Despite an intensive survey and formal tribal consultation, no Native American archaeological materials associated with tribal settlements were identified by consulting tribes as potentially culturally significant under Public Resources Code 21074, and none are expected to be encountered in this project area. Due to an extensive history of flooding, silt deposits, and changes to the mouth of Elk River, it is possible, that buried archaeological materials could be encountered during implementation of this project. This will be most likely to occur along the margins of Elk River and Humboldt Bay. Therefore, the City will continue to coordinate with appropriate Tribal representatives to support archaeological resource monitoring during construction.

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).

Thresholds of Significance

The incremental effects of a project are cumulatively considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

Assessment

The project will have a less than significant impact with the successful implementation of mitigation measures.

A cumulative impact is when the incremental effects of the project, when combined with the effects of other past, present and reasonably foreseeable future projects, are cumulatively considerable.

As discussed in Section 10 Land Use and Planning, the project is consistent with the development contemplated in the City of Eureka's General Plan.

As reported throughout this document, any potential significant impacts (agricultural, biological, cultural resources, geology, hazardous materials, water quality, noise and recreation) potentially caused by this project will be mitigated to the less-than-significant level with the successful implementation of mitigation measures.

The project does not have adverse impacts that are individually limited, but cumulatively considerable. It is the goal of the project that the beneficial effects of tidal marsh restoration and habitat enhancement will be cumulative over time.

c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?

Thresholds of Significance

The project will have environmental impacts that cause substantial adverse effects on human beings, either directly or indirectly.

Assessment

The project will have less than significant impacts with the successful implementation of mitigation measures.

The project's environmental impacts that may adversely affect people have been determined to be less than significant or mitigated to less than significant with successful implementation of mitigation measures. As discussed herein, the project is not expected to cause any substantial adverse environmental effects that will cause harm to human beings either directly or indirectly. The habitat enhancement and restoration actions implemented as part of this project will be beneficial to human beings.

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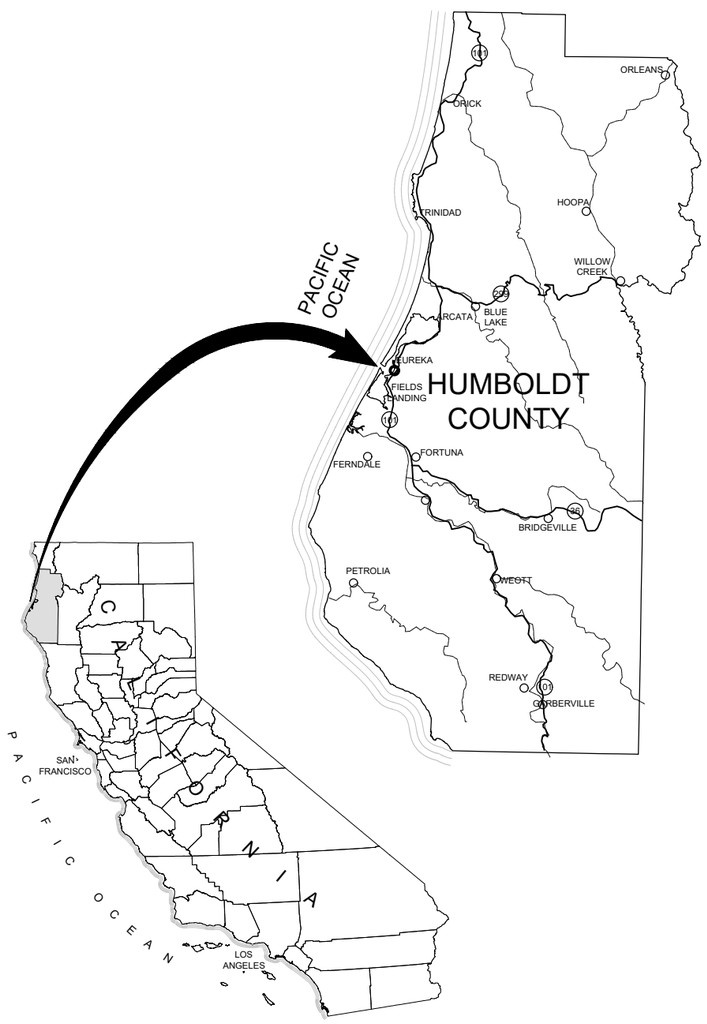
Appendix A

30% Designs

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT

FEBRUARY 2017

AREA MAP



VICINITY MAP

SHEET INDEX

SHEET NO.	TITLE
C-1	COVER SHEET AND SHEET INDEX
C-2	GENERAL NOTES
C-3	EXISTING FEATURES
C-4	EXISTING TOPOGRAPHY
C-5	EXISTING HYDROLOGY
C-6	EXISTING VEGETATION TYPES AND AREAS
C-7	ESTUARY AND WETLAND DEVELOPMENT PLAN
C-8	DESIGN TOPOGRAPHY
C-9	POST-DEVELOPMENT VEGETATION TYPES AND AREAS
C-10	AREA 1 GRADING PLAN
C-11	AREA 1 CHANNEL CROSS SECTIONS AND PROFILE
C-12A, 12B	AREA 2 GRADING PLAN
C-13	AREA 2 CHANNEL CROSS SECTIONS AND PROFILE
C-14	AREA 2 TIDAL RIDGE
C-15	SPARTINA ERADICATION PLAN
C-16	AREA 1 BOAT RAMP
C-17	DETAILS

30% DESIGN PLAN SET

REV#	REVISION NOTE	DATE

LICENSE STAMP

greenway
Solving community challenges
GREENWAY PARTNERS
1385 6TH STREET, SUITE 201 ARCATA, CA 95521
(707) 822-0597

Trinity Associates

COVER SHEET AND SHEET INDEX

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 2/10/17

Drawn By: KB	Checked By: SS
Last Revised: 5/23/17	Scale:

DRAWING NUMBER

C-1

GENERAL NOTES

1. THE ELK RIVER ESTUARY AND SALT MARSH RESTORATION PROJECT IS OWNED BY THE CITY OF EUREKA. THE PROJECT BOUNDARIES ARE THE PARCEL BOUNDARIES AND NO WORK IS PLANNED TO OCCUR ON NORTH COAST RAILROAD AUTHORITY (NCRA) PROPERTY OR ON CALTRANS PROPERTY. PARCEL CORNERS AND BOUNDARIES WILL BE MARKED BY THE CITY OR THE ENGINEER PRIOR TO THE CONTRACTOR MOBILIZATION.
2. THE PROJECT IS BEING FUNDED BY VARIOUS STATE AND FEDERAL AGENCIES. THE WORK SHALL BE DONE AT PREVAILING WAGE RATES.
3. PROJECT REQUIRES A CALIFORNIA CLASS A GENERAL ENGINEERING CONTRACTOR'S LICENSE.
4. QUANTITIES OF MATERIALS AND SITE CONDITIONS SHOWN IN THE PLANS ARE APPROXIMATE. ALL MATERIALS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR UNLESS OTHERWISE NOTED.
5. CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY OF EUREKA, GREENWAY PARTNERS, NCRA, AND THEIR REPRESENTATIVES HARMLESS FROM ANY AND ALL LIABILITY, REAL AND/OR ALLEGED, IN CONJUNCTION WITH THE EXECUTION OF THIS PROJECT.
6. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY AND ALL DAMAGES TO EXISTING STRUCTURES, ROADS, RAILROAD TRACK AND TRACK BED, AND UTILITIES DURING CONSTRUCTION. ALL DAMAGE SHALL BE RESTORED TO EQUAL OR BETTER CONDITION AT THE CONTRACTOR'S EXPENSE.
7. CONTRACTOR SHALL VERIFY LOCATIONS, ELEVATIONS, DISTANCES, AND FEATURES THAT MAY AFFECT THE WORK. SHOULD EXISTING CONDITIONS DIFFER FROM THOSE SHOWN OR INDICATED, OR IF IT APPEARS THAT THESE PLANS, SPECIFICATIONS, AND SPECIAL PROVISIONS DO NOT ADEQUATELY DETAIL THE WORK TO BE DONE, CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO CONTINUING WITH ANY RELATED WORK. NO ALLOWANCE WILL BE MADE ON HIS BEHALF FOR ANY EXTRA EXPENSE RESULTING FROM FAILURE OR NEGLECT IN DETERMINING THE CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALE.
8. A SET OF SIGNED WORKING DRAWINGS AND A SET OF SPECIFICATIONS WILL BE KEPT AT ALL TIMES AT THE JOB SITE ON WHICH ALL CHANGES OR VARIATIONS IN THE WORK, INCLUDING ALL EXISTING UTILITIES, ARE TO BE RECORDED AND/OR CORRECTED DAILY AND SUBMITTED TO THE ENGINEER WHEN THE WORK TO BE DONE IS COMPLETED.
9. CONTRACTOR SHALL PROVIDE AND MAINTAIN SUFFICIENT TEMPORARY BARRIERS AND FENCING TO PROVIDE FOR THE SAFETY OF THE PUBLIC IN ACCORDANCE WITH AN APPROVED PLAN AND TO THE SATISFACTION OF THE ENGINEER.
10. SHOULD GRADING OPERATIONS ENCOUNTER HAZARDOUS MATERIALS, OR WHAT APPEAR TO BE HAZARDOUS MATERIALS, STOP WORK IN THE AFFECTED AREA IMMEDIATELY AND CONTACT 911 OR THE APPROPRIATE AGENCY FOR FURTHER INSTRUCTIONS.
11. CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST 72 HOURS IN ADVANCE OF COMMENCEMENT OF ANY PART OF THE WORK AND SHALL COORDINATE CONSTRUCTION SCHEDULE WITH ENGINEER TO MINIMIZE IMPACT TO PEOPLE UTILIZING THE HIKSHARI TRAIL
12. UNSUITABLE EXCAVATED MATERIAL SHALL BE REMOVED FROM SITE AND DISPOSED OF IN A MANNER CONSISTENT WITH APPLICABLE REGULATIONS SUCH AS CITY OR COUNTY GRADING ORDINANCES. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY AND EXPENSE FOR PROPER DISPOSAL OF UNSUITABLE MATERIALS TAKEN FROM SITE AND PROVIDE SUITABLE DOCUMENTATION OF PERMISSION AND ENVIRONMENTAL DOCUMENTATION FOR USE OF ANY DISPOSAL SITE AS REQUESTED BY THE ENGINEER.
13. THE DESIGN FEATURES INCLUDING HORIZONTAL AND VERTICAL ALIGNMENTS, TYPICAL SECTIONS, APPROACHES, AND OTHER DESIGN DETAILS SHOWN ON THESE DESIGN PLANS SHALL NOT BE ALTERED OR MODIFIED IN ANY WAY DURING CONSTRUCTION WITHOUT THE EXPRESSED, WRITTEN DIRECTION AND APPROVAL OF THE ENGINEER AND/OR OWNERS REPRESENTATIVE. DRAINAGE STRUCTURES SHALL BE INSTALLED AS SHOWN THE PLANS WITH ONLY MINOR CORRECTIONS IN LOCATION SKEW AND/OR ELEVATIONS AS NEEDED TO FIT FIELD CONDITIONS AS DETERMINED BY THE ENGINEER OR OWNER'S REPRESENTATIVE.
14. THE CONTRACTOR SHALL READ AND MAKE CAREFUL EXAMINATION OF THE PLANS, SPECIFICATIONS, QUANTITIES AND MATERIAL ESTIMATES AND VISIT THE SITE OF THE PROPOSED CONSTRUCTION TO BECOME FAMILIAR WITH THE SITE CONDITIONS AND LIMITATIONS BEFORE PREPARING THEIR BID. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL ERRORS RESULTING FROM THE FAILURE TO MAKE SUCH AN EXAMINATION AND SHALL NOT RELIEVE THE CONTRACTOR FROM ANY COST OVERRUNS OR FROM FULFILLING THE TERMS OF THE CONTRACT.
15. NO WORK SHALL BE PERFORMED OUTSIDE OF THE DESIGNATED CONSTRUCTION LIMITS WITHOUT THE APPROVAL OF THE OWNER'S REPRESENTATIVE.
16. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING STAGING AREAS WITH THE CITY OF EUREKA. ALL STAGING AREAS WITHIN THE RIGHT-OF-WAY SHALL BE PRE-APPROVED BY THE CITY.
17. UPON COMPLETION OF THE CONSTRUCTION PROJECT, THE CONTRACTOR SHALL LEAVE THE PROJECT AREA FREE OF DEBRIS AND UNUSED MATERIAL. ALL DAMAGE CAUSED BY THE CONTRACTOR SHALL BE RESTORED TO AN "AS GOOD OR BETTER" CONDITION.
18. EXISTING FENCING SHALL REMAIN IN PLACE AND UNDISTURBED BY CONSTRUCTION OPERATIONS UNLESS OTHERWISE SHOWN ON THE PLANS. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY AND ALL DAMAGES TO FENCES DURING CONSTRUCTION. ALL DAMAGE SHALL BE RESTORED TO EQUAL OR BETTER CONDITION AT THE CONTRACTOR'S EXPENSE.
19. THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER A MINIMUM OF 72 HOURS IN ADVANCE OF ANY EXCAVATION THAT WILL EXTEND 2 FEET OR DEEPER, AND WILL NOT PROCEED WITH ANY EXCAVATION WORK UNTIL CLEARED TO DO SO BY THE ENGINEER. A PROJECT ARCHAEOLOGIST MAY BE ON SITE DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR IS ADVISED THAT IF ANY ARCHAEOLOGICAL FINDINGS ARE DISCOVERED DURING CONSTRUCTION THAT THE MONITOR OR ARCHAEOLOGIST HAS THE AUTHORITY TO SLOW OR STOP CONSTRUCTION ACTIVITIES AS THEY DEEM NECESSARY.
20. EXISTING SIGN SYSTEMS SHALL BE PROTECTED THROUGHOUT CONSTRUCTION ACTIVITY UNLESS NOTED OTHERWISE ON PLANS. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY AND ALL DAMAGES TO SIGNS DURING CONSTRUCTION. ALL DAMAGE SHALL BE RESTORED TO EQUAL OR BETTER CONDITION AT THE CONTRACTOR'S EXPENSE.
21. STRUCTURAL EXCAVATION AND BACKFILL OF CULVERTS AND OTHER DRAINAGE STRUCTURES SHALL BE CONSIDERED INCIDENTAL TO INSTALLATION OF THE STRUCTURE. EXCESS MATERIAL REMOVED MAY BE USED TO REBUILD APPROACHES OR MAY BE PLACED ALONG ROADWAY/TRAIL SHOULDERS IN AREAS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
22. THE LOCATIONS AND LENGTH OF PIPES MAY BE MODIFIED AS NECESSARY TO FIT ACTUAL FIELD CONDITIONS AS DETERMINED AND APPROVED BY THE ENGINEER.
23. EXISTING PIPES & CULVERTS TO BE REMOVED SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

TRAFFIC CONTROL NOTES

1. MOST OF THE WORK WILL OCCUR ON UNDEVELOPED CITY PROPERTY (WETLANDS AND OPEN FIELDS). SOME OF THE WORK WILL OCCUR ALONG POUND ROAD AND THE HIKSHARI TRAIL (BEHIND A LOCKED GATE THAT PREVENTS VEHICULAR ACCESS). NONE OF THE WORK WILL OCCUR ON CITY STREETS OR CALTRANS RIGHT-OF-WAYS. THE CONTRACTOR IS RESPONSIBUE FOR PREPARING AND SUBMITTING A PEDESTRIAN TRAFFIC CONTROL FOR THE REVIEW AND APPROVAL OF THE ENGINEER THAT ALLOWS USE OF THE POUND ROAD AND THE HIKSHARI TRAIL DURING THE DURATION OF THE PROJECT.

SURVEY NOTES

1. THE CITY AND/OR THE ENGINEER ARE RESPONSIBLE FOR ESTABLISHING HORIZONTAL AND VERTICAL SURVEY CONTROL AND FOR STAKING PARCEL CORNERS AND BOUNDARIES.
2. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING AND STAYING WITHIN THE LIMITS OF WORK.
3. CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION SURVEY OF THE LOCATIONS, ELEVATIONS, AND GRADES OF ALL FEATURES. CONTRACTOR SHALL ARRANGE AND PAY FOR THE SERVICES OF A CALIFORNIA LICENSED SURVEYOR, AS NECESSARY. COMPUTER AIDED DESIGN (CAD) FILES WILL BE AVAILABLE AND PROVIDED TO THE CONTRACTOR PRIOR TO CONSTRUCTION. STAKING WILL BE REVIEWED BY OWNER FOR CONFORMANCE TO DESIGN PRIOR TO CONSTRUCTION.
4. THE CITY/ENGINEER WILL PREPARE THE RECORD DRAWINGS FOR THE FINISHED PROJECT.

UTILITY NOTES

1. PRESERVE AND PROTECT ALL ABOVE GROUND AND UNDERGROUND UTILITIES. HUMBOLDT COMMUNITY SERVICES DISTRICT'S 10" PRESSURE SEWER MAIN RUNS PARALLEL TO THE WESTERN BOUNDARY OF THE PROJECT. THE CITY OF EUREKA'S PRESSURE SEWER MAIN RUNS PARALLEL TO POUND ROAD/HIKSHARI TRAIL. PGE HAS OVERHEAD POWER LINES AND THERE ARE UNDERGROUND COMMUNICATION LINES PRESENT ALONG THE EASTERN BOUNDARY OF THE PROJECT.
2. THE LOCATIONS OF UTILITIES SHOWN IN THE PLANS ARE ONLY APPROXIMATE AND MAY VARY FROM THOSE SHOWN ON THE PLANS. CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICES ALERT (600) 227-2600 A MIN. OF 48 HOURS PRIOR TO ANY EXCAVATION AND POTHOLE FOR EXACT LOCATION. VARIATIONS IN LOCATION AND DEPTH SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY AND PROPOSED MODIFICATIONS REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO CHANGING THE PLANS TO ACCOMMODATE THE UTILITIES. ANY DAMAGE TO EXISTING UTILITIES THROUGH THE ACTIONS OF THE CONTRACTOR SHALL BE REPAIRED TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL COORDINATE WORK ON OR AROUND NON-CITY-OWNED UTILITIES WITH THE RESPONSIBLE UTILITY COMPANY.
4. ALL EXISTING UTILITIES SHOULD BE CONSIDERED ACTIVE UTILITIES UNLESS OTHERWISE INDICATED.
5. CONSTRUCTION ACTIVITY WILL TAKE PLACE IN THE VICINITY OF OVERHEAD ELECTRIC TRANSMISSION LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE AWARE OF, AND OBSERVE, THE MINIMUM CLEARANCES FOR WORKERS AND EQUIPMENT OPERATING NEAR HIGH VOLTAGE ELECTRIC LINES AS SET OUT IN THE HIGH VOLTAGE SAFETY ORDERS OF THE CALIFORNIA DIVISION OF INDUSTRIAL SAFETY AS WELL AS OTHER APPLICABLE SAFETY REGULATIONS.

CONSTRUCTION SEQUENCE

IT IS ANTICIPATED THAT THE ENTIRE PROJECT (BOTH AREAS 1 AND 2) WILL BE COMPLETED IN ONE CONSTRUCTION SEASON (MAY 15 TO OCTOBER 15) AND WILL NOT EXTEND INTO THE RAINY SEASON. THE FOLLOWING SUGGESTED CONSTRUCTION SEQUENCE IS SUBJECT TO MODIFICATION BY THE CONTRACTOR AFTER CONSULTATION AND APPROVAL BY THE ENGINEER. BOTH AREAS COULD BE WORKED ON AT THE SAME TIME.

AREA 1:

1. SET UP THE CONSTRUCTION STAGING AREA WITH FENCING AND SECONDARY CONTAINMENT PADS FOR THE EQUIPMENT (FUELS AND LUBRICANTS).
2. SET UP THE FRESHWATER BYPASS SYSTEM TO CAPTURE SURFACE WATER RUN-ON FROM THE DRAINAGE AREAS NORTH OF POUND ROAD. ELECTRICITY IS AVAILABLE AT THE LIFT STATION ON POUND ROAD AND THE WATER CAN BE DISCHARGED UNDER THE BRIDGE ON THE HIKSHARI TRAIL.
3. ON AN EBBING TIDAL CYCLE; CHASE AQUATIC ORGANISMS OUT OF THE EXISTING CHANNELS INTO ELK RIVER, THROUGH THE TIDE GATES
4. ADJUST THE TIDE GATES SO THAT THEY SEAL TIGHT TO THE CONCRETE WALL THEN CLOSE AND LOCK THEM IN PLACE
5. BEGIN SPARTINA ERADICATION PROGRAM (SEE SPARTINA ERADICATION PROGRAM, BELOW)
6. SET UP THE FILTER PAD FOR GROUNDWATER THAT WILL BE PUMPED FROM THE NEW CHANNEL EXCAVATION (DETAIL _____)
7. SET UP A DEWATERING PUMP (WITH SECONDARY CONTAINMENT FOR FUEL) AT THE TIDE GATE TO PUMP GROUNDWATER UP ONTO THE FILTER PAD
8. CONSTRUCT NEW CHANNEL STARTING AT THE TIDE GATES AND WORKING UPGRADIENT
9. USE EXCAVATED MATERIALS TO CONSTRUCT NEW TRAIL PRISM ALONG NCRA RAILROAD BED
10. SPREAD EXCAVATED MATERIALS TO DESIGN GRADES
11. SURFACE NEW CLASS 1 TRAIL BETWEEN POUND ROAD AND THE RAILROAD BRIDGE
12. CONSTRUCT BERM THAT WILL DEFINE THE LIMITS OF THE FRESHWATER MARSH
13. INSTALL/REPAIR TIDE GATES THAT WILL CONTROL HYDROLOGY OF PROPERTIES TO THE NORTH AND EAST
14. INSTALL CAUSEWAY AND VIEWING PLATFORM
15. CONSTRUCT BOAT RAMP
16. REMOVE TIDE GATES AND BREAK CONCRETE WALL OFF DOWN TO ELEVATION AT BOTTOM OF NEW CHANNEL
17. COMPLETE REMOVAL OF DIKES AND DITCHES
18. REMOVE FILTER PAD AND DEWATERING PUMP(S)
19. REMOVE STAGING AREA AND FENCING

AREA 2:

1. SET UP THE CONSTRUCTION STAGING AREA WITH FENCING AND SECONDARY CONTAINMENT PADS FOR THE EQUIPMENT (FUELS AND LUBRICANTS).
2. SET UP THE FILTER PAD FOR GROUNDWATER THAT WILL BE PUMPED FROM THE NEW CHANNEL EXCAVATION (DETAIL _____)
3. SET UP A DEWATERING PUMP (WITH SECONDARY CONTAINMENT FOR FUEL) AT SAND DUNE TO PUMP GROUNDWATER UP ONTO THE FILTER PAD
4. CONSTRUCT NEW CHANNEL STARTING AT SAND DUNE AND WORKING UPGRADIENT
5. USE EXCAVATED MATERIALS TO CONSTRUCT NEW TIDAL RIDGE/TRAIL PRISM AROUND PERIMETER OF PROPERTY
6. SPREAD EXCAVATED MATERIALS TO DESIGN GRADES
7. INSTALL CAUSEWAY AND VIEWING PLATFORM
8. CONSTRUCT NEW TRAILHEAD PARKING LOT AND ENTRANCE ON TO TOOBY ROAD
9. COMPLETE CONSTRUCTION OF THE LOOP TRAIL (SURFACING WITH ROCK)
10. COMPLETE REMOVAL OF EXISTING DIKES AND DITCHES
11. COMPLETE CONSTRUCTION OF NEW CHANNEL THROUGH THE SAND DUNE
12. REMOVE FILTER PAD AND DEWATERING PUMP(S)
13. REMOVE STAGING AREA AND FENCING

SITE SPECIFIC WATER POLLUTION CONTROL PLAN

GENERAL

1. THIS FOLLOWING TEXT OUTLINES THE BASIC PARAMETERS OF THE SITE SPECIFIC WATER POLLUTION CONTROL PLAN FOR THE ELK RIVER ESTUARY PROJECT. THE SELECTED CONTRACTOR WILL BE REQUIRED TO IMPLEMENT THIS PLAN OR PREPARE AN ALTERNATE PLAN.
2. THIS SITE-SPECIFIC WATER POLLUTION CONTROL PLAN IDENTIFIES THE POTENTIAL POLLUTANTS, DESCRIBES THE MEASURES THAT WILL BE IMPLEMENTED TO PREVENT OR CONTROL THESE POLLUTANTS, SPECIFIES THE MONITORING PROGRAM THAT WILL BE IMPLEMENTED TO ENSURE THAT THE MEASURES ARE SUCCESSFUL, AND CORRECTIVE ACTIONS THAT CAN BE TAKEN TO IMPROVE THE EFFECTIVENESS OF THE MEASURES.
3. THE POTENTIAL POLLUTANTS INCLUDE SEDIMENTS AND HYDROCARBONS. THE SEDIMENTS INCLUDE SILT AND SAND PARTICLES THAT WILL BE MOBILIZED DURING THE EXCAVATION AND GRADING OF THE SITE. THE HYDROCARBONS ARE FUELS AND LUBRICANTS ASSOCIATED WITH HEAVY EQUIPMENT AND SMALL GASOLINE ENGINES.

HYDROCARBONS

4. ALL EQUIPMENT SHALL BE KEPT IN GOOD WORKING ORDER. HEAVY EQUIPMENT (SUCH AS BULLDOZERS AND EXCAVATORS) SHALL BE PRESSURE WASHED PRIOR TO BEING MOBILIZED TO THE SITE TO REMOVE GREASE AND OIL RESIDUALS. EACH PIECE OF EQUIPMENT SHALL BE INSPECTED EACH DAY FOR LEAKS AND REPAIRED AS NECESSARY. DAILY MAINTENANCE AND FUELING SHALL BE DONE ON A CONTAINMENT PAD IN THE CONTRACTOR'S STAGING AREA. ALL EQUIPMENT SHALL BE EQUIPPED WITH AN EMERGENCY SPILL CLEAN UP KIT.
5. GASOLINE POWERED DEWATERING PUMPS AND ASSOCIATED FUEL STORAGE CONTAINERS SHALL BE SET UP ON A CONTAINMENT PAD OR PALLET. NO MORE THAN 5 GALLONS OF FUEL SHALL BE STORED WITH THE PUMP WHEN IT IS STATIONED OUT IN THE FIELD. EACH PUMP SHALL BE EQUIPPED WITH AN EMERGENCY SPILL CLEAN UP KIT.

SEDIMENTS

6. THE SOIL SUBSTRATE TO BE EXCAVATED AND SPREAD CONSISTS OF SILT, SAND, AND CLAY. THERE ARE FOUR POTENTIAL PATHWAYS FOR SEDIMENTS TO ESCAPE THE PROJECT SITE: A) FRESHWATER DIVERSION SYSTEM, B) CHANNEL DEWATERING SYSTEM, C) TIDAL AND RAINWATER FLUSHING, AND D) TRACK OUT ON EQUIPMENT.

   A. THE FRESHWATER ENTERING AREA 1 FROM THE NORTH WILL BE CAPTURED AND DIVERTED INTO ELK RIVER, DOWN STREAM OF THE PROJECT SITE FOR THE DURATION OF THE PROJECT. A COLLECTION BASIN WILL BE EXCAVATED ALONG THE PROJECT SIDE OF POUND ROAD, CONNECTING THE FOUR CULVERTS. AN ELECTRIC PUMP WITH DISCHARGE HOSE WILL BE USED TO MOVE THE WATER FROM THE COLLECTION BASIN TO THE DISCHARGE POINT. INITIALLY, THE WATER IN THE COLLECTION BASIN WILL BE CARRYING SEDIMENTS. FOR THE FIRST FEW DAYS, UNTIL THE WATER IS RUNNING CLEAR, THE DISCHARGE POINT WILL BE LOCATED IN THE UPLANDS GRASS AREA ADJACENT TO THE CONTRACTOR'S STAGING AREA (SHEET C-___). SEDIMENTS WILL BE TRAPPED IN THE GRASS AND THE WATER WILL SHEET FLOW BACK TO THE CHANNEL. THERE IS NO FRESHWATER RUNNING ONTO AREA 2 AND SO, THERE WILL NOT BE A DIVERSION SYSTEM.

   B. EXCAVATION OF THE NEW CHANNELS WILL INTERCEPT GROUNDWATER AND SO MUST BE DEWATERED AS THEY ARE FORMED. THE EXCAVATIONS IN AREAS 1 AND 2 WILL START BEHIND THE EXISTING DIKE AND TIDE GATES AND PROCEED UPGRADIENT. A GASOLINE-POWERED WATER PUMP WILL BE POSITIONED AT THE LOW END OF THE CHANNEL AND WILL PUMP THE SEDIMENT-LADEN WATER UP ONTO A FILTER PAD FORMED IN AN ADJACENT UPLAND AREA. SEDIMENTS WILL BE FILTERED OUT AND WATER WILL SHEET FLOW BACK INTO ELK RIVER. THE LOCATIONS AND DESIGN OF THE FILTER PAD ARE SHOWN ON SHEET (C-__).

   C. AFTER THE CHANNELS ARE FORMED AND THE EXCAVATION MATERIALS SPREAD, THE DIKES AND TIDE GATES WILL BE REMOVED. OPENING THE NEWLY FORMED CHANNEL AND MARSH PLAINS TO TIDAL INFLUENCE WILL RESULT IN A SHORT TERM PULSE OF SEDIMENTS INTO ELK RIVER AND HUMBOLDT BAY. ADDITIONAL SEDIMENTS WILL BE WASHED OFF THE MARSH PLAINS DURING THE FIRST RAINS OF THE SEASON. THESE SEDIMENT PULSES WILL BE SHORT TERM, TEMPORARY AND ARE UNAVOIDABLE.

   D. THE TRACK OUT OF MUD AND SEDIMENTS WILL BE AVOIDED BY KEEPING ALL HEAVY EQUIPMENT ON SITE FOR THE DURATION OF THE PROJECT. NONE OF THE EXCAVATED MATERIALS WILL BE TRUCKED OFF SITE. SOME CRUSHED ROCK WILL BE IMPORTED TO SURFACE THE TIDAL RIDGE SERVING AS AN ACCESS ROAD FOR PGE. DUMP TRUCKS WILL RUN OVER A ROCK APRON/RUMBLE STRIP ON THEIR WAY OFF THE SITE TO SHAKE LOOK SOIL OFF THEIR WHEELS.

REV#	REVISION NOTE	DATE
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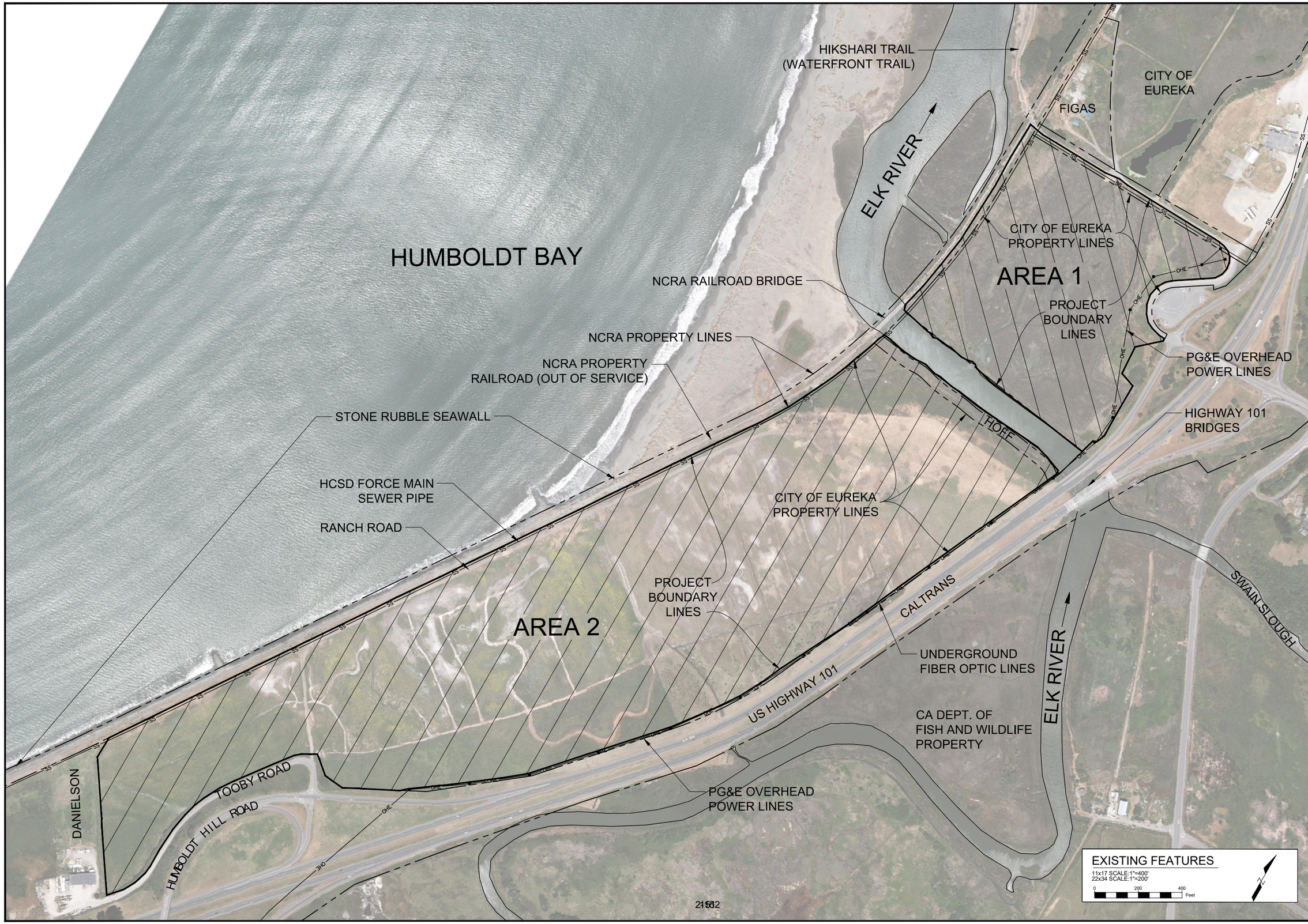
GENERAL NOTES

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 12/30/16
Drawn By: KB | Checked By: SS
Last Revised: 5/23/17 | Scale:

DRAWING NUMBER

C-2



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EXISTING FEATURES

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 12/30/16	
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Last Revised: 5/23/17	Scale:

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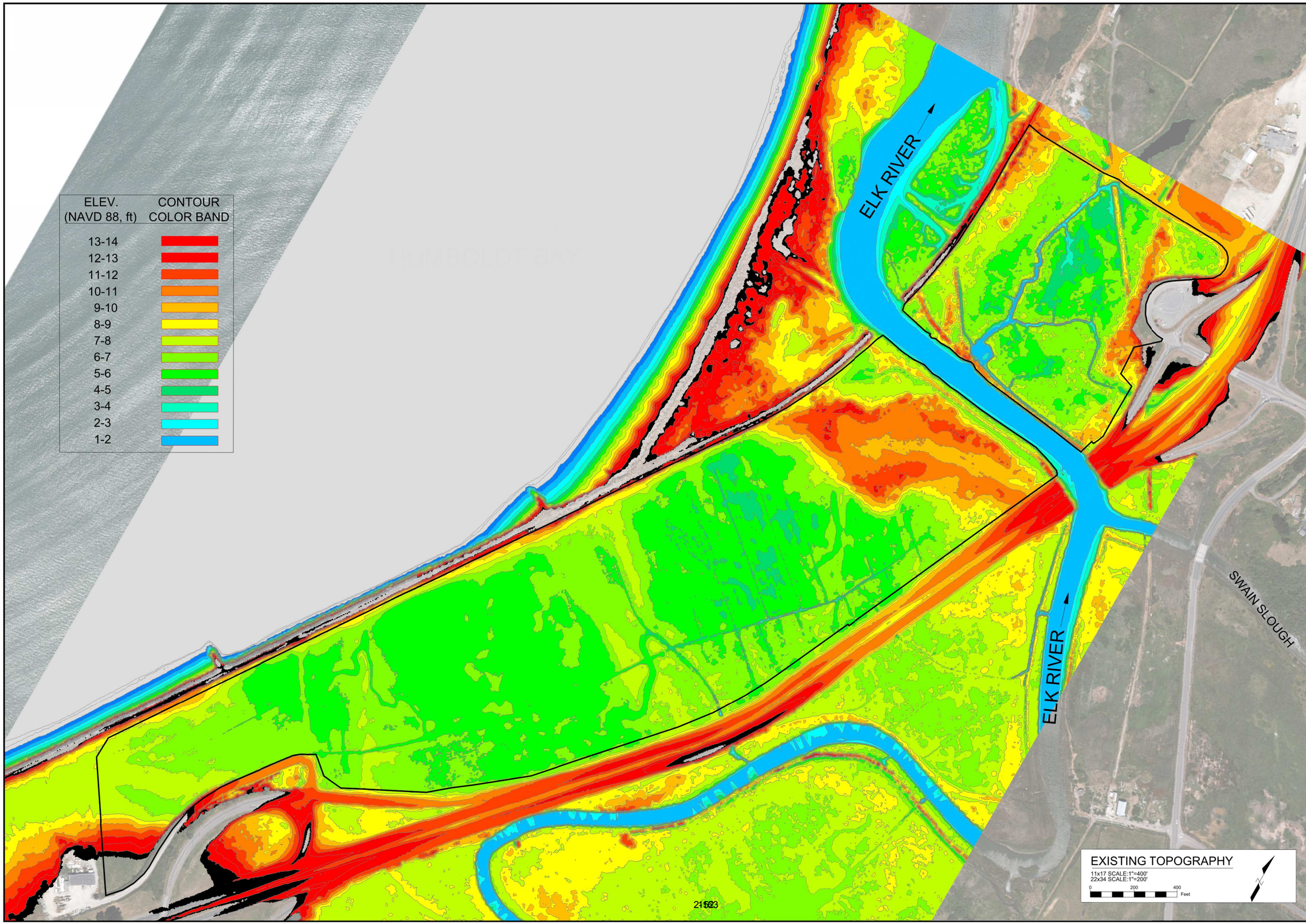
C-3



REV#	REVISION NOTE	DATE
1	SUBMITTED 30% PLANS	12/16

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EXISTING TOPOGRAPHY

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

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Last Revised:	Scale:

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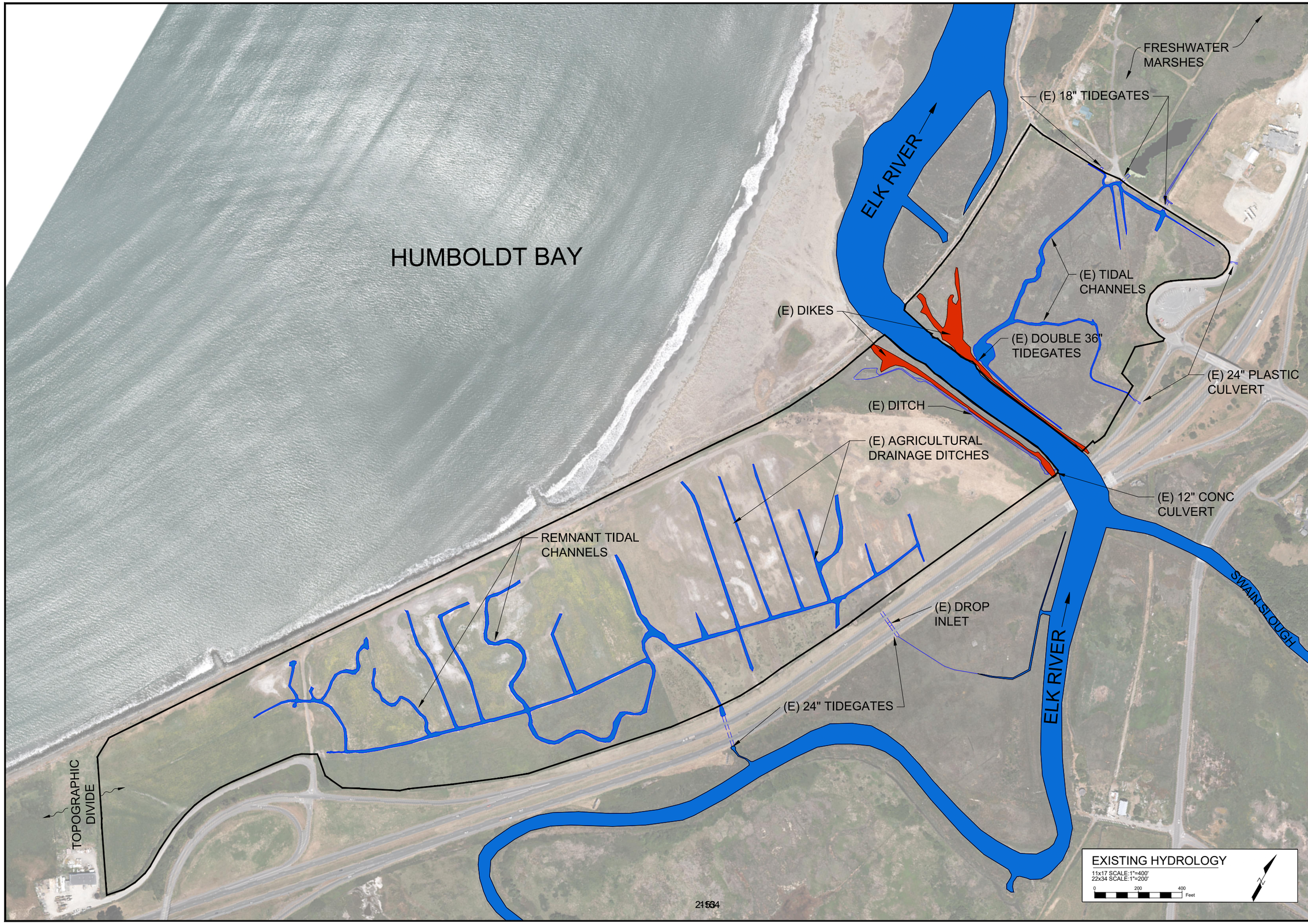
C-4



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EXISTING HYDROLOGY

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 12/30/16	
Drawn By: KB	Checked By: SS
Last Revised: 5/23/17	Scale:

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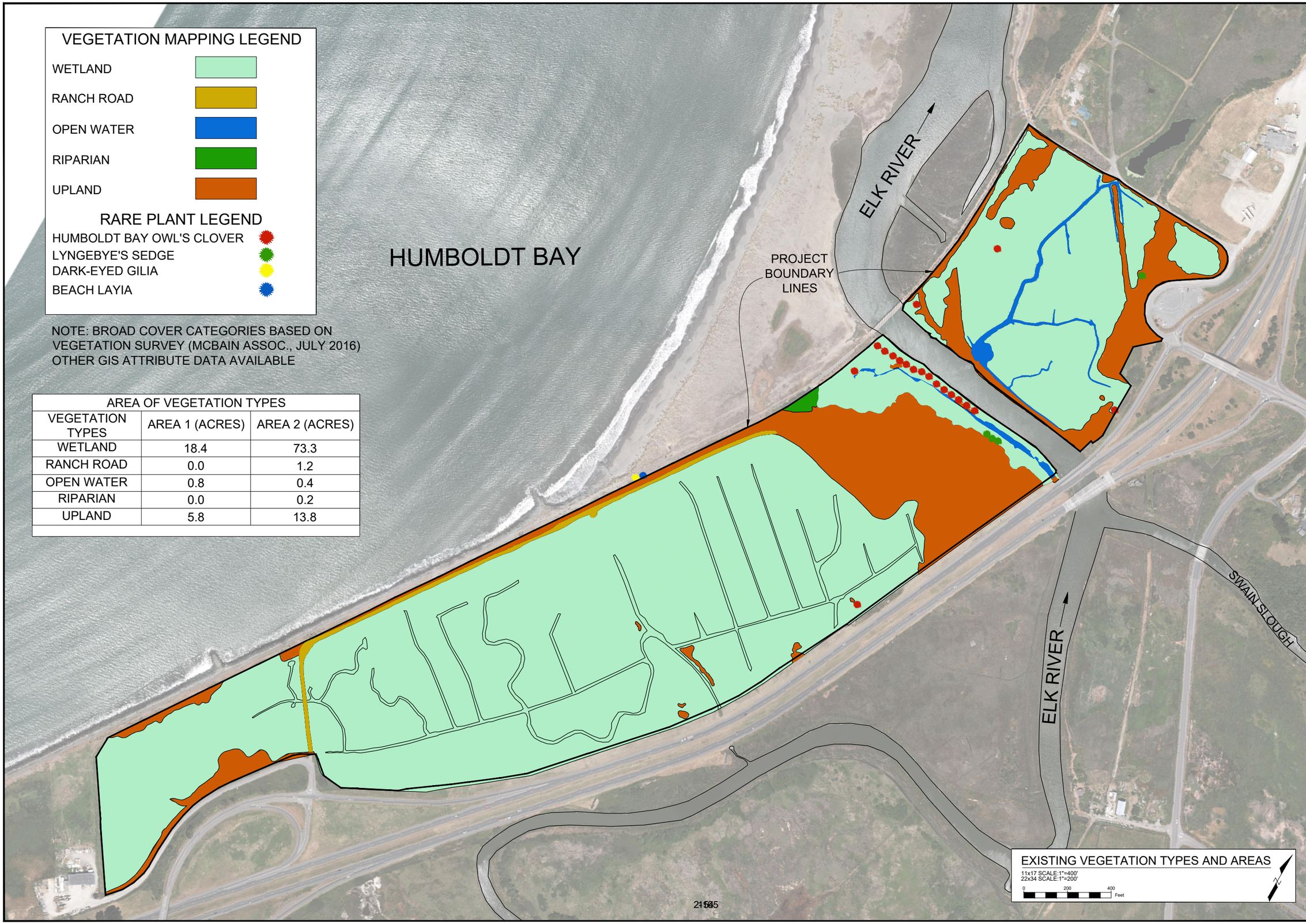
C-5



VEGETATION MAPPING LEGEND

- WETLAND
- RANCH ROAD
- OPEN WATER
- RIPARIAN
- UPLAND

RARE PLANT LEGEND

- HUMBOLDT BAY OWL'S CLOVER
- LYNGEBYE'S SEDGE
- DARK-EYED GILIA
- BEACH LAYIA

NOTE: BROAD COVER CATEGORIES BASED ON VEGETATION SURVEY (MCBAIN ASSOC., JULY 2016)
OTHER GIS ATTRIBUTE DATA AVAILABLE

AREA OF VEGETATION TYPES

VEGETATION TYPES	AREA 1 (ACRES)	AREA 2 (ACRES)
WETLAND	18.4	73.3
RANCH ROAD	0.0	1.2
OPEN WATER	0.8	0.4
RIPARIAN	0.0	0.2
UPLAND	5.8	13.8

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EXISTING VEGETATION TYPES AND AREAS

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 12/30/16
Drawn By: KB
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Last Revised: 5/23/17
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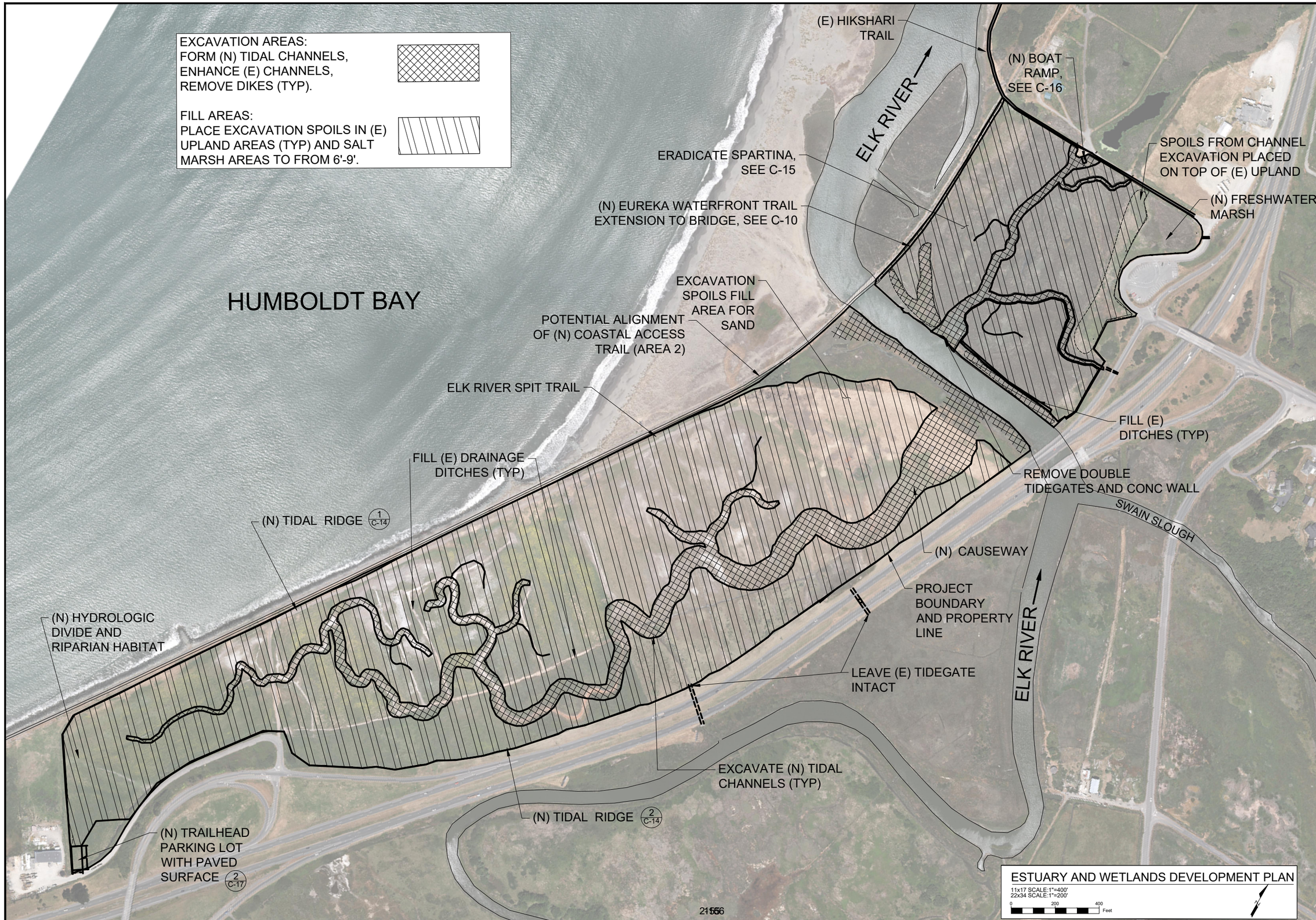
C-6



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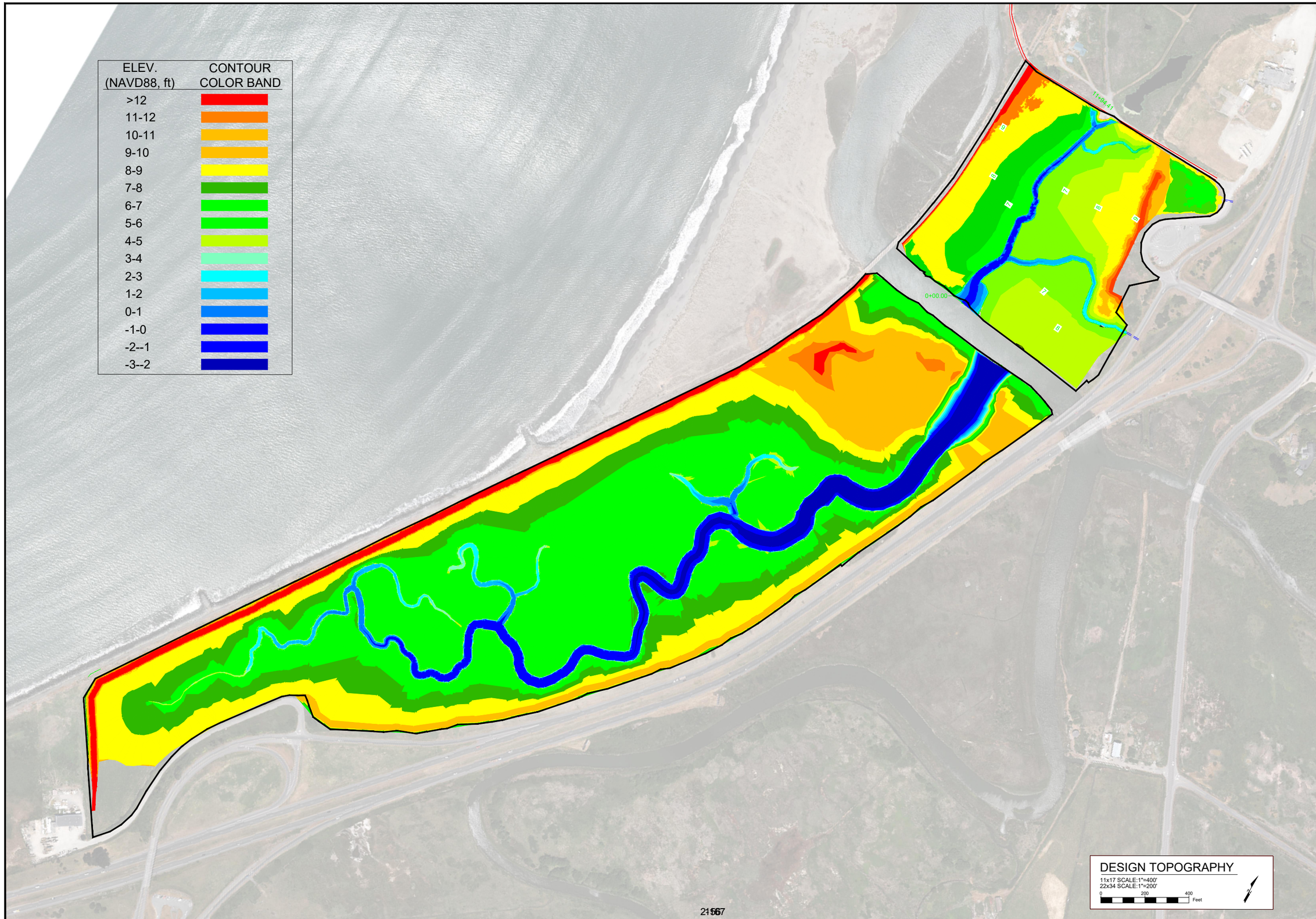
ESTUARY AND WETLANDS DEVELOPMENT PLAN

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 12/30/16	
Drawn By: KB	Checked By: SS
Last Revised: 5/23/17	Scale:

DRAWING NUMBER

C-7



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DESIGN TOPOGRAPHY

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 1/24/17	
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Last Revised: 5/23/17	Scale:

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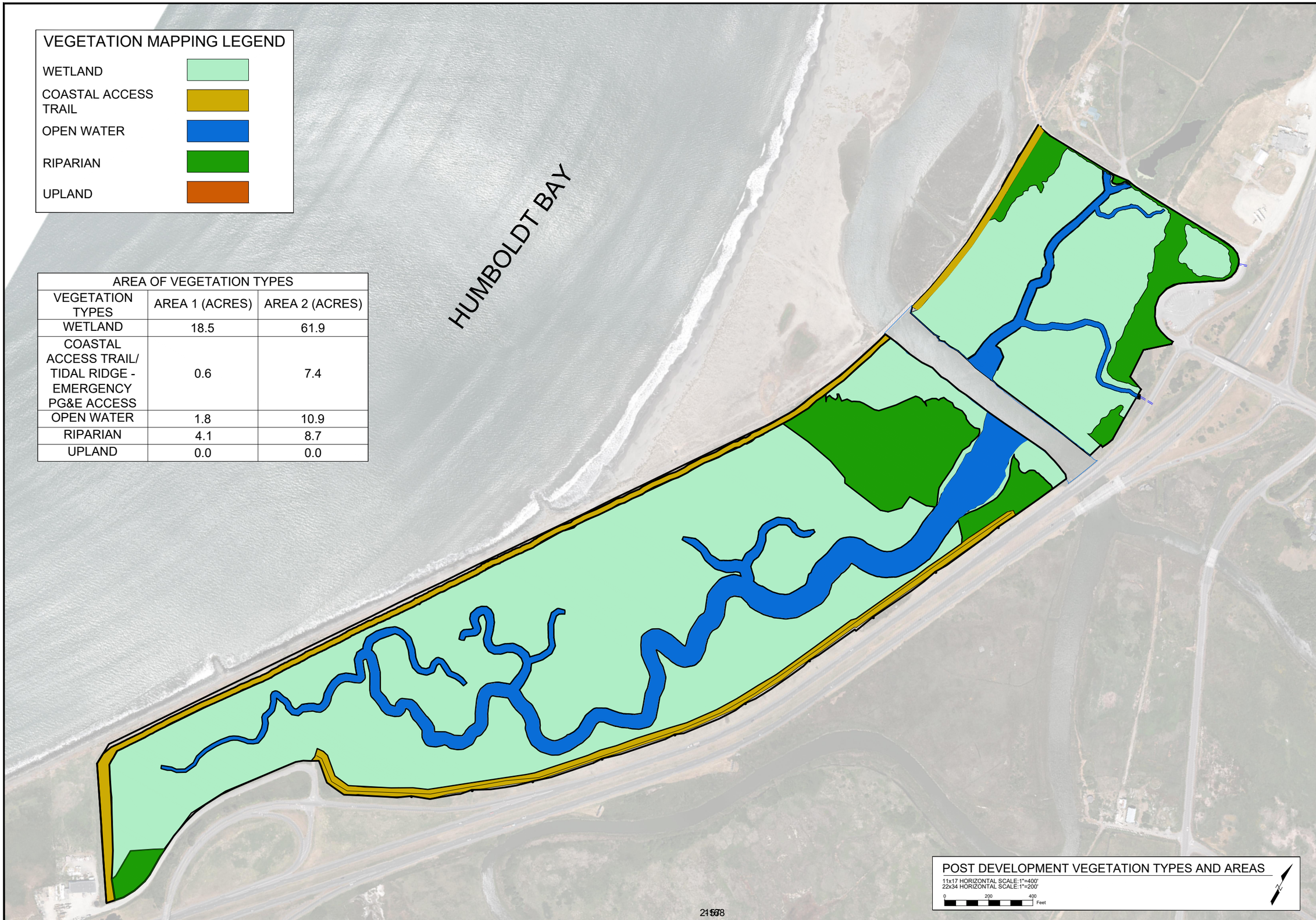
C-8



AREA OF VEGETATION TYPES

VEGETATION TYPES	AREA 1 (ACRES)	AREA 2 (ACRES)
WETLAND	18.5	61.9
COASTAL ACCESS TRAIL/ TIDAL RIDGE - EMERGENCY PG&E ACCESS	0.6	7.4
OPEN WATER	1.8	10.9
RIPARIAN	4.1	8.7
UPLAND	0.0	0.0

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POST DEVELOPMENT VEGETATION TYPES AND AREAS

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

DATE: 12/30/16	
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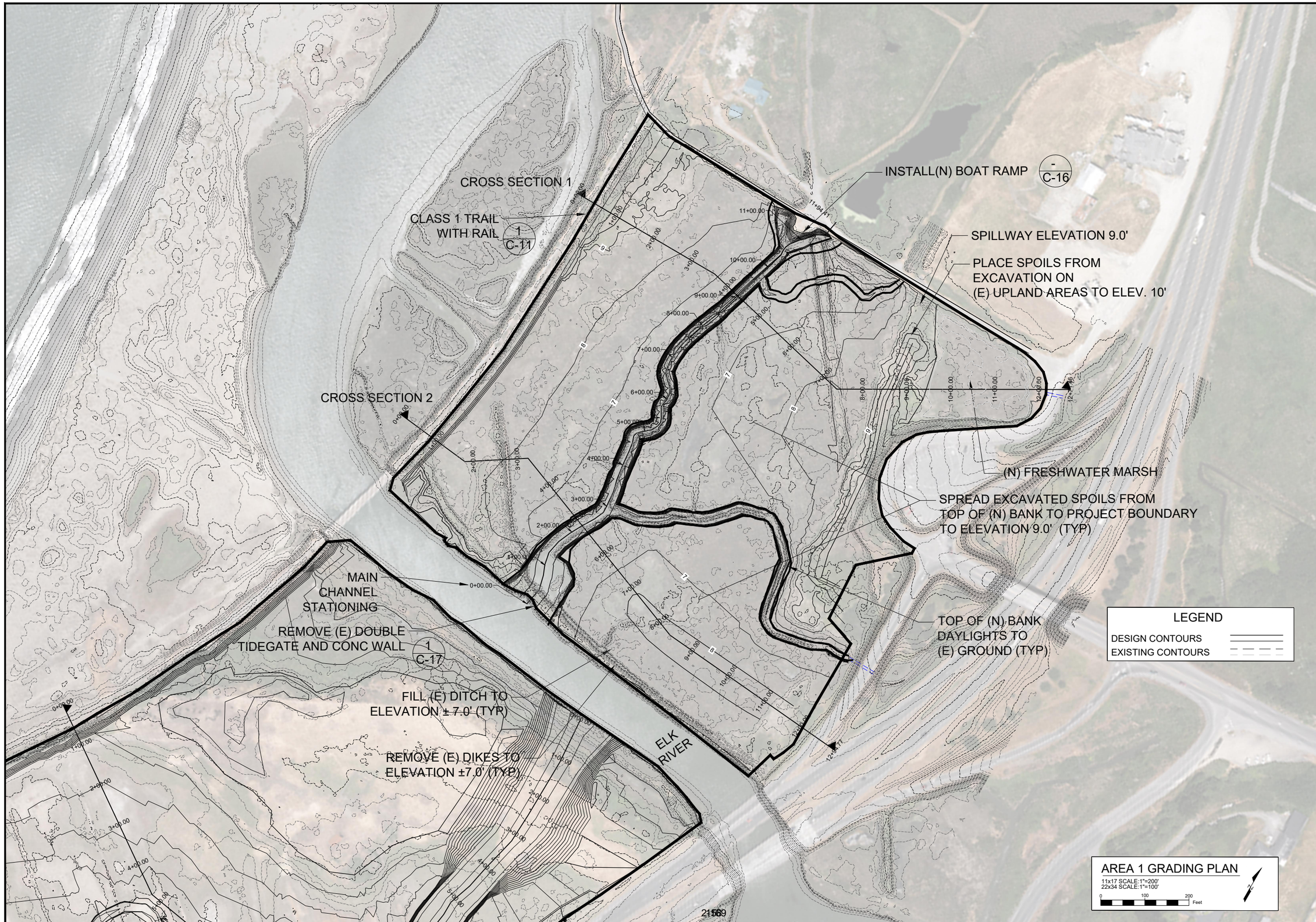
C-9



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AREA 1 GRADING PLAN

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

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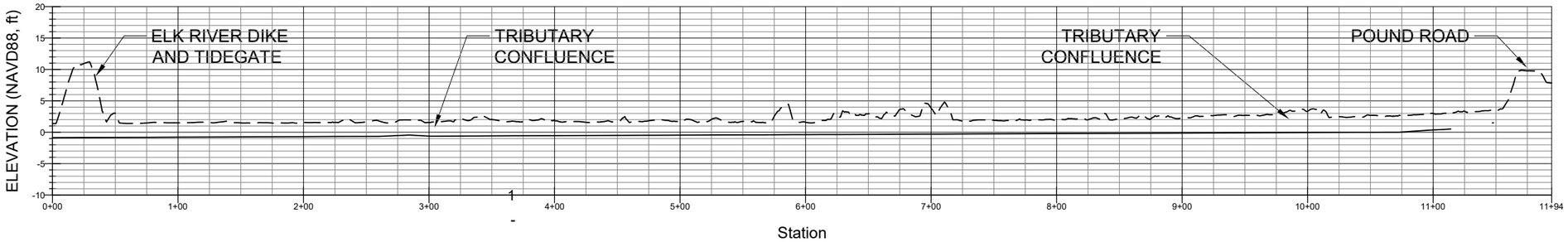
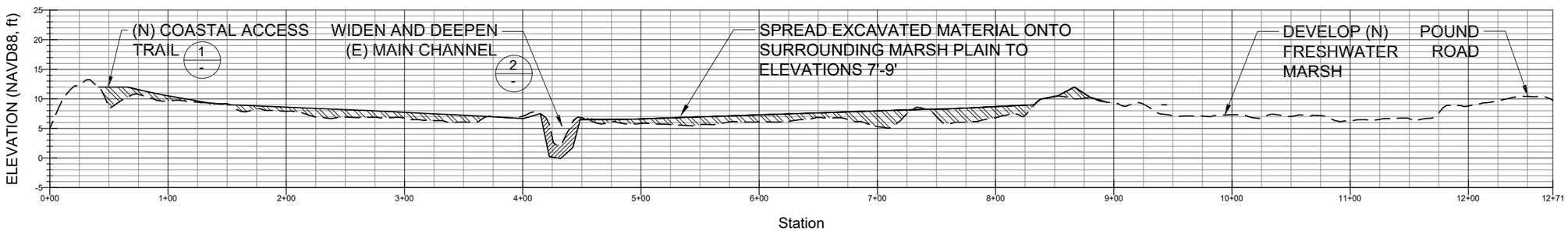
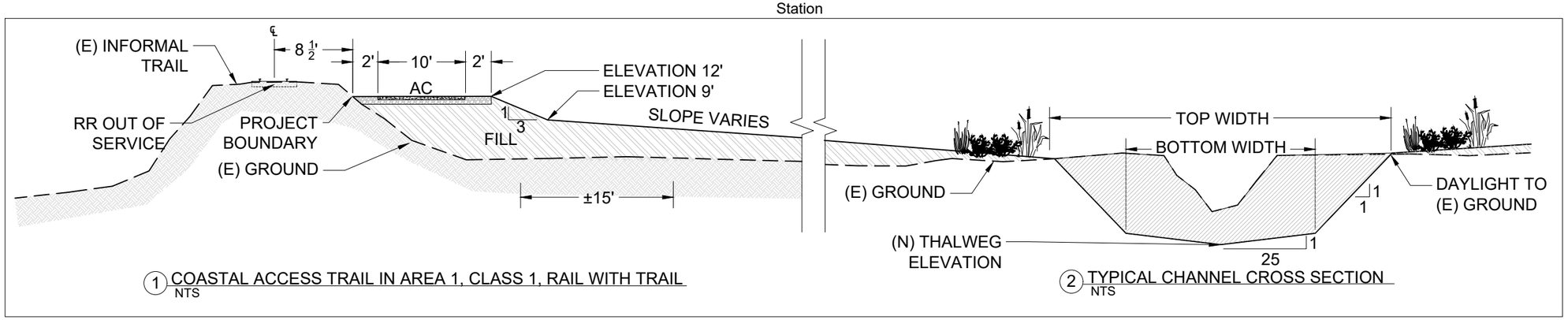
AREA 1 MAIN CHANNEL PROFILE



CROSS SECTION 1

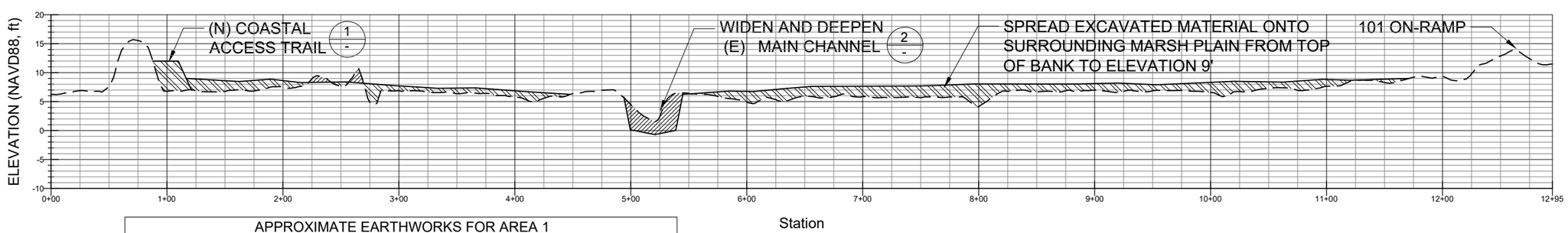




1 COASTAL ACCESS TRAIL IN AREA 1, CLASS 1, RAIL WITH TRAIL
NTS

2 TYPICAL CHANNEL CROSS SECTION
NTS

CROSS SECTION 2



APPROXIMATE EARTHWORKS FOR AREA 1		
	VOLUME (CY)	AREA (ACRES)
CUT	18,400	3.2
FILL	18,400	19.3 TOTAL
		17.3 FRESH CONVERTED TO SALT MARSH
		2 UPLAND

LEGEND

- EXISTING SURFACE
- DESIGN SURFACE
- EXCAVATED AREAS
- FILLED AREAS

AREA 1 CROSS SECTIONS AND PROFILE

11x17 HORIZONTAL SCALE:1"=100'
22x34 HORIZONTAL SCALE:1"=50'
5X VERTICAL EXAGGERATION

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AREA 1 CROSS SECTIONS AND PROFILE

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CITY OF EUREKA

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C-11

HUMBOLDT BAY

REMOVE (E) DIKE TO ELEV ±7.0'

PLACE SAND SPOILS IN UPLAND AREA

(N) ELK RIVER SPIT TRAIL, ELEVATION 14'

LIMITS OF (N) TIDAL RIDGE 1 C-14

SPREAD SPOILS FROM EXCAVATIONS UP TO ELEVATION 9' WITH OCCASIONAL TIDAL HUMMOCKS >9' FOR ROOSTING SITES AND MIGRATION ZONES

MATCHLINE

FILL (E) DRAINAGE DITCHES (TYP)

REMOVE (E) CULVERT

MAIN CHANNEL STATIONING

LIMITS OF (N) TIDAL RIDGE 2 C-14

(E) PG&E UTILITY POLES (TYP)

TOP OF (N) BANK DAYLIGHTS TO (E) GROUND (TYP)

LEGEND

DESIGN CONTOURS

EXISTING CONTOURS

AREA 2 GRADING PLAN

11x17 SCALE:1"=200'
22x34 SCALE:1"=100'

0 100 200 Feet

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AREA 2 GRADING PLAN

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C-12A

HUMBOLDT BAY

SPREAD SPOILS FROM EXCAVATIONS TO ELEVATION 9' (TYP) WITH OCCASIONAL TIDAL HUMMOCKS >9' FOR ROOSTING SITES AND MIGRATION ZONES

MATCHLINE

(E) RAILROAD PRISM AND SEAWALL 3 / C-17

LIMITS OF (N) TIDAL RIDGE 1 / C-14

FILL (E) DRAINAGE DITCHES (TYP)

RAISE GRADE TO PEAK ELEVATION 14' TO CREATE HYDOLOGIC DIVIDE AND RIPARIAN HABITAT

LIMITS OF (N) TIDAL RIDGE 2 / C-14

(N) PAVED PARKING LOT - TRAIL HEAD 2 / C-16

100'

25'

LEGEND

DESIGN CONTOURS

EXISTING CONTOURS

AREA 2 GRADING PLAN

11x17 SCALE:1"=200'
22x34 SCALE:1"=100'

0 100 200 Feet

21672

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AREA 2 GRADING PLAN

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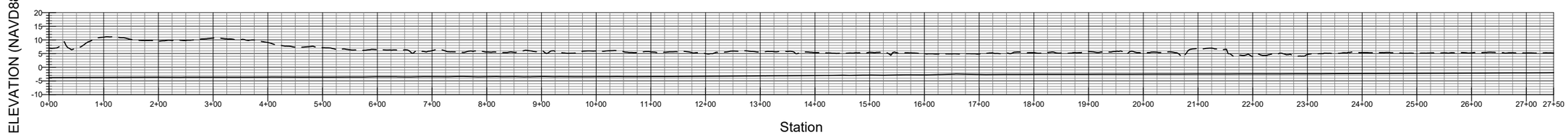
C-12B

AREA 2 MAIN CHANNEL PROFILE



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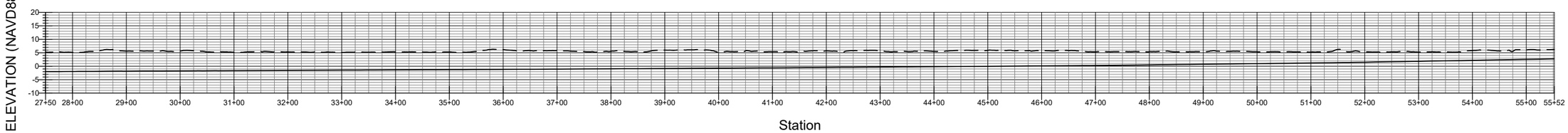

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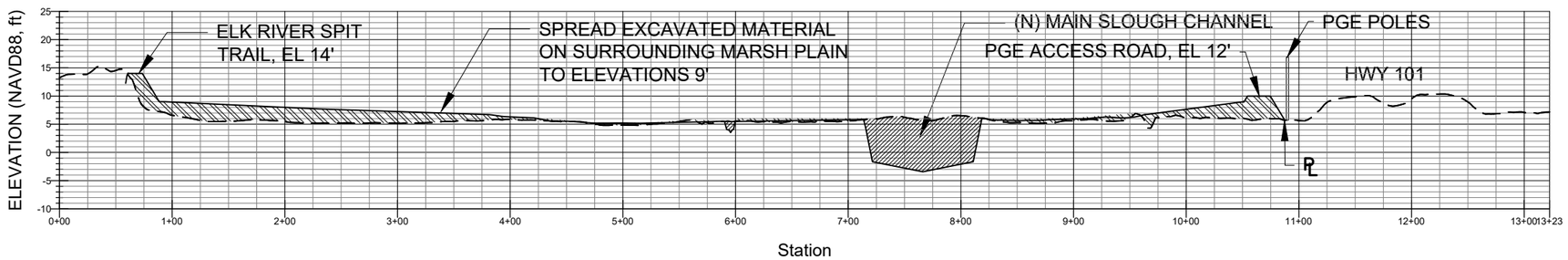

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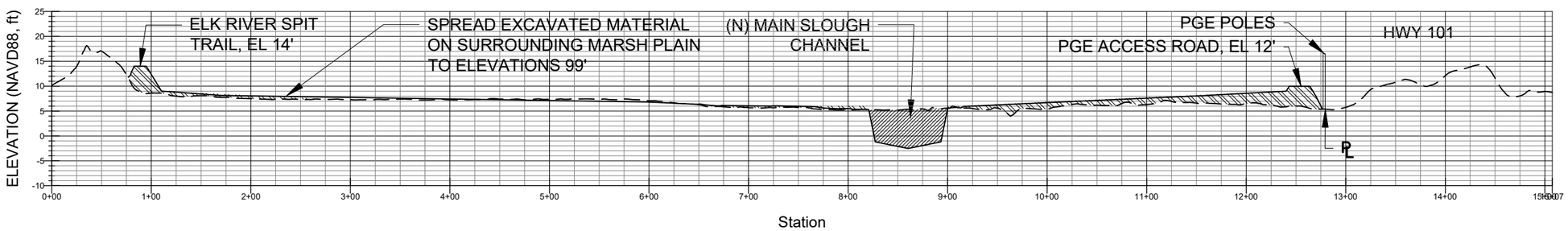

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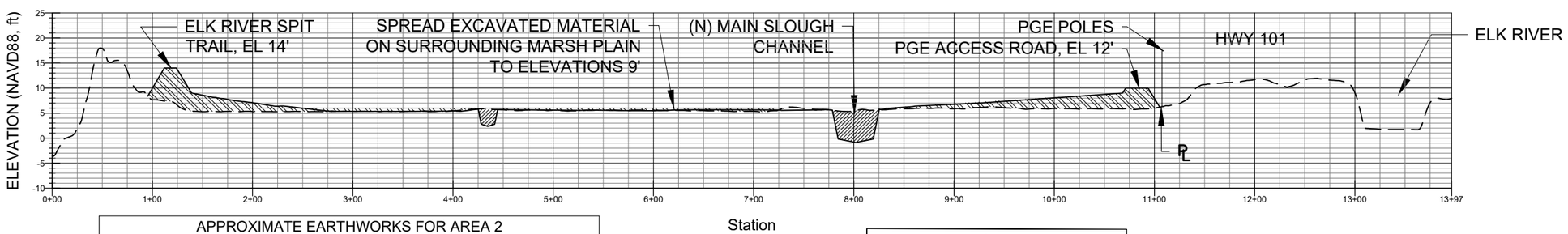

APPROXIMATE EARTHWORKS FOR AREA 2		
	VOLUME (CY)	AREA (ACRES)
CUT	125,200	12.0
FILL	125,200	61.7 TOTAL
		53.0 BRACKISH TO SALT MARSH
		8.7 UPLAND AND TRAIL

LEGEND

- EXISTING SURFACE
- DESIGN SURFACE
- EXCAVATED AREAS
- FILLED AREAS

AREA 2 CROSS SECTIONS AND PROFILE

SCALE VARIES
5x VERTICAL EXAGGERATION

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AREA 2 CROSS SECTIONS AND PROFILE

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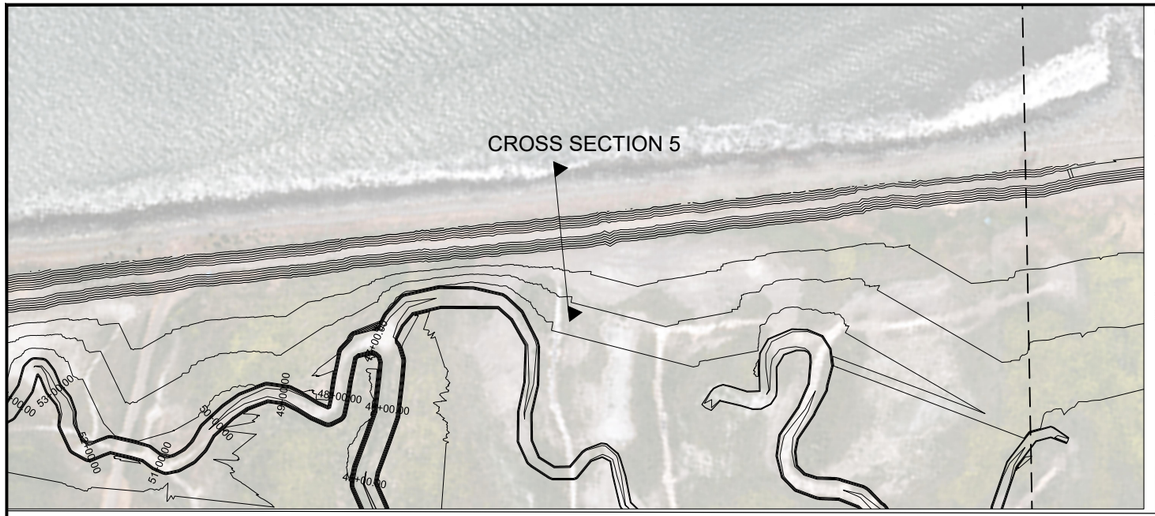
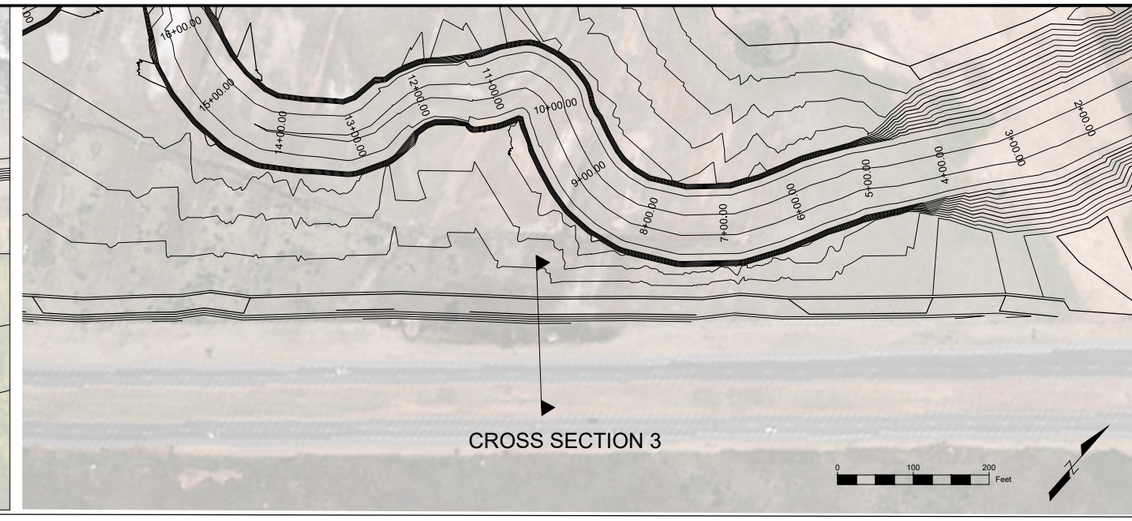
C-13





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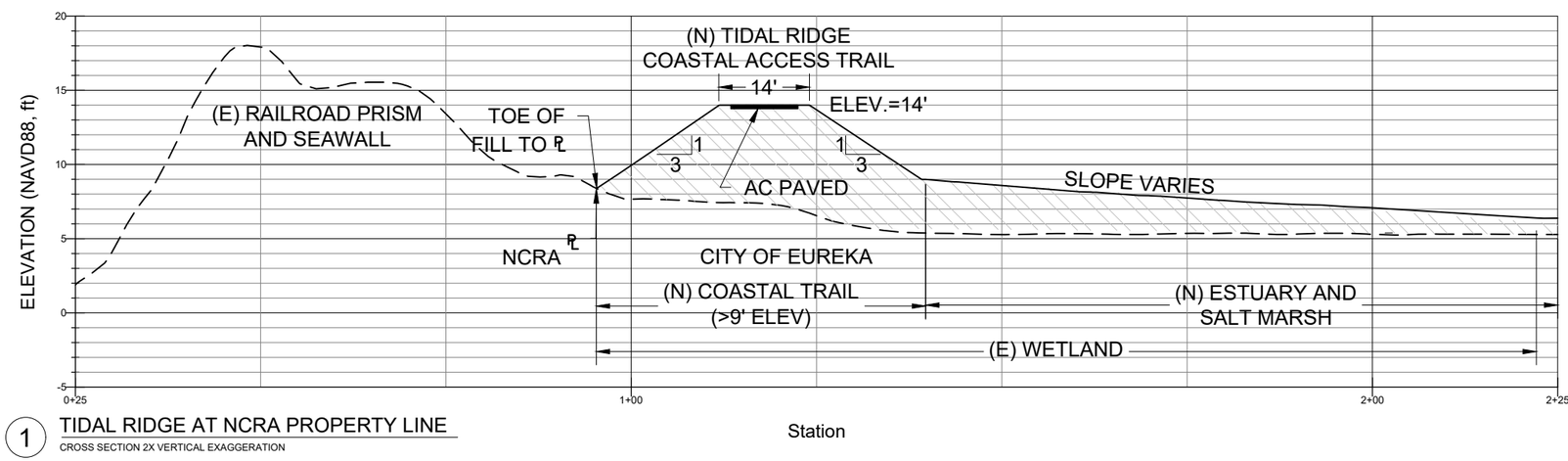
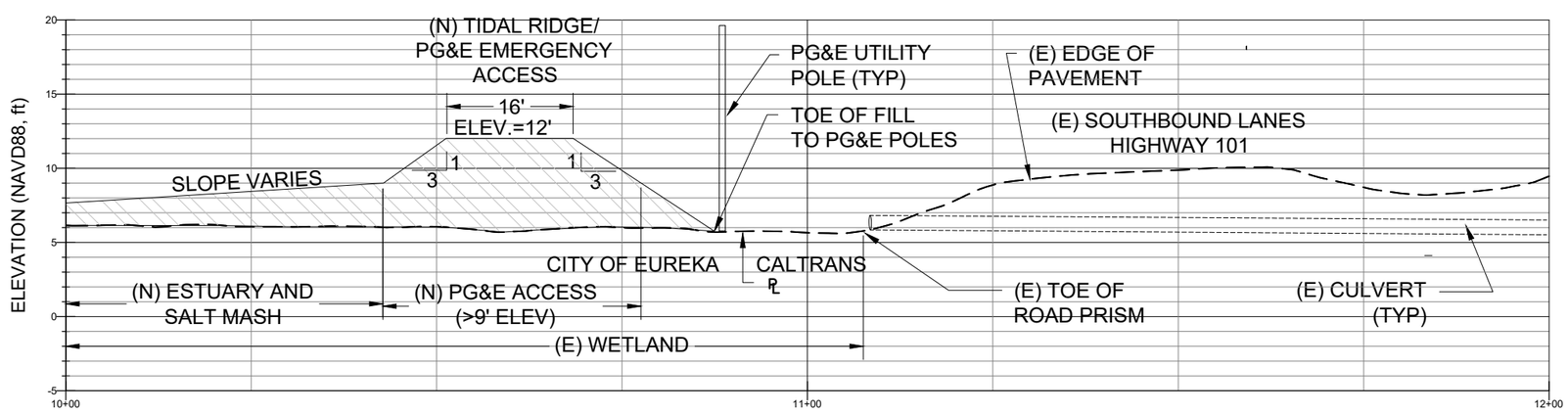


1 TIDAL RIDGE AT NCRA PROPERTY LINE

CROSS SECTION 2X VERTICAL EXAGGERATION

CROSS SECTION 3



2 TIDAL RIDGE AT CALTRANS PROPERTY LINE

CROSS SECTION 2X VERTICAL EXAGGERATION

LEGEND

EXISTING SURFACE

DESIGN SURFACE

FILLED AREAS

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TIDAL RIDGE AT PROPERTY LINE

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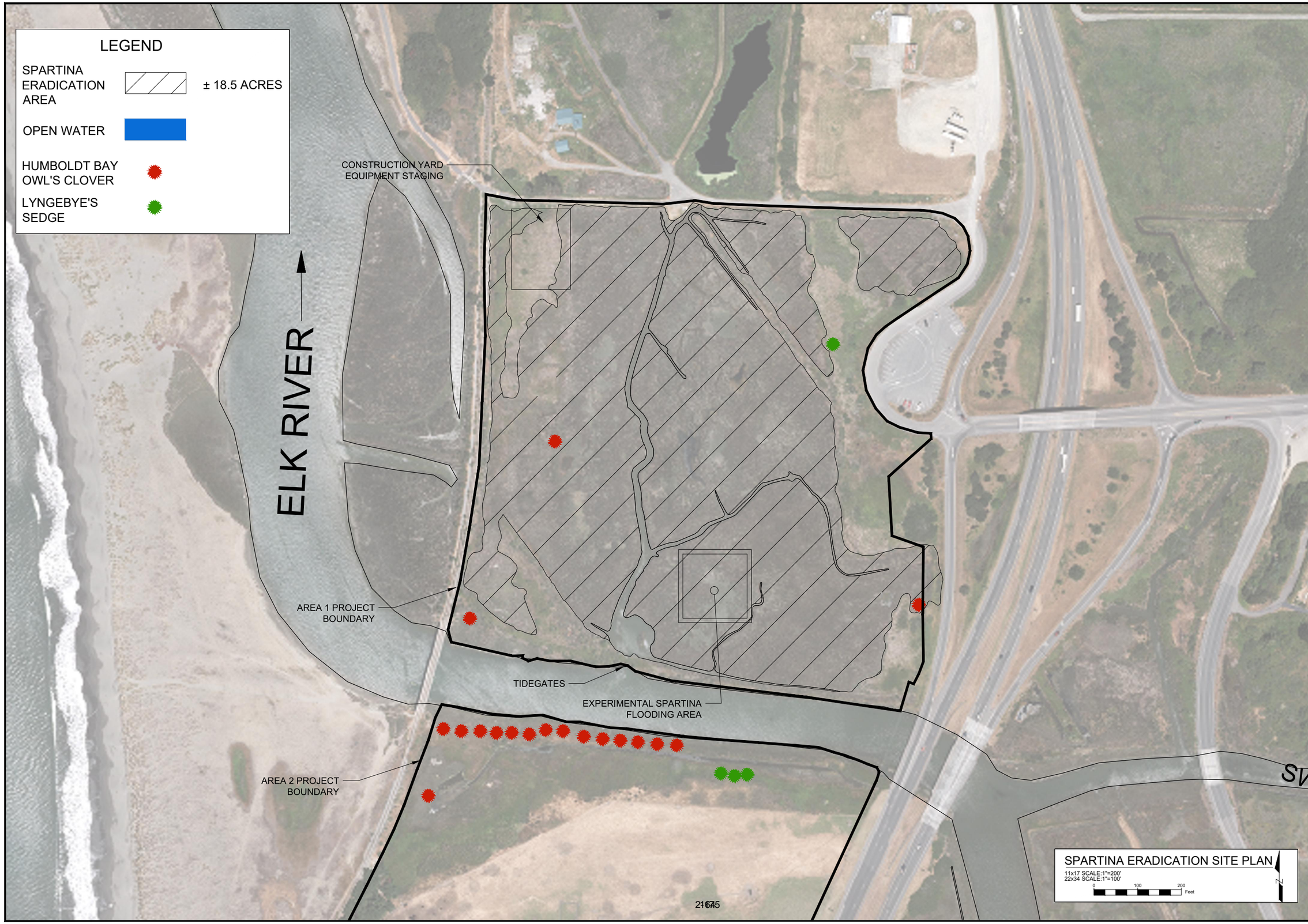
C-14



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SPARTINA ERADICATION SITE PLAN

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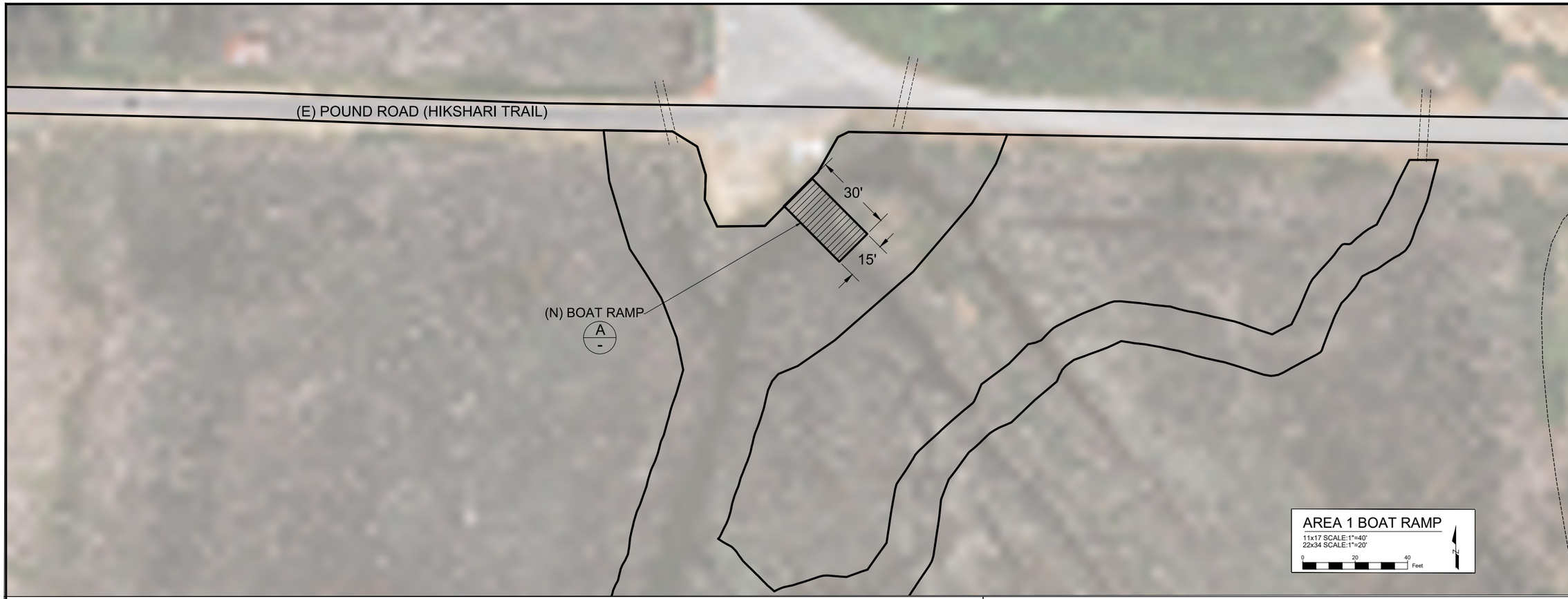
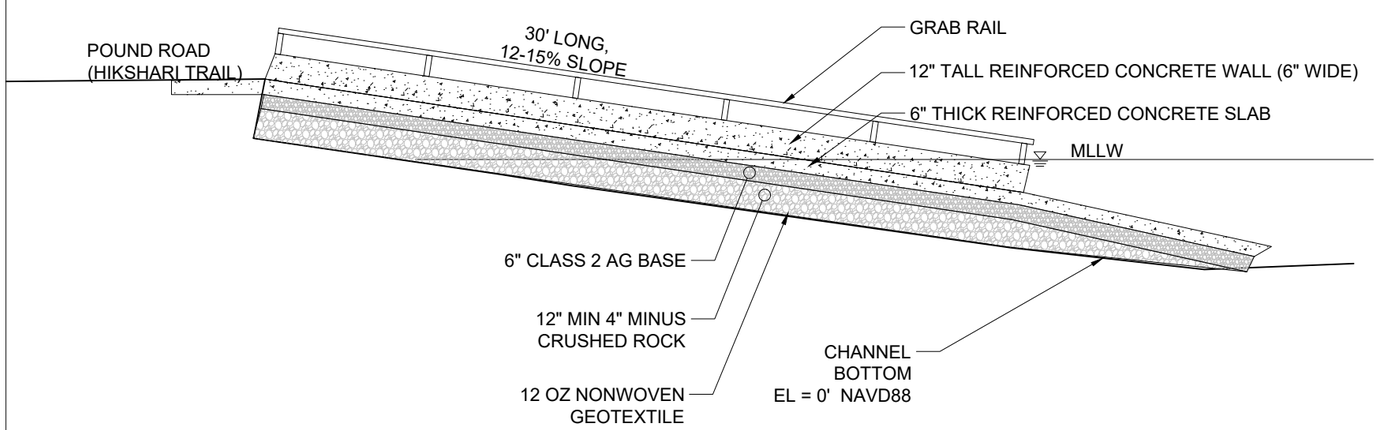
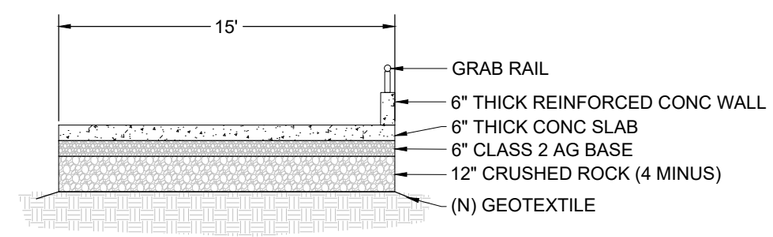




A BOAT RAMP PROFILE
NTS



B BOAT RAMP CROSS SECTION
NTS

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AREA 1 BOAT RAMP

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
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CITY OF EUREKA

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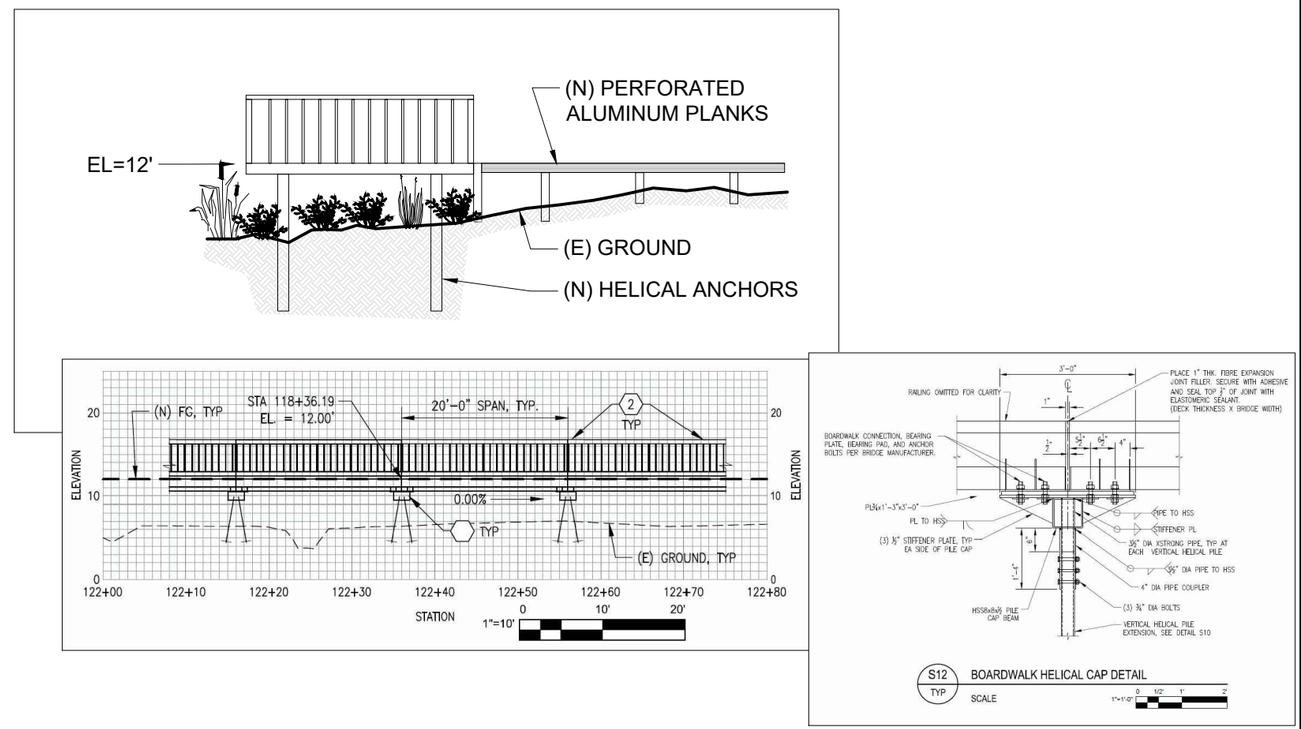
C-16

1 ELK RIVER DOUBLE TIDEGATE
NTS

2 PARKING LOT AT TRAILHEAD (PAVED AND FENCED)
NTS

3 (E) RAILBED AND SEAWALL
NTS



5 TRAIL CAUSEWAY AND VIEWING PLATFORM
NTS

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DETAILS

ELK RIVER ESTUARY AND TIDAL ENHANCEMENT PROJECT
EUREKA, CA 95501
CITY OF EUREKA

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Appendix B

Constraints Analysis and Conceptual Design Analysis

Elk River Estuary and Tidal Wetlands Enhancement Project

Constraints Analysis and Design Alternatives Summary

Prepared for:

The City of Eureka

Prepared by:

Trinity Associates
980 7th Street, Suite K
Arcata, CA 95521

Greenway Partners
1385 8th Street, #201
Arcata CA 95521

November 10, 2016

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EXECUTIVE SUMMARY

The goal of the City of Eureka's (City) Elk River Estuary and Tidal Wetlands Enhancement Project (project) is to expand and enhance tidal wetlands in the diked, former bay lands associated with the Elk River Slough/Estuary. Coho salmon and other aquatic species will benefit from this expansion of habitat quantity and quality. The project will also improve public access and recreation, extending from the City's Hikshari Trail south to South Bay at King Salmon along the Humboldt Bay Trail/Rail corridor and adding a non-motorized public boat ramp. The project will also construct a living shoreline to buffer a portion of Highway 101 from anticipated sea level rise.

There project is divided into two components1) expand and enhance Elk River's estuary in Area 1 and Area 2 adjacent to the Elk River, and 2) expand and enhance tidal wetlands in Area 3 and Area 4 near King Salmon and Buhne Slough. All four areas are generally located between U.S. Highway 101 (Highway 101) and the North Coast Railroad Authority (NCRA) property and King Salmon Canal.

Within each of the four project areas (Area 1 through Area 4), constraints are identified and assessed relative to their potential impacts on the achievement of project goals. Constraints are evaluated in ten categories: regulatory requirements, property ownership, land use, hydrology, utilities, transportation infrastructure, physical constraints, biological constraints, cultural resources, and exotic invasive species. Identification of these constraints was used to evaluate a minimum of four design options for each of the four areas.

Across Areas 1-4, the preferred design alternative maximized ecological benefits within the limitations of existing constraints such as property ownership, physical topography and bathymetry, utilities, and flood control, among many others detailed in this report for each of the four areas. Additionally, the project will need to be compliant with all local, state, and federal land use and environmental regulations and ultimately obtain permits and permissions from numerous agencies.

The potential enhancement of the estuarine habitat uniquely available near the mouth of the Elk River is ecologically significant to the broader Elk River watershed and Humboldt Bay hydrologic unit. Increasing the quantity and quality of aquatic habitat in the Elk River estuary will have significant benefits to rearing coho salmon, Chinook salmon, and steelhead trout, all of which are listed as threatened or endangered under the Endangered Species Act. The project's resulting increase in aquatic habitat and ecosystem function will benefit many other species as well, including eelgrass.

The upper portion of the Elk River is presently listed as a 303(d) stream for sediment impairment under the Clean Water Act. Expanding the tidal prism on Elk River may have an added benefit of helping to flush sediments delivered from the upper watershed from the main channel.

Estuary habitat is incredibly valuable to wetland enhancement and species recovery. Expansion of this rare ecotone is a significant opportunity to pursue population recovery for numerous imperiled species in the Humboldt Bay and Elk River hydrologic units. Every possible opportunity must be taken to best realize this rare opportunity across more than 112 acres, restoring natural tidal function and ecosystem resiliency in a significantly altered landscape.

These proposed actions are taken in concert with participating landowners, who have generously donated their time to learn about the project's goal and conceptual design approach. The preferred design alternatives for each of the four areas were also developed considerate of comments received from public agencies, which generally expressed a preference toward pursuing restoration actions that would result in the most significant restoration gains.

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1 PROJECT SUMMARY

The City of Eureka's (City) Elk River Estuary and Tidal Wetlands Enhancement Project (project) is a multi-phase and multi-year project. The project goal is to expand and enhance tidal wetlands in the diked, former bay lands associated with the Elk River Slough/Estuary. Coho salmon and other aquatic species will benefit from this expansion of habitat quantity and quality.

There are two components to the City of Eureka's planning grant from the State Coastal Conservancy: 1) expand and enhance Elk River's estuary, and 2) expand and enhance tidal wetlands. The two components are hydrologically stratified. Areas 1 and 2 are connected to Elk River Slough, and Areas 3 and 4 are connected to Buhne Slough and South Bay (Figure 1). All four areas are generally located between U.S. Highway 101 (Highway 101) and the North Coast Railroad Authority (NCRA) property and King Salmon Canal. The project will also improve public access and recreation in Area 1, extending from the City's Hikshari Trail south to South Bay at King Salmon along the Humboldt Bay Trail/Rail corridor and adding a non-motorized public boat ramp.

Figure 1. Elk River estuary and tidal wetlands enhancement Areas 1-4.

The City is the project proponent of the Elk River estuary component approximately 112 acres (Areas 1 23.5 acres and Area 2 88.8 acres) of this planning grant, as most of this work would occur on City property in the City's jurisdiction. The tidal enhancement component of this grant is in Areas 3 and 4 on approximately 100 acres of public and private property. Project elements for Areas 3 and 4 include identifying constraints, developing potential conceptual designs, and having an advisory team review and select a preferred conceptual design. If affected property owners concur with the preferred project design, a project proponent would need to be identified to seek grants, develop engineering designs, secure regulatory authorization, and implement the project as a whole or in phases.

The project area has undergone substantial changes compared to conditions mapped in 1858 by the U.S. Coast Survey (Figure 2). Much of the original Humboldt Bay shoreline no longer exists near the Elk River estuary and Buhne Slough. The extensive tidal wetlands that once occupied the low-lying areas at the mouth of Elk River and on Buhne Slough were isolated from the Bay and converted to farmland. The Project area is traversed by the Northwestern Pacific Railroad (NPR), Highway 101, County roads, underground and above ground utilities, Humboldt Bay, and diked and rip-rapped shorelines.

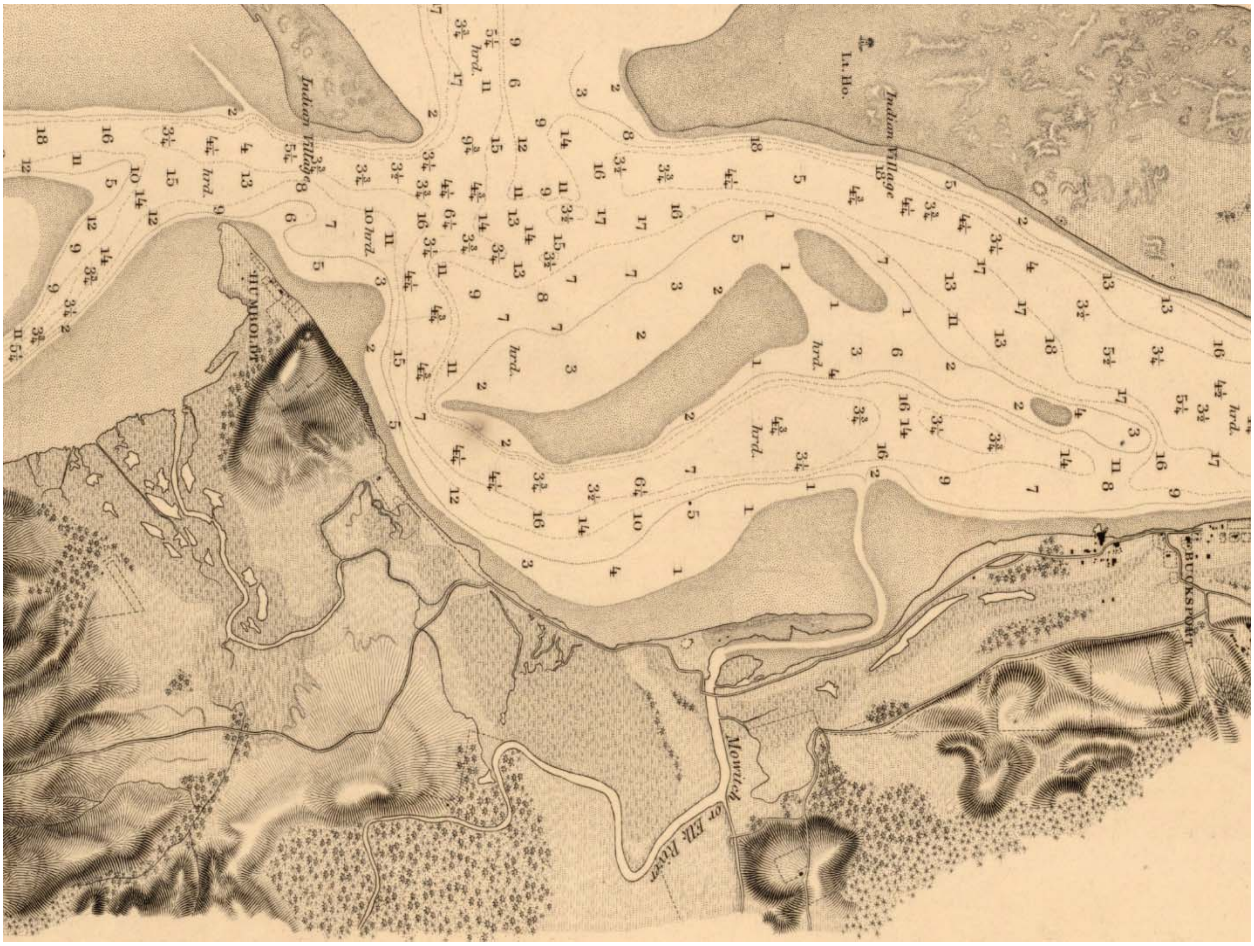

Figure 2. 1858 Coast Survey of the shoreline between Buhne Slough and Bucksport.

1.1 Constraints Analysis

Within each of the four project areas (Area 1 through Area 4), constraints are identified and assessed relative to their potential impacts on the achievement of project goals. Constraints are evaluated in ten categories:

1. **Regulatory Requirements:** permits and other regulatory permissions that must be sought and granted prior to commencing project implementation;
2. **Property ownership**: public (local and state) versus private interests-permission to place fill, excavate, replace or pull water controls structures, and alter saltwater intrusion/inundation;
3. **Land use**: conversion of agricultural lands and Aleutian goose grazing lands to natural resource uses;
4. **Hydrology**: existing tidal inundation, drainage pattern, and structures; potential project-related effects to stormwater runoff, flooding, and tidal inundation;
5. **Utilities**: the presence of above or below ground utilities that traverse the project area, which may affect excavation, placement of fill, or introducing tidal inundation;
6. **Transportation infrastructure**: consideration of public (local, state, and federal) and private roads and railroad, including the placement of fill or introduction of tidal inundation;
7. **Physical constraints**: existing surface and bathymetric elevations and need for fill or excavation.
8. **Biological constraints**: protected species, habitats, and species of concern such as tidewater goby, Humboldt Bay owl's clover, Point Reyes bird's beak, eelgrass, salt marsh, brackish wetlands, riparian and dune mat.
9. **Cultural resources:** identified through tribal consultation and formal cultural resources investigations; and
10. **Exotic invasive species**: removal and control of Spartina.

1.2 Conceptual and Preferred Design Alternatives

Conceptual Design Alternatives

At least four conceptual design alternatives have been prepared for each of Areas 1 – 4. Design alternatives have been developed considerate of identified constraints, ranging from property ownership, transportation, utilities, cultural resources, hydrology, land use, physical setting, and exotic invasive vegetation (i.e., Spartina).

Conceptual design alternatives considered the full range of enhancement actions possible in each of the four areas. While the four areas are described separately, design elements were developed comprehensively and linked between areas, establishing restored large-scale ecosystem functions, aquatic habitat connectivity, and enhanced tidal function at a landscape level.

During evaluation of project's constraint analysis and design alternatives, additional opportunities were identified for expansion and enhancement of tidal habitat on Buhne Slough (Areas 3C and 3D) and the estuary on Elk River (Area 5) (Figure 3). Area 5 is not addressed further in this report.

Preferred Design Alternatives

Conceptual design alternatives were shared with stakeholders and agency representatives. Based on known constraints identified in this document and input received from stakeholders and agency representatives, a preferred design alternative was selected for each of the four project areas. Thirty percent designs are being developed for Area 1 and 2 based on the preferred design alternatives. The City has pursued Phase II funding to develop 100% designs for Area 1 and Area 2 and implement the project.

Figure 3. Potential Elk River Estuary and Tidal Wetlands Project Areas 1-5.

2 AREA 1 CONSTRAINTS

2.1 Regulatory Requirements

All applicable local, state, and federal regulatory authorizations will need to be secured for the proposed project prior to commencing work. In addition, an encroachment permit from Caltrans will be required.

2.2 Property Ownership

Area 1 (Figure 4) is predominately owned by the City of Eureka. A portion of Caltrans' property extends west, into the proposed Project Area 1 from the Highway 101 on-ramp. The NCRA's railroad bed also extends east into Area 1. Proposed activities (placement of fill, channel excavation, placement of tide gate on culvert) involve Caltrans property, and the City will be required to secure an encroachment permit from Caltrans. The Waterfront trail extension will occur on property owned by NCRA under an easement currently held by the City to expand the Humboldt Trail/Rail corridor.

The Hikshari Trail is located along the northern boundary of Area 1 along with three parcels. Two of the parcels are privately owned, and one is owned by the City. To the east is Pound Road under Humboldt County's jurisdiction and a Highway 101 inter-change owned by Caltrans. To the south is Elk River

Slough, which is state sovereign lands under the Humboldt Bay Harbor Recreation and Conservation District (HBHRCD) jurisdiction. To the west is the NCRA railroad property. On the City's property and parallel to the railroad is a 30-foot right-of-way easement that Humboldt Community Services District (HCSD) holds for their sewer line.

The only direct property ownership constraints to restoring and enhancing tidal wetlands opportunities in Area 1 is Caltrans' property on the eastern border of the project and cooperation with NCRA on the proposed trail extension on their property via an extension of the City's license agreement. The proposed project design will require an encroachment permit from Caltrans. Indirectly, protecting adjacent properties not owned by the City will require design considerations and cooperation related to maintaining or modifying drainage structures and accommodating stormwater runoff.

Figure 4. Existing conditions in Area 1, north of the Elk River Slough.

2.3 Land Use

Area 1 is in the City's land use jurisdiction and is zoned Natural Resource (NR). Restoration and enhancement of coastal wetlands are allowable uses on NR zoned property. However, pursuant to the

Coastal Act, Area 1 is in the State's retained jurisdiction, therefore proposed project activities, which are considered developments, will be subject to Coastal Commission authorization. The policies in Chapter 3 of the Coastal Act will apply to the proposed project activities. Existing zoning and regulatory policies are deemed to be compatible with the goal of the proposed project of expanding and enhancing the estuary and tidal wetlands on Elk River. All applicable local, state, and federal regulatory authorizations will be secured for the proposed project prior to commencing work.

2.4 Hydrology

There are five culverts draining adjacent properties to Area 1 (Figure 5). Restoring Area 1 to being fully tidal by removing the tide gates and dike on Elk River Slough could tidally inundate upstream properties, during mean higher high water (MHHW) and mean annual maximum water MAMW tides, if protection measures are not implemented (Figure 5). Tidal channels will need to be excavated or expanded to five existing water control structures to accommodate stormwater runoff and control backwater flooding. Tide gates on these culverts will limit saltwater inundation of adjacent properties. Three of these culverts already have tide gates. Two culverts will need to be retrofitted with tide gates. Tidal channels will be excavated or expanded to these five culverts to accommodate stormwater runoff and control backwater flooding. There is very little stormwater runoff or associated drainage area above the culverts draining to Area 1. Backwater flooding is not anticipated to become a problem with the installation and maintenance of tide gates. The main tidal channel from Elk River to the proposed boat launch ramp will need to be deepened to become a submerged channel and provide non-motorized watercraft access during low tides.

2.5 Utilities

There are both above and below ground utilities in Area 1. Pacific Gas & Electric (PG&E) has 9 electrical distribution poles located in Area 1 (six on City and three on Caltrans' property). Two poles are in an area designated for placement of fill, and one is in an area that is tidally inundated now and will remain inundated. Underground utilities in Area 1 include two sewer lines, one that parallels the western boundary near the toe of the NCRA railroad bed prism and the other along the eastern boundary of Highway 101. There are also buried optical fiber lines parallel to the eastern boundary along Highway 101, on Caltrans' property. Impacts to the underground utilities (sewer line and optical fibers) can and will be avoided through appropriate design and implementation. The two electrical distribution poles in areas where fill will be placed may need to be modified by PG&E to accommodate increased surface elevations.

2.6 Transportation Infrastructure

Restoring Area 1 to a fully tidal condition is not likely to adversely affect the road prism of the Highway 101 inter-change or the NCRA railroad bed prism, as they are tidally inundated now. Fill will be placed on the low-lying area fronting the Highway 101 road prism to form a living shoreline salt marsh plain/riparian slope (6' to 10' elevation NAVD 88) that will buffer the road prism from tidal inundation. An outlet channel will be left to convey stormwater discharge from an existing culvert in this area.

2.7 Physical Constraints

The depth of the proposed channels in Area 1 will match the thalweg elevation of Elk River Slough adjacent to Area 1. The existing tide gates and dike separating Area 1 from Elk River Slough will be removed. The width of the new channels will be modeled to accommodate the projected tidal prism volume and to optimize the creation of new eelgrass habitat. A Class 1 pedestrian trail will be constructed within the railroad property and a causeway and viewing platform will be constructed out into the salt marsh. There are several physical constraints (construction logistics) that will affect the proposed project design and construction sequencing.

The design of the trail and the causeway/viewing platform must consider the bearing capacity of the underlying soils and slopes of the terrain. The grading work and stockpiling sequence will also be affected by the soft (muddy) conditions that will develop when heavy equipment starts moving materials. Access roads and/or plank walkways may have to be installed and then removed. Much of the newly formed channels will be below seasonal groundwater elevations. The materials removed from the excavation will likely be saturated, heavy and sticky.

Figure 5. Location of water controls structures discharging to Area 1, and potential tidal inundation areas by MHHW (dark blue shading) and MAMW (light blue).

2.8 Biological Constraints

Vegetation survey and mapping have occurred in Area 1 to support project planning and design. A nine quadrangle U.S. Geological Survey (USGS) was also conducted to identify all potential vegetation, bird, animal, amphibian, and fish species that may be found in the project area and affected by project implementation.

There are no protected plant species in Area 1, but there are several populations of plant species of concern (Humboldt Bay owl's clover, Point Reyes bird's beak, and Lyngbye sedge). Best Management Practices (BMPs) will be necessary during project implementation to protect these species.

The U.S. Fish and Wildlife Service (USFWS) and Humboldt State University (HSU collaborated to collect water samples to run eDNA test to determine the presence of any protected aquatic species such as tidewater goby in Area 1; none were found. Filling of in-board ditches will occur during low tide when they are de-watered to avoid impacts to tidewater goby should they be present.

Use of BMPs during project implementation will be needed to help ensure that Endangered Coho Salmon and Threatened Chinook Salmon and Steelhead trout are not negatively impacted, along with any sensitive bird species that may use the project area as identified in the nine quadrangle USGS search.

2.9 Cultural Resources

A cultural resource survey and investigation has been performed in Area 1. All observed historic resources were recorded and an evaluation of historical significance was conducted. The investigation recommended that these features no longer retain the requisite integrity to qualify for inclusion in the National Register of Historic Places. Additionally, historic Wiyot villages referenced in available ethnographic accounts and maps were determined to have been located outside the boundaries of Area 1 and Area 2. The investigation further concluded the proposed project will not result in significant impacts to historic resources, as defined by CEQA.

2.10 Exotic Invasive Species

Spartina, an invasive cordgrass species presently exists in Area 1. Restoring Area 1 to a fully tidal condition will require Spartina control to reduce the dispersal of Spartina to other areas on Elk River Slough and Humboldt Bay.

3 AREA 1 DESIGN ALTERNATIVES

The Goal for Area 1 is to expand and enhance tidal wetlands in Elk River Slough and public access to the coast and recreational opportunities. Proposed ecological benefits of design alternatives will focus on restoring hydrologic connectivity, expanding tidal channel habitat, managing Spartina and other invasive exotic species, and increasing eelgrass habitat. The project will also enhance Area 1's resiliency to sea level rise and improve the ecological integrity of its current condition. Five conceptual design alternatives are summarized below (Figure 6).

3.1 Option 1

This is the minimal conceptual design for Area 1 and includes the removal of existing tide gates and a length of dike sufficient to restore full tidal connectivity. Existing in-board ditches will be blocked off to focus the tidal prism in the main channels. Tide gates will be placed on three existing water control structures discharging to this area to prevent saltwater intrusion off-site. Once tide gates are removed, channel expansion and propagation would be expected to occur passively, in response to restoring full tidal connectivity. Option 1 does not include Spartina eradication or control.

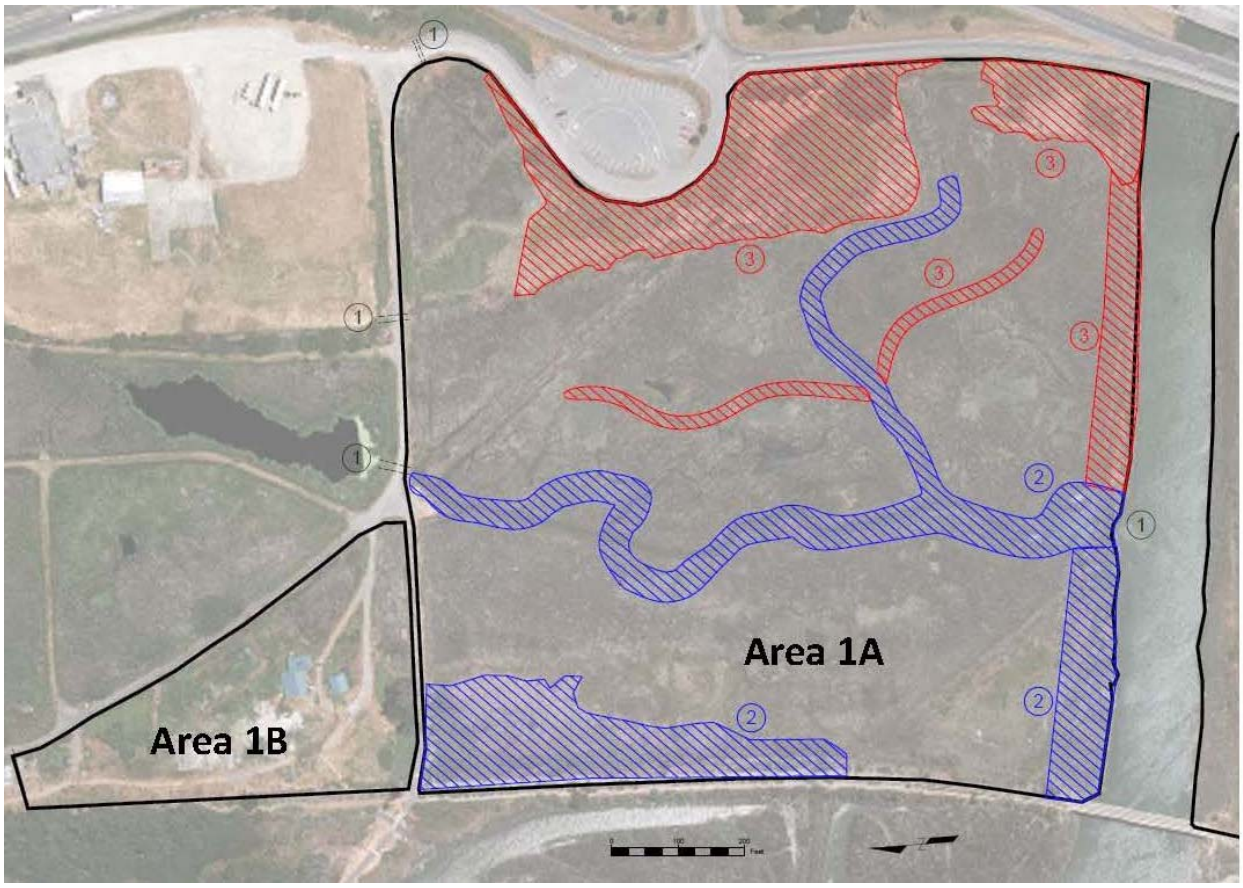

Figure 6. *Conceptual design alternatives for Area 1A. Option 1 tide gate and limited dike removal only. Option 2 is shown in blue, and Option 3 is shown in red. Option 4 includes Spartina management in Area 1, and Option 5 includes public access and recreational opportunities. No design for area 1B.*

3.1 Option 2

In addition to activities described under Option 1, heavy equipment would be utilized to excavate the dikes west of the tide gates to the rail road grade to restore greater tidal connectivity. The width and depth of existing channels would also be maximized for the benefit eelgrass and other aquatic species. Excavated material will be used on-site in upland areas, particularly in the proposed Humboldt Bay Trail corridor along the railroad grade and HCSD sewer right-of-way.

3.2 Option 3

Option 3 includes the full suite of possible actions for Area 1. In addition to the activities described in Options 1 and 2, the eastern dike would also be breached to further restore tidal functions and connectivity. The remnant railroad grade could be excavated to improve tidal connectivity. Additionally, new tidal estuary channels would be constructed with heavy equipment. Excavated material will be used on-site in upland areas along the Humboldt Bay Trail/Rail corridor and along Highway 101.

3.3 Option 4

Mechanical and manual Spartina removal would occur as well, to further reduce the spread of the

invasive exotic to other project areas.

3.4 Option 5

Option 5 would increase public access and recreational opportunities in Area 1. The private parcel in Area 1B would be acquired to be developed as a visitor center and parking as well as to expand tidal wetlands. The access gate at the end of the Pound Road would be removed. A non-motorized boat launch would be constructed at the entrance to Hikshari Trail at the juncture of Area 1A and 1B. Additionally, the City's Waterfront Trail would be extended south to the Elk River, expanding the Humboldt Bay Trail/Rail corridor.

3.5 Area 1 Preferred Design Alternative

Based on input received from stakeholders and consideration of constraints, the preferred design alternative for Area 1 includes the full suite of activities described in Options 1-5 (Figure 7). This will maximize the ecological benefits realized within existing constraints. Existing tide gates will be removed, and a length of dike sufficient to restore full tidal connectivity. Existing in-board ditches will be blocked off to focus the tidal prism in the main channels. Tide gates will be placed on three existing water control structures discharging to this area to prevent saltwater intrusion off-site. Once tide gates are removed, channel expansion and propagation would be expected to occur passively, in response to restoring full tidal connectivity.

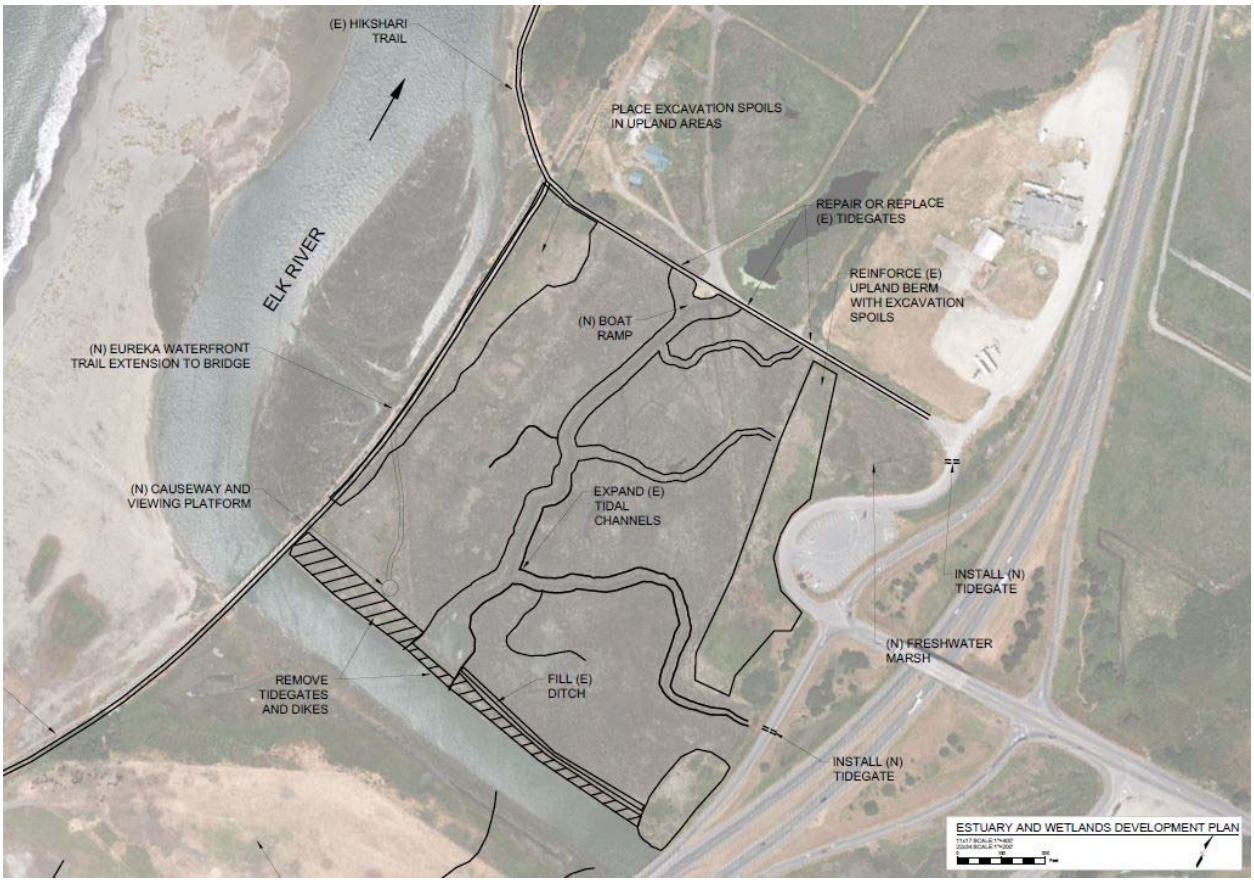

Figure 7. *Area 1 preferred design alternative.*

Heavy equipment would be utilized to excavate the dikes west of the tide gates to the rail road grade to restore greater tidal connectivity. The width and depth of existing channels would also be maximized for the benefit eelgrass and other aquatic species.

The eastern dike would also be breached to further restore tidal functions and connectivity. The former ERBS railroad grade could be excavated to improve tidal connectivity. Additionally, new tidal estuary channels would be constructed with heavy equipment. Excavated material will be used on-site in upland areas along the Humboldt Bay Trail/Rail corridor and along Highway 101.

Saltwater intrusion introduced to Area 1 through restoration actions (e.g., tide gate removal) would help treat Spartina. Remaining Spartina would be treated via mechanical and manual Spartina removal would occur as well, to further reduce the spread of the invasive exotic to other project areas.

Public access and recreational opportunities in Area 1 will be increased. The private parcel in Area 1B would be acquired to be developed as a visitor center and parking as well as to expand tidal wetlands. The access gate at the end of the Pound Road would be removed. A non-motorized boat launch would be constructed at the entrance to Hikshari Trail at the juncture of Area 1A and 1B. The Waterfront (Hikshari) Trail itself will also be extended southward to the Elk River.

4 AREA 2 CONSTRAINTS

4.1 Regulatory Requirements

All applicable local, state, and federal regulatory authorizations will need to be secured for the proposed project prior to commencing work. In addition, an encroachment permit from Caltrans will be required.

4.2 Property Ownership

Area 2 (Figure 8) is located south of Elk River Slough and is predominately owned by the City of Eureka. A 50-foot strip of land the length of the project area on the south bank of the Elk River is privately owned. Caltrans' Highway 101 property extends west into the project area, south to Tooby Road.

Figure 8. Project Area 2 (yellow outline), south of Elk River. Most the property is owned by the City of Eureka.

To the north of Area 2 is the Elk River Slough, which is state sovereign lands under the HBHRCD jurisdiction. Caltrans' Highway 101 Humboldt Hill off-ramp, and Tooby Road (maintained by Humboldt County) form the eastern border of Area 2. The NCRA railroad property forms the western border. HCSD's forced main sewer line runs parallel to the railroad grade in a 30-foot easement on the City's property. A private parcel forms the southern border of Area 2.

The only direct property ownership constraint to expanding and enhancing Elk River's estuary and tidal wetland opportunities in Area 2 is the private property between the Elk River and City's property and Caltrans' property. The City will need permission to excavate a new channel across the private parcel or to acquire the property. Proposed project activities that involve Caltrans property (placement of fill, channel excavation, and construction of public parking lot at Tooby Road) will require the City to secure an encroachment permit. Indirectly, protecting adjacent properties to the south not owned by the City will require design considerations such as increasing the elevation of slight topographic divide to 10+ ft. (NAVD 88) to limit salt water inundation of these properties.

4.3 Land Use

Area 2 is in the City's land use jurisdiction and is zoned coastal agriculture. Approximately 12.5 acres of Area 2 is in the State's retained jurisdiction pursuant to the Coastal Act, while the remainder of the area is in the City's Local Coastal Program (LCP) jurisdiction. Development will be subject to both the City's and Coastal Commission authorization. The City leases its property in Area 2, which has been used to

graze livestock. Converting land zoned coastal agricultural to non-agricultural uses could be a constraint. There is also a conflict between interest groups regarding the proposed conversion of seasonal Aleutian goose grazing habitat to estuary and tidal wetlands habitat for Coho salmon recovery and the benefit of pelagic fisheries. Former use of Area 2 for bio-solids disposal may require soil testing and possible approval by the North Coast Water Quality Control Board (NCRWQCB) for the conversion of this land to estuary and tidal wetlands, which will discharge to Elk River.

The policies in the City LCP and in Chapter 3 of the Coastal Act apply to the proposed project activities. Existing zoning and regulatory policies are deemed to be supportive of the goal of the proposed project of expanding and enhancing the estuary and tidal wetlands on Elk River, although there is an inherent conflict between policies to restore tidal wetlands whenever feasible and protect agricultural lands. As these are former tidelands, their restoration can only occur in this location, while agricultural uses are prevalent on non-former tide lands. Further, estuaries are valuable habitat for the recovery of protected Coho salmon and naturally occur in the lower-most reaches of rivers such as Elk River. On the balance, restoring former tidal wetlands and enhancing the estuary on Elk River are of greater priority in this unique coastal location than perpetuating agricultural uses on these public lands.

The Coastal Act does allow fill to be place to protect existing structures, such as Highway 101. The construction of a living shoreline, which will support coastal wetland habitat will help protect Highway 101 from tidal inundation as result of the proposed Project restoring Area 2 to full tidality.

4.4 Hydrology

There are two water control structures with tide gates that drain Area 2 beneath Highway 101 and discharge to Elk River. The southern tide gate is proposed to be removed to increase connectivity with Elk River. There is a drop inlet structure associated with Caltrans' northern culvert; removing the tide gates could result in tidal inundation of the median area on Highway 101 that drains north to Elk River. The drainage channel from Area 2 to the northern culvert will be filled and the tide gate will remain. Stormwater and tidal drainage from Area 2 will be directed to Elk River. Salt water inundation from removing the southern tide gate will be limited to Area 2 and not affect properties to the south (Figure 9). Connecting Area 2 directly to Elk River will result in tidal inundation during MHHW and potentially of property to the south during MAMW tides (Figure 6). Preventing tidal flooding of private property to the south will need to be addressed and avoided by increasing the elevation of an existing topographic divide to 10+ ft. (NAVD 88). Opening Area 2 to a full tidal cycle during MHHW or MAMW (6.5 and 8.8 ft. [NAVD 88]) will not result in the NCRA property becoming tidally inundated.

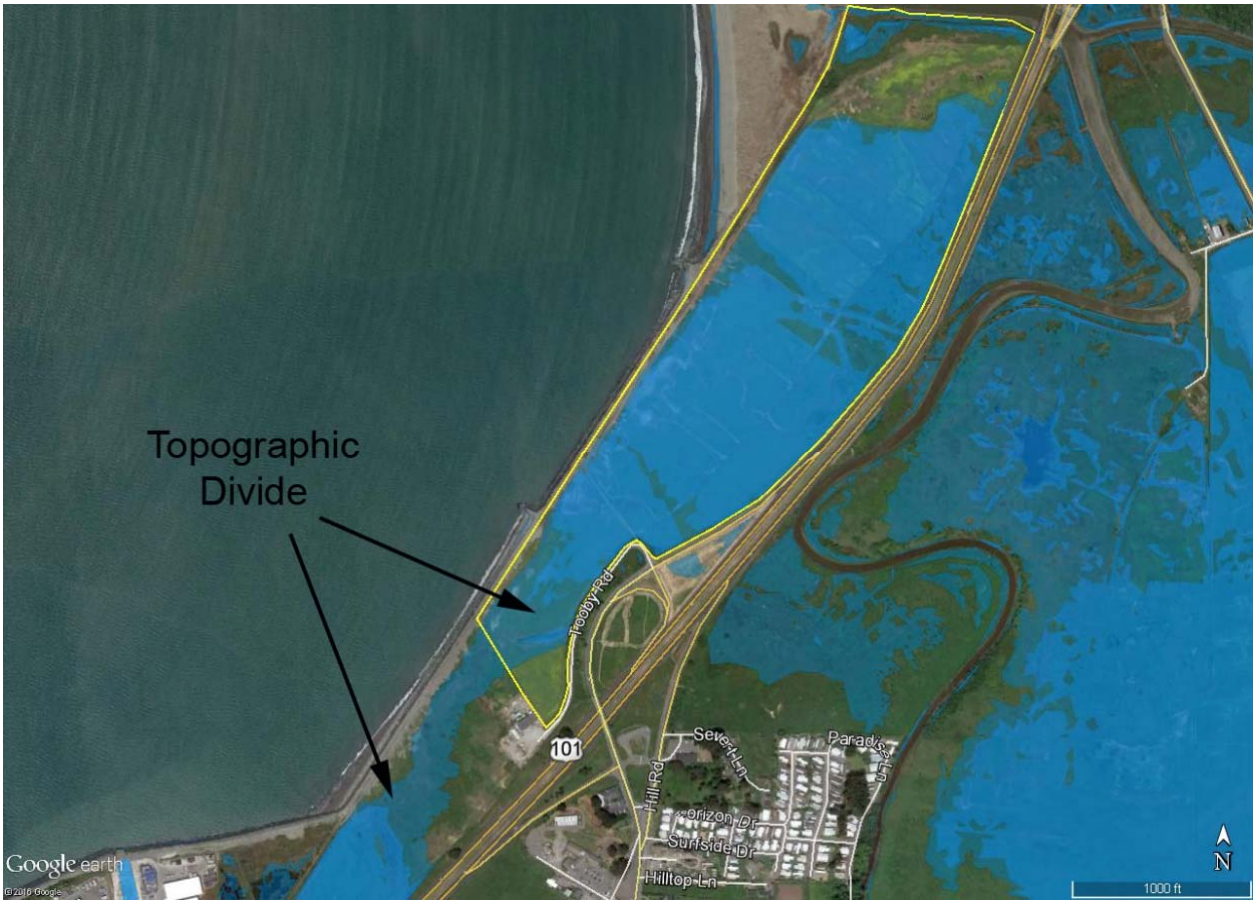

Figure 9. Potential tidal inundation of Area 2 during MHHW (dark blue shading), MAMW (light blue) tides, and an existing topographic divide between Areas 2 and 3.

Recent extreme tides and storm surges have severely eroded railroad grade ballast from NCRA property in numerous locations resulting in fill of seasonal wetlands in Area 2 and 3 (Figure 10). The condition of the seawall and NCRA property needs to be assessed and engineering designs developed to rehabilitate and enhance the structure to protect infrastructure and the estuary and intertidal wetland features proposed for Area 2.

4.5 Utilities

There are both above and below ground utilities in Area 2. PG&E has eleven electrical distribution poles located in Area 2 on City property. Nine pole are in an area designated for placement of fill, and one is in an area that is tidally inundated now and will remain inundated. Underground utilities in Area 2 include a HCSD force main pressure sewer line that parallels the western boundary of the City's property and is located approximately 10 ft. east of that property line. There are also buried optical fiber lines parallel to the eastern boundary along Highway 101 on Caltrans' property. These underground utilities (sewer line and optical fibers) can and will be avoided through appropriate design and implementation. The nine electrical distribution poles in areas where fill will be placed may need to be modified by PG&E to accommodate increased surface elevations.

Figure 10. NCRA railroad grade erosion and seasonal wetlands fill, post 2015- 2016 king tides and storm surge in Area 2.

4.6 Transportation Infrastructure

Restoring Area 2 to a fully tidal condition is likely to tidally inundate the road prism of Highway 101 and off-ramp as well as a portion of Tooby Road, during various high tide events. As described in Section 2.4 (Area 2 Hydrology), the NCRA railroad prism is not likely to be tidally inundated at MAMW or king tides. Fill can be placed along the Caltrans road prism to form a living shoreline salt marsh plain/riparian slope (6 ft. to 10 ft. elevation NAVD 88) that will buffer the road prism from tidal inundation. An outlet channel will be needed to convey stormwater discharge through the southern culvert under Highway 101.

An engineering assessment is needed of the Humboldt Bay Trail/Railroad corridor and protective shoreline rock sea wall. Recent extreme high tides and storm waves have caused extensive erosion of the railroad ballast, which have formed gravel deltas extending out into Area 2. Bay over-wash will only increase as the sea wall deteriorates as will erosion of Area 2, ultimately threatening HCSD forced sewer main and even Highway 101.

4.7 Physical Constraints

An existing windblown sand deposit forms an upland area parallel to Elk River and is a physical constraint to reconnecting Area 2 to Elk River. The proposed Project will need to excavate a new channel through this sand deposit from Elk River. The new channel will then meander south approximately 4,200 ft. The side slopes of the channel through the sand dune may have to be laid back further than the side slopes throughout the rest of the Area. The depth of the proposed main tidal channel into Area 2 will match the thalweg elevation of Elk River slough adjacent to Area 2. The width and depth of the tributary

tidal channels will be modeled to accommodate the projected tidal prism volume and to optimize the creation of new eelgrass habitat.

4.8 Biological Constraints

Vegetation survey and mapping have occurred in Area 2 to support project planning and design. A nine quadrangle USGS was also conducted to identify all potential vegetation, bird, animal, amphibian, and fish species that may be found in the project area and affected by project implementation.

There are no protected plant species in Area 2, but there are several populations of plant species of concern (Humboldt Bay owl's clover, Point Reyes bird's beak, and Lyngbye sedge). BMPs will be necessary during project implementation to protect these species.

USFWS and HSU collaborated to collect water samples to run eDNA test to determine the presence of any protected aquatic species such as tidewater goby in Area 2, and none were found. Filling of in-board ditches should occur during low tide when they are de-watered to avoid impacts to tidewater goby should they be present.

Use of BMPs during project implementation will be needed to help ensure that Endangered Coho Salmon and Threatened Chinook Salmon and Steelhead trout are not negatively impacted, along with any sensitive bird species that may use the project area, as identified in the nine quadrangle USGS search.

While there are no Aleutian goose roosting or nesting sites in Area 2 or in the vicinity, construction would occur during the dry season after Aleutian geese have finished their seasonal grazing.

4.9 Cultural Resources

As with Area 1, a cultural resource survey and investigation has been performed in Area 2. All observed historic resources were recorded and an evaluation of historical significance was conducted. The investigation recommended that these features no longer retain the requisite integrity to qualify for inclusion in the National Register of Historic Places. Additionally, historic Wiyot villages referenced in available ethnographic accounts and maps were determined to have been located outside the boundaries of Area 1 and Area 2. The investigation further concluded the proposed project will not result in significant impacts to historic resources, as defined by CEQA.

4.10 Exotic Invasive Species

Spartina presently exists in a limited (approximately an acre) reach of Area 2 parallel to Elk River. Restoring Area 2 to a fully tidal condition will require Spartina eradication where it exists and control to prevent its establishment in the new tidal wetlands areas.

5 AREA 2 DESIGN ALTERNATIVES

The goal for Area 2 is to also expand and enhance the estuary of Elk River and increase public access and recreational opportunities. Proposed ecological benefits of design alternatives will focus on creating a tidal channel network and hydrologic connectivity with the estuary of Elk River. This expansion of the estuary will also increase tidal and brackish water wetland habitat and eelgrass habitat. The construction of a living shoreline buffer along the western and eastern boundaries of the Project area will benefit publicly owned transportation, utility corridors, public access, and recreational opportunities. Four conceptual design alternatives for Area 2 are summarized below (Figure 11).

Figure 11. Conceptual design alternatives considered for Area 2. Option 1 shown in green; Option 2 shown in red; Option 3 shown in blue. Option 4 includes an access road and observation trail and deck.

5.1 Option 1

This is the minimal conceptual design alternative that includes the excavation of a tidal channel entrance and network to enhance tidal connectivity and tidal/estuarine habitats. The new channel entrance would connect directly to the Elk River. An existing in-board ditch will be blocked off to focus the tidal prism in the main channel. Note width and depth dimensions will ultimately be controlled by the depth of the Elk River channel itself. The width and depth of the new channels would be maximized for the benefit Eelgrass and other aquatic species. A tide gate on one culvert that drains to the east beneath Highway 101 to Elk River would be removed to increase tidal connectivity. Excavated material would be used on-site to construct a hydrologic berm/riparian habitat to retain grazing and Aleutian goose habitat on the southern half of Area 2. Construction of the new tidal channel entrance and network would enhance seasonal wetlands in a 50:50 balance between agricultural grazing use/Aleutian goose habitat and new estuary habitat.

5.2 Option 2

Option 2 expands the channel network proposed in Option 1 to enhance a larger amount of estuary habitat while retaining agricultural grazing use/Aleutian goose habitat at approximately a 66:33 ration. The new channel network would also be extended. A second tide gate on a culvert that drains to the east beneath Highway 101 to Elk River would be removed to increase tidal connectivity. Excavated material would be used to construct living shorelines that gradually increase in elevation to buffer the Humboldt Bay Trail/ Railroad/HCSD right-of-way and Highway 101.

5.3 Option 3

Option 3 includes the excavation of a second new tidal entrance and maximizing tidal connectivity. The two new channel entrances would connect directly to the Elk River. Excavated material would be used to construct living shoreline that gradually increase in elevation to buffer the Humboldt Bay Trail/Railroad/HCSD right-of-way and Highway 101.

5.4 Option 4

Option 4 would increase public access and recreational opportunities in Area 2. The existing dirt road would be improved to provide public access from Tooby Road to the NCRA railroad and then parallel to railroad north to a crossing to allow the public to access Elk River Spit and Humboldt Bay. Public parking with pervious pavers would be developed adjacent to Tooby Road. A public trail would extend from the Humboldt Bay Trail corridor east to a viewing deck above the enhanced tidal wetlands area.

5.5 Area 2 Preferred Design Alternative

Based on input received from stakeholders, the preferred design alternative for Area 2 includes a modified version of Options 3 and 4 (Figure 12).

Excavation of a single tidal channel entrance and network will enhance tidal connectivity and tidal/estuarine habitats. The new channel entrance would connect directly to the Elk River. An existing in-board ditch will be blocked off to focus the tidal prism in the main channel. Note width and depth dimensions will ultimately be controlled by the depth of the Elk River channel itself. The width and depth of the new channels would be maximized for the benefit eelgrass and other aquatic species. A tide gate on one culvert that drains to the east beneath Highway 101 to Elk River would be removed to increase tidal connectivity.

A second tide gate on a culvert that drains to the east beneath Highway 101 to Elk River would be removed to increase tidal connectivity. Excavated material would be used to construct living shoreline that gradually increase in elevation to buffer Highway 101.

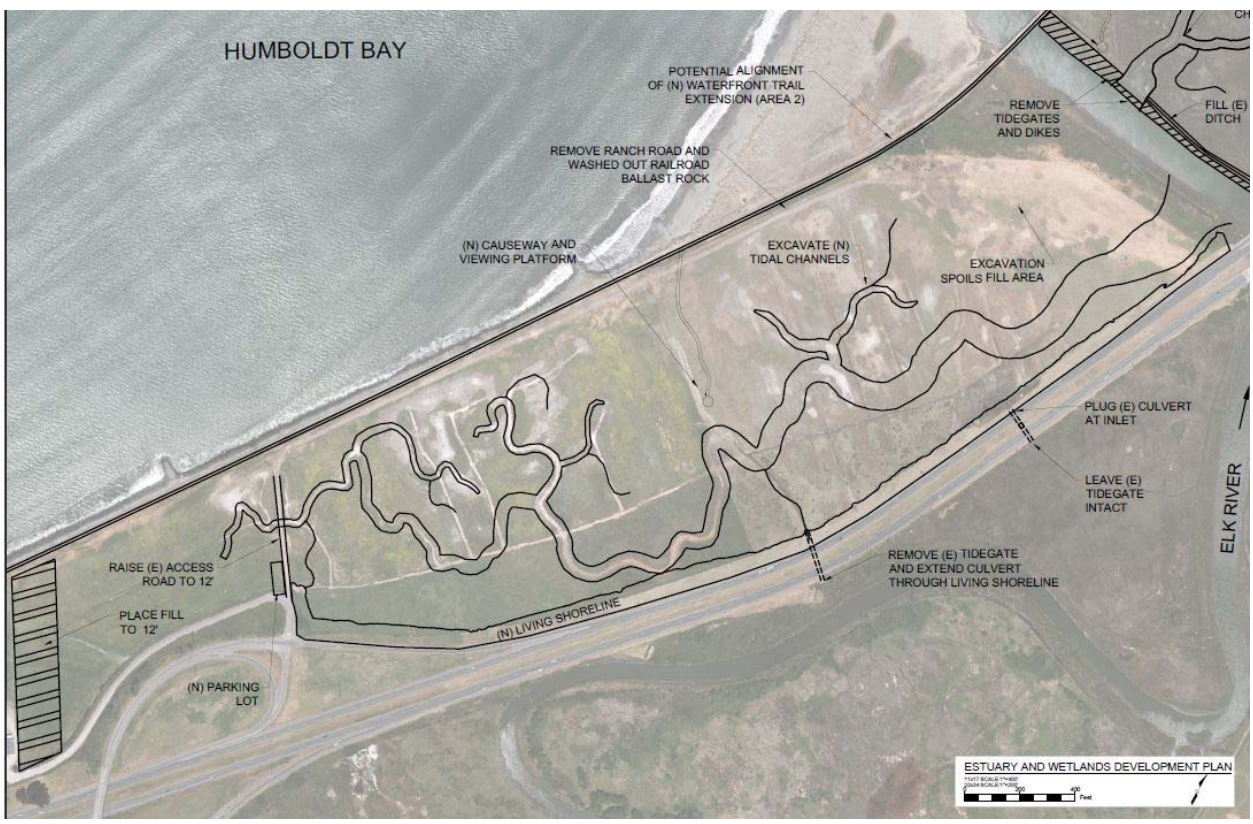

Figure 12. *Area 2 preferred design alternative.*

6 AREA 3 CONSTRAINTS

6.1 Regulatory Requirements

All applicable local, state, and federal regulatory authorizations will need to be secured for the proposed project prior to commencing work. In addition, an encroachment permit from Caltrans, Humboldt County, and NCRA will be required.

6.2 Property Ownership

Area 3 (Figure 13) has been divided into Area 3A and Area 3B based on property ownership and is located north of King Salmon Avenue and west of Highway 101. Area 3A includes two private parcels. One parcel has a wetlands conservation easement held by the National Resources Conservation Service (NRCS). NCRS staff and property owner have expressed support for enhancing connectivity of this parcel with Buhne Slough and the conversion of seasonal freshwater wetlands to tidal and brackish water wetlands. Area 3B is predominately privately owned by PG&E (three parcels in Area 3B). The NCRA owns the railroad corridor property, which forms the western boundary of Area 3A and traverses Area 3B. Caltrans' Highway 101 property also extends west into Area 3. The County owns King Salmon Avenue. The HCSD holds a right-of-way easement for its sewer line that crosses Area 3B east to west and then parallels the NCRA property north to the Elk River waste water treatment facility.

Permission and/or collaboration from/with PG&E and two private property owners and two easements will be necessary in Area 3. The direct property ownership constraints to restoring and enhancing tidal wetlands opportunities in Area 3 are (1) PG&E's property and their need to maintain access to their utility infrastructure and (2) Caltrans' property and water control structures on the eastern border of the project. The proposed project design will require PG&E permission and an encroachment permit from Caltrans. Indirectly, protecting adjacent properties that could be tidally inundated by the proposed project will require design considerations and cooperation related to maintaining or modifying drainage structures and accommodating stormwater runoff.

Figure 13. Project Area 3 (A&B), north of King Salmon Avenue. Area 3 was historically part of the Buhne Slough tidal complex.

6.3 Land Use

Most of Area 3 is in Humboldt County's land use jurisdiction. The City of Eureka's jurisdiction occupies a small portion of the northern most northern private parcel in Area 3A. All of the private properties east of the NCRA property in Area 3 are zoned Commercial Recreation with the following combining zone designations: Coastal Resource Dependent, Flood Hazard Areas, and Coastal Wetlands. PG&E's property west of the NCRA in Area 3B and north of King Salmon Avenue is zoned Coastal Dependent Industrial (MC) with the following combining zone designations: Coastal Resource Dependent, Flood Hazard Areas, and Coastal Wetlands.

Pursuant to the Coastal Act, a significant portion of Area 3 is in the State's retained jurisdiction, while the remainder of Area 3 is in the County LCP jurisdiction as described in the Humboldt Bay Area Plan (HBAP). Any proposed habitat enhancement activities are considered development and will be subject to both the County's and Coastal Commission coastal development authorization. There may be a conflict between interest groups regarding the proposed conversion of seasonal Aleutian goose grazing habitat in Area 3B to tidal wetlands habitat.

The policies in the County's HBAP and in Chapter 3 of the Coastal Act will apply to the proposed project activities. Normally converting CDI to other uses would be a constraint, but the portion of the CDI parcel in Area 3A is undeveloped and currently supports tidal wetlands and would not be developable as a CDI use. The Commercial Recreation designated properties in Area 3B are east of the NCRA property are

undeveloped and support tidal wetlands. In Area 3A, the low-lying properties are currently under agricultural use for grazing, and the upland portion is developed for commercial uses. Restoration of coastal wetlands is an allowable use in Commercial Recreation designated lands with a Coastal Wetlands overlay. Therefore, existing zoning and regulatory policies are deemed to be supportive of the goal of the proposed project of expanding and enhancing hydrologic connectivity and tidal wetlands on Buhne Slough. All applicable local, state, and federal regulatory authorizations will be secured for the proposed project prior to commencing work.

6.4 Hydrology

Area 3 occupies the historic Buhne Slough salt marsh complex that has been diked off from Humboldt Bay, channelized with construction of King Salmon Canal, and segmented hydrologically by several linear transportation structures (NCRA, Highway 101, Buhne Ranch Road, and King Salmon Avenue). Area 3 currently supports a muted tide cycle and tidal wetlands and brackish and freshwater wetlands fed by stormwater runoff from Humboldt Hill east of Highway 101. The lower portion of historic Buhne Slough in Area 3 is now referred to as King Salmon Canal and the former inlet to PG&E's Humboldt Bay Power Plant. In Area 3, there are several water controls structures in place where Highway 101, NCRA railroad, old Buhne Ranch Road, and King Salmon Avenue cross Buhne Slough.

In Area 4, Buhne Slough joins King Salmon Canal via a 2 ft. diameter culvert with a tide gate (currently staying open) and enters Area 3 through a 5 ft. diameter culvert, under King Salmon Avenue. Tidal waters proceed up Buhne Slough through a 2 ft. diameter culvert under the railroad, and then through two 3 ft. diameter culverts under the abandoned Buhne Ranch Road before entering a 4 ft. x 10 ft. box culvert under Highway 101 at the eastern edge of Area 3.

A small roadside ditch is present along western toe of Highway 101 that allows stormwater to drain from Area 3A south to Buhne Slough. The historic Buhne Slough channel in Area 3A has been cut-off from the lower Buhne Slough with the construction of Highway 101. Area 3A receives wave generated over wash from Humboldt Bay in the winter. Stormwater in Area 3A drains south to a remnant of Buhne Slough on PG&E's property, not east in its historic channel which was blocked by the construction of Highway 101. A small 1 ft. diameter culvert also allows tidal waters to be exchanged from Area 4 underneath King Salmon Avenue with Area 3.

The series of culverts between Highway 101 and King Salmon Avenue are grossly undersized, partially plugged and significantly restrict stormwater flows coming from the Humboldt Hill watershed that drains to the historic Buhne Slough salt marsh complex east of Highway 101.

If Area 3 became fully tidal, salt water inundation could extend north to Area 3A. Area 3B is predominately salt marsh now. MAMW or king tides could extend north to Area 2 if the slight topographic divide is not increased in elevation above 9 ft. (Figure 14). If Area 3 became fully tidal, stormwater runoff from the east could also become temporarily impounded behind Highway 101 and flood properties east of Highway 101 and east of Broadway Avenue.

Recent extreme tides and storm surges have severely eroded railroad grade ballast from NCRA property in numerous locations resulting in fill of seasonal wetlands in Area 2 and 3 (Figure 10). The condition of the seawall and NCRA property needs to be assessed and engineering designs developed to rehabilitate and enhance the structure to protect infrastructure and seasonal wetland features in Area 3A.

The low lying former Buhne Slough salt marsh and stormwater runoff from two drainages on Humboldt Hill to the east Highway 101 drain into Area 3. The area to the east of Highway 101 becomes flooded in the winter from precipitation and stormwater runoff. The former Buhne Slough salt marsh area is underlain with Bay mud and not very permeable. Buhne Slough has been diverted from its former channel (King Salmon Canal) and discharges to Area 4 via a 5 ft. culvert. The reduced drainage capacity of Buhne Slough and current water control structures likely contribute to flooding east of Highway 101.

Restoring connectivity between Buhne Slough and South Bay could tidally affect former salt marsh areas upstream and east of Highway 101. Restoring tidal connectivity could affect stormwater runoff and flooding east of Highway 101. Installing tide gates on Buhne Slough water control structures would likely increase flooding upstream during stormwater runoff. Preventing tidal inundation or flooding of private property to the east of Area 3 will need to be addressed. Caltrans is not supportive of placing tide gates on its water control structures (culverts) due to the increased maintenance responsibilities associated with tide gates.

Figure 14. Potential tidal inundation of Area 3 during MHHW (dark blue shading) and MAMW (light blue) tides, and an existing topographic divide between Areas 3 and 2.

6.1 Utilities

There are both above and below ground utilities that traverse Area 3 in a very concentrated zone (Figure 15). The HCSD has a forced main pressure sewer line that crosses Area 3 and Buhne Slough from the east and then runs north parallel to the railroad grade in a 30-foot easement. PG&E has a main 12 in gas line entering Area 3 from the east that also crosses Buhne Slough and multiple electrical transmission lines and towers/poles crossing in the same zone. There are also buried optical fiber lines parallel to the eastern boundary along Highway 101 on Caltrans' property.

The underground utilities that cross Buhne Slough create major constraints to increasing the slough's channel capacity (width and depth). As long at the electrical transmission towers and poles can remain accessible, increasing tidal connectivity in Area 3B with Humboldt Bay should not be a limitation as this area is tidally inundated under existing conditions.

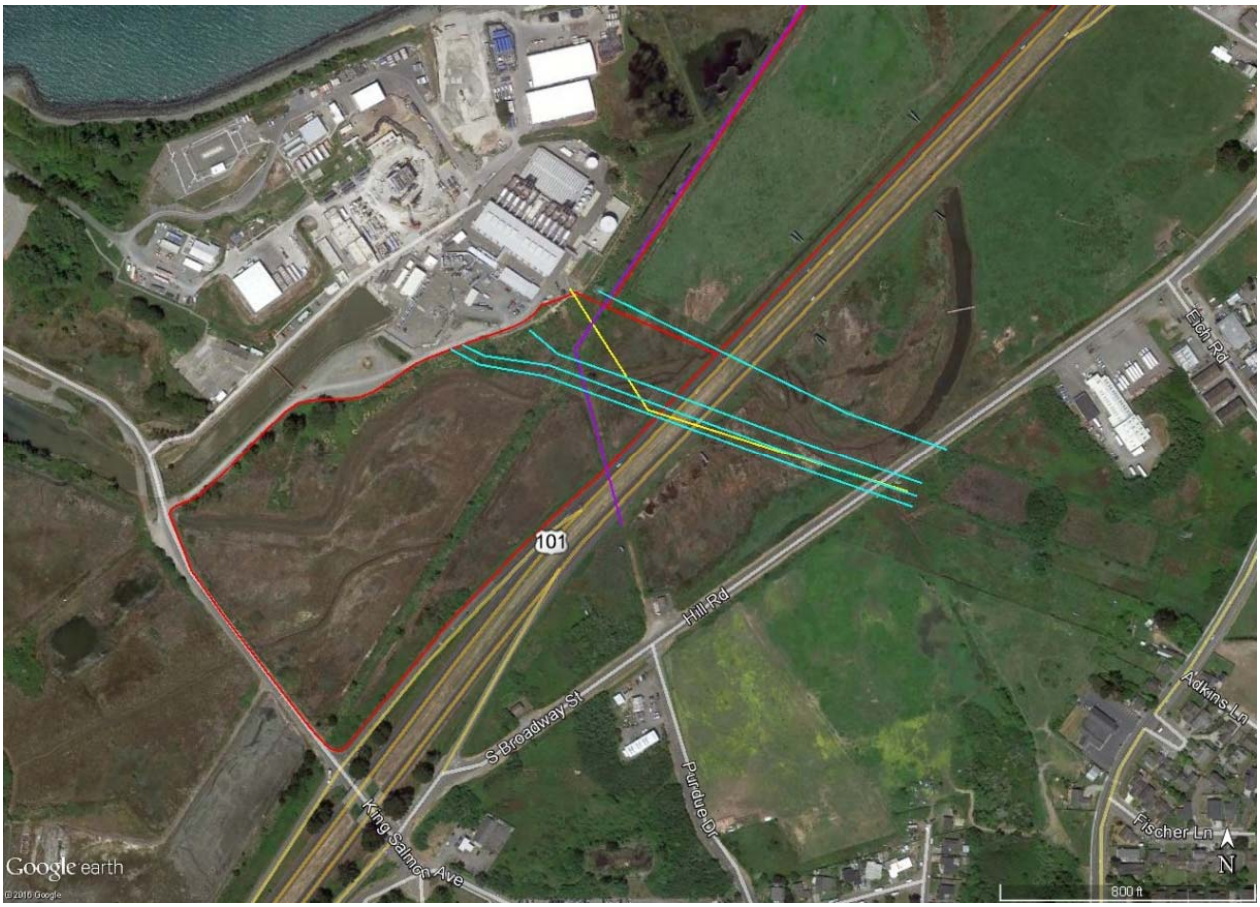

Figure 15. Utilities traversing Area 3: Humboldt Community Services District's sewer line (purple), PG&E's gas line (yellow) and overhead electrical transmission towers and poles (turquoise).

6.1 Transportation Infrastructure

Tidal inundation of Highway 101, King Salmon Avenue, PG&E road prisms, and the railroad base occurs under existing conditions in Area 3B but not in Area 3A. Restoring Area 3 to a fully tidal condition would likely inundate the road prism in Area 3A on the west-side of Highway 101 by MHHW. This is not considered a constraint under the current tidal regime. If Area 3 is restored to full tidal influences, no road, highway, or railroad surfaces would be tidally inundated by current MAMW tides.

6.2 Physical Constraints

There are no natural physical constraints in Area 3, but artificial constraints from existing water control structures on Buhne Slough and utility and transportation infrastructure impose many physical constraints to increasing tidal connectivity and enhancing tidal wetlands in Area 3. Excavation to increase the capacity of Buhne Slough would be constrained by underground utilities that cross the channel. The private road on the left bank of King Salmon Canal may not be able to be breached to support full tidal restoration of Area 3 if it is designated as a haul route to be used in the removal of nuclear casks from PG&E's property. The removal of nuclear casks from PG&E's property may also prevent construction of

a full tidal channel under King Salmon Avenue to connect Area 3 to Humboldt Bay. Tidal inundation and backwater flooding of adjacent properties east of Highway 101 and south of King Salmon Avenue are fluvial constraints to restoring a full tidal cycle on Buhne Slough in Area 3.

6.3 Biological Constraints

Vegetation survey and mapping have not been prepared of Area 3 for this project but environmental assessments prepared for PG&E and NRCS do cover most of Area 3. Stillwater Sciences (2016) conducted vegetation surveys in Area 3 as part of PG&E's *Biological Mitigation and Monitoring Plan for the Humboldt Bay Power Plant* and identified the presence of special status Sea-watch (*Angelica lucida)*, as well as Lyngbye's sedge and Point Reye's bird beak, also found in Area 1 and Area 2. Eelgrass was also observed in the PG&E Intake Canal (Stillwater Sciences 2016). Stillwater Sciences (2016) also noted that special-status northern red-legged frog (*Rana aurora*) amphibians have the potential to occur in Area 3.

USFWS and HSU collaborated to collect water samples to run eDNA test to determine the presence of any protected aquatic species such as tidewater goby in Area 3; none were detected.

6.4 Cultural Resources

A cultural resource survey and investigation has not been performed in the course of this project of Area 3. A cultural resources survey would need to precede any proposed excavation in Area 3.

6.5 Exotic Invasive Species

Spartina presently exists in Area 3B but not in 3A. Increasing Area 3's connectivity with Humboldt Bay will require Spartina eradication where it exists and control to prevent its establishment in the new tidal wetlands of Area 3A.

7 AREA 3 DESIGN ALTERNATIVES

The goal in Area 3 is to restore connectivity of Buhne Slough to Humboldt Bay and restore Buhne Slough's former tidal wetlands and eelgrass habitats. Hydrologically, Area 3 is part of the larger former salt marsh area associated with Buhne Slough that includes Area 4 too. As the goals for Area 3A and 3B are the same, these two areas could be combined into one Area 3. Five conceptual design alternatives for Area 3 are summarized below (Figure 16).

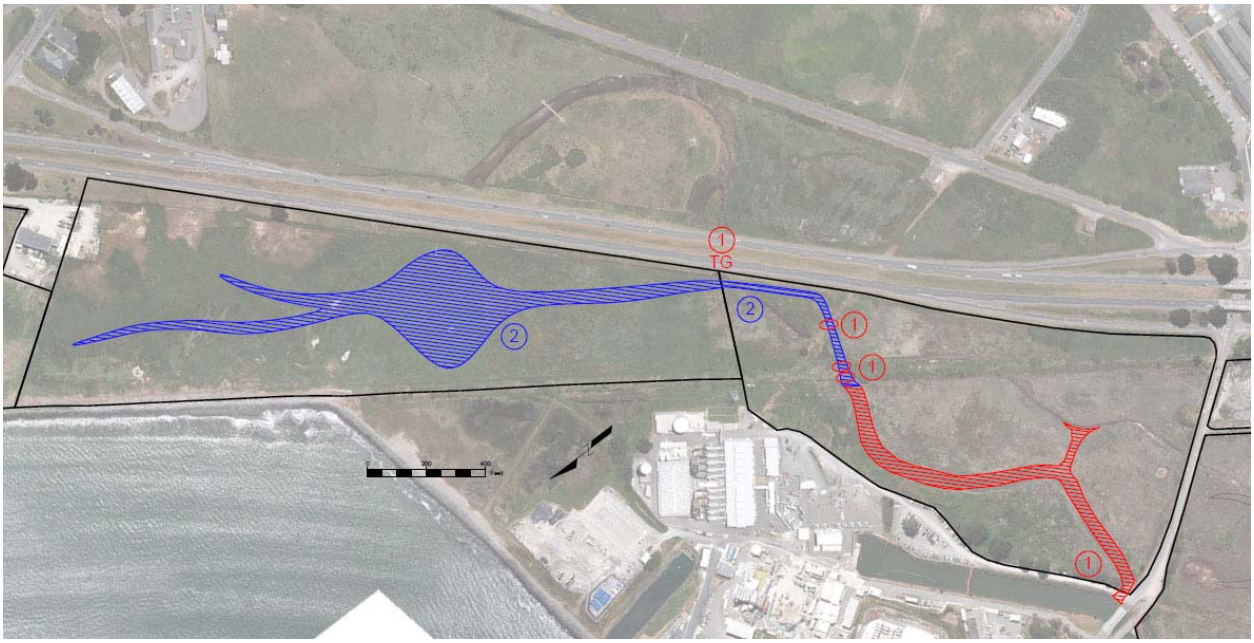

Figure 16. Conceptual design alternatives for Area 3. Option 1, shown in red, proposes to breach King Salmon Canal and install tide gates. Option 2 is shown in blue, and Option 3 in green.

7.1 Option 1

This is the minimal of the conceptual design alternatives, which focuses on restoring full tidal connectivity to Buhne Slough and South Bay via the King Salmon canal, and promoting passive tidal channel expansion. An existing in-board ditch will be blocked off to focus the tidal prism in the main channel. The two culverts under the NCRA Railroad grade and the one culvert under former Buhne Road will be either removed or expanded to accommodate full tidal capacity. Tide gates would need to be installed in Caltrans' box culvert on Buhne Slough and another culvert to the South beneath Highway 101 to prevent saltwater intrusion east of the highway. Backwater flooding during stormwater runoff is likely to occur east of Highway 101 and Broadway Avenue (Figure 14). Option 1 does not include Spartina control.

7.2 Option 2

Option 2 is essentially the same as Option 1, although tide gates will not be placed on Caltrans' culverts under Highway 101. Tidal inundation would occur east of Highway 101 and east of Broadway Avenue. A tide gate could be installed on the culvert under Broadway Avenue to prevent the area to the east from saltwater intrusion. Backwater flooding during stormwater runoff is likely to occur east of Highway 101 and Broadway Avenue.

7.3 Option 3

In addition to restoring full tidal connectivity to Buhne Slough to South Bay via the King Salmon canal, Option 3 will expand the channel capacity of Buhne Slough up to Highway 101 where an outlet pool will be excavated at the culvert. A new channel would be excavated north from Buhne Slough to reconnect the former upper reaches of Buhne Slough (Area 3a). A pond would also be excavated in the former Buhne Slough channel to the west of the Highway 101 in remnant reach of Buhne Slough. Option 3 also does not include Spartina control.

7.4 Option 4

Option 4 would expand the channel capacity of an existing tidal channel in Area 3B extending north from King Salmon Avenue through a culvert that would need to be replaced or removed under the NCRA Railroad grade up to Buhne Slough.

7.5 Option 5

Option 5 would add mechanical and manual Spartina control to Options 1-3 tidal connectivity activities.

7.6 Area 3 Preferred Design Alternative

Based on feedback received from stakeholders on conceptual design alternatives and existing constraints, the preferred design alternative for Area 3 includes all elements from Option 2 – Option 5. Full tidal connectivity to Buhne Slough and South Bay via the King Salmon canal will be restored, promoting passive tidal channel expansion. An existing in-board ditch will be blocked off to focus the tidal prism in the main channel. The two culverts under the NCRA Railroad grade and the one culvert under former Buhne Road will be either removed or expanded to accommodate full tidal capacity. Tidal inundation would occur east of Highway 101 and east of Broadway Avenue. A tide gate could be installed on the culvert under Broadway Avenue to prevent the area to the east from saltwater intrusion. Backwater flooding during stormwater runoff is likely to occur east of Highway 101 and Broadway Avenue (Figure 14).

The channel capacity of Buhne Slough will be expanded up to Highway 101 where an outlet pool will be excavated at the culvert. A new channel would be excavated north from Buhne Slough to reconnect the former upper reaches of Buhne Slough (Area 3A). A pond would also be excavated in the former Buhne Slough channel to the west of the Highway 101 in remnant reach of Buhne Slough.

The channel capacity of an existing tidal channel in Area 3B will also be expanded, extending north from King Salmon Avenue through a culvert that would need to be replaced or removed under the NCRA Railroad grade up to Buhne Slough.

Mechanical and manual Spartina control to all tidal connectivity activities in Area 3.

8 AREA 4 CONSTRAINTS

8.1 Regulatory Requirements

All applicable local, state, and federal regulatory authorizations will need to be secured for the proposed project prior to commencing work. In addition, an encroachment permit from Humboldt County may be required.

8.2 Property Ownership

Area 4 (Figure 17) is located south of King Salmon Avenue and west of Highway 101 and is a mix of public (HBHRCD and Humboldt County) and two privately owned properties. Area 4 has been divided into Area 4A and Area 4B based on property ownership and hydrological characteristics. In Area 4A, two public agencies own properties who are supportive of the project but it will not be feasible to enhance connectivity with South Bay and tidal wetlands or eelgrass habitat without the cooperation of adjacent private property owners. Area 4B is entirely privately owned, and the owner is interested in enhancing connectivity with South Bay and creating eelgrass habitat and tidal wetlands. Area 4B is hydrologically isolated from Area 4A through MHHW tides and can be made so from higher tides such as MAMW if

tidal enhancement is not pursued in 4A.

The NCRA owns the railroad corridor property, which forms the eastern boundary of Area 4. Caltrans' Highway 101 borders the NCRA property. The County owns King Salmon Avenue. Area 4 is bound by King Salmon Canal (Buhne Slough) and South Bay, separated by earthen dikes, except in Area 4B where the dikes have been breached.

Figure 17. Project Area 4 (A&B), south of King Salmon Avenue. Area 4 was historically part of the Buhne Slough tidal complex.

8.3 Land Use

All of Area 4 is in the County's land use jurisdiction and is zoned Coastal Recreation with the following combining zone designations: Coastal Resource Dependent, Flood Hazard Areas, and Coastal Wetlands. The State has retained coastal development jurisdiction in this area pursuant to the Coastal Act. The policies in the County's HBAP and in Chapter 3 of the Coastal Act will apply to the proposed Project activities. Nearly all the property in Area 4 is undeveloped and currently supporting tidal wetlands with a few upland areas and remnant concrete slabs and asphalt road from past commercial uses. The concrete in Area 4B may have supported former commercial uses. If soils associated with the concrete are contaminated their removal may be necessary. There is interest in both the public and private properties to seek mitigation credit for their properties. Restoration of coastal wetlands is an allowable use in Commercial Recreation designated lands with a Coastal Wetlands overlay. Therefore, existing zoning and

regulatory policies are deemed to be supportive of the goal of the proposed project of expanding and enhancing hydrologic connectivity and tidal wetlands on Buhne Slough.

8.4 Hydrology

There are two drainage structures (5 ft. and 1 ft. culverts) beneath King Salmon Avenue that convey stormwater runoff from Area 3 to Area 4. There is a 2 ft. culvert and tide gate on the drainage ditch (Buhne Slough) that is connected to King Salmon Canal. The tide gate is not operational, and is currently stuck open. An in-board ditch parallels the perimeter dike from King Salmon Avenue east to the NCRA. The ditch has been filled at the property boundary between Area 4A and B. A former agricultural ditch extends north from the perimeter dike ditch to Area 3 via a 1 ft. diameter culvert without a tide gate. Area 4B has become hydrologically reconnected with South Bay since its perimeter dikes were breached. Potential tidal inundation of Area 4 resulting from project implementation is shown in Figure 18.

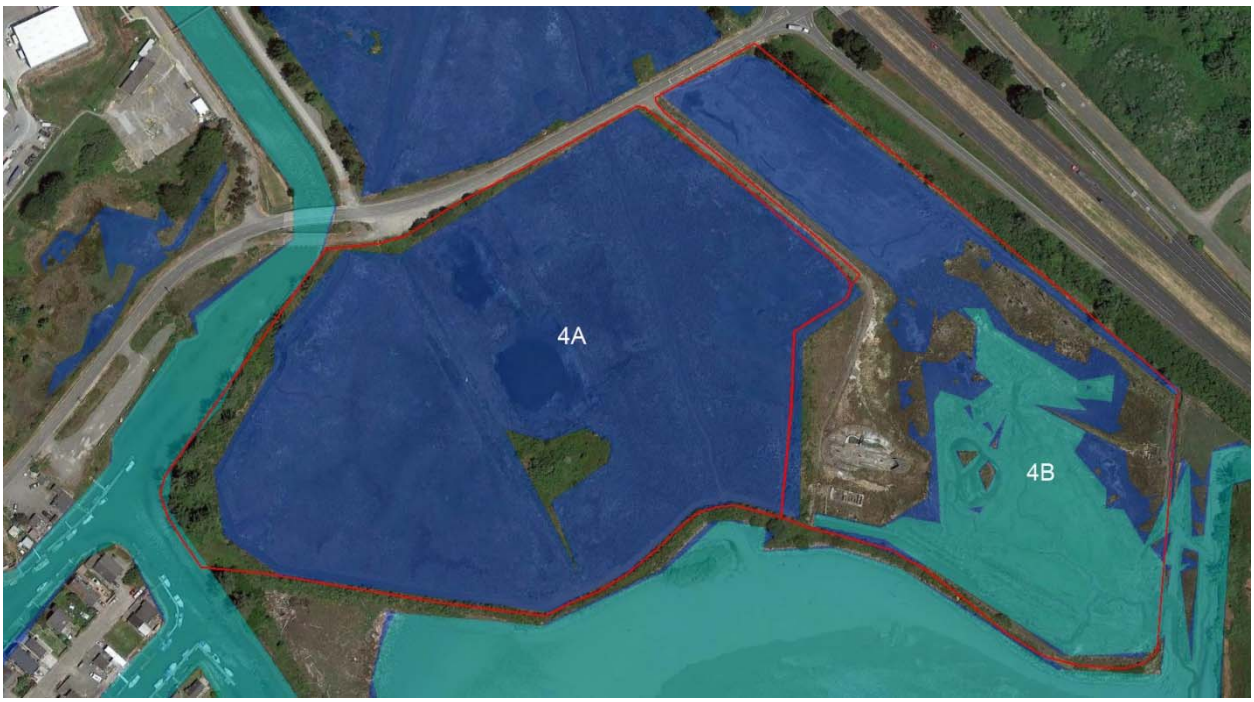

Figure 18. Tidal inundation of Area 4 during MHW (light blue) and MHHW (dark blue) tides. Area 4A and Area 4B are hydrologically separated.

Area 4A is a mix of public and private property. It is not possible to hydrologically isolate the private property from the public property, due to restrictions on placing fill in existing wetlands. Enhancement of tidal wetlands in Area 4A will require the cooperation of all property owners. If Area 4A were to be reconnected to King Salmon Canal and South Bay, it may be necessary to limit tidal inundation of Area 3 with the placement of tide gates on the 5 and 1 ft. diameter culverts under King Salmon Avenue to prevent backwater flooding of Area 3 and property east of Highway 101 during high tides. Area 4B is hydrologically isolated from Area 4A and is currently connected to South Bay (Figure 18).

8.5 Utilities

There are underground utilities in Area 4. HCSD has a sewer and possibly a water line parallel to King Salmon Avenue. Access to these underground utilities would not be impaired by re-connecting Area 4 to

King Salmon Canal and South Bay, as Area 4 is currently tidally inundated by a muted tide cycle.

8.6 Transportation Infrastructure

Tidal inundation of King Salmon Avenue and NCRA railroad base currently occurs in Area 4. If Area 4 is restored to full tidal influences, King Salmon Avenue road surface would not be tidally inundated by current MAMW tides.

8.7 Physical Constraints

The lack of a dike or upland topography separating the private property from publicly owned property in Area 4A is a constraint to increasing re-connectivity to King Salmon Canal and South Bay. The potential depth of tidal channels in Area 4 to create eelgrass habitat may be controlled by the depth of King Salmon Canal in Area 4A and the existing a South Bay channel adjacent to Area 4B.

8.8 Biological Constraints

Vegetation survey and mapping have not been prepared of Area 3 for this project but environmental assessments prepared for PG&E do cover most of Area 4A. Stillwater Sciences (2016) observed Sea-watch in Area 4. Stillwater Sciences (2016) also noted that special-status northern red-legged frog (*Rana aurora*) amphibians have the potential to occur in Area 4.

USFWS and HSU collaborated on collecting water samples to run eDNA test to determine the presence of any protected aquatic species such as tidewater goby in Area 4; none were detected. Any filling of in-board ditches should occur during low tide when they are de-watered to avoid impacts to tidewater goby should they be present.

8.9 Cultural Resources

A cultural resource survey and investigation has not been performed in the course of this project of Area 4. A cultural resources survey would need to precede any proposed excavation in Area 4.

8.10 Exotic Invasive Species

Spartina presently exists in Area 4. Increasing Area 4's connectivity with Humboldt Bay will require Spartina eradication where it exists. Spartina control would be required to reduce seed dispersal to other areas on Buhne Slough and South Bay.

9 AREA 4 DESIGN ALTERNATIVES

The goal in Area 4 is to restore connectivity of tidal wetlands to Buhne Slough and South Bay, and enhance tidal wetlands and eelgrass habitats. As the goals for Area 3 and 4 are the same, these two areas could be combined into one Area 3, if all landowners were willing. Area 4 is predominately diked former tideland. Historically, Area 4 was hydrologically connected to Buhne Slough and South Bay. Five conceptual design options for Area 4 are summarized below (Figure 19).

Figure 19. Conceptual design alternatives for Area 4. Option 1, shown in red, replaces culvert under King Salmon Avenue on Buhne Slough, removes a tide gate and segment of an existing dike, indicated by a red X. Option 2 is shown in blue, and Option 3 is shown in green.

9.1 Option 1

This is the minimal of the four potential conceptual design options. Option 1 focuses on reconnecting Buhne Slough to King Salmon Canal by removing the tide gate and a length of dike sufficient to restore full tidal connectivity. An existing in-board ditch will be blocked off to focus the tidal prism in the main channel. This Option would require the participation of private property owners in Area 4A. Option 1 does not include Spartina control.

9.2 Option 2

In addition to the activities described for Option 1, Option 2 proposes to excavate another section of dike to accommodate a new channel entrance to South Bay and a network of tidal channels throughout Area 4A, connecting to two existing ponds, and expanding an existing tidal channel North to King Salmon Avenue. The culvert under King Salmon Avenue would be replaced to accommodate greater channel capacity. Option 2 would also require the participation of private property owners in Area 4A. Option 2 does not include Spartina control.

9.3 Option 3

Area 4B can be restored independent of Area 4A, as it has a single property owner who is willing to create eel grass habitat on their property. An existing roadway from King Salmon Avenue to the perimeter dike separates Area 4A from 4B from tidal inundation except during king tides. The asphalt on the road way could be removed and a dike constructed to keep the two areas hydrologically separated. Area 4B could be excavated to form a network of deep channels that connect to an existing channel draining to South Bay to provide eel grass habitat. The existing breaches in the perimeter dike could also be expanded to restore full tidal connectivity to South Bay.

9.4 Option 4

This is the most comprehensive of the conceptual design alternatives for Area 4, as it would implement Options 1 through Option 3.

9.5 Option 5

Option 5 includes mechanical and manual Spartina removal throughout Area 4.

9.6 Area 4 Preferred Design Alternative

Based on feedback received from stakeholders on conceptual design alternatives and existing constraints, the preferred design alternative for Area 4 includes all elements from Option 1 through Option 5. Buhne Slough will be reconnected to King Salmon Canal by expanding the culvert capacity under King Salmon Avenue and removing the tide gate and a length of dike sufficient to restore full tidal connectivity. An existing in-board ditch will be blocked off to focus the tidal prism in the main channel. A second segment of dike on South Bay would be removed to promote passive tidal channel development. However, this option would require the participation of private property owners in Area 4A.

10 CONCLUSIONS

As stated previously, there are two components to the City of Eureka's planning grant from the State Coastal Conservancy:

1. expand and enhance Elk River's estuary in Area 1 and Area 2, as well as the Humboldt Bay Trail/Rail corridor expansion; and
2. expand and enhance tidal wetlands and eelgrass habitat in Area 3 and Area 4.

The two components are hydrologically stratified. Area 1 and Area 2 are connected to Elk River Slough, and Area 3 and Area 4 are connected to Buhne Slough and South Bay. The City is the project proponent of the Elk River estuary component (Areas 1 and 2) of this planning grant, as most of this work would occur on City property in the City's jurisdiction. The City has applied for a grant to fund to complete engineering and permitting in Phase II of its Elk River Estuary Enhancement and Waterfront Trail Extension Project.

The tidal and eelgrass habitat enhancement component of this grant is in Area 3 and Area 4 on approximately 100 acres of public and private ownership. A project proponent(s) is/are needed to seek grants, develop engineering designs, secure regulatory authorization to implement a project or projects to expand and enhance tidal wetlands or eelgrass habitats in Area 3 or Area 4. Enhancement of Areas 3A and 3B would likely need to proceed together as they are hydrologically linked.

A significant constraint to enhancing connectivity with Buhne Slough (King Salmon Canal) and South Bay to restore a full tidal cycle is the potential to cause backwater flooding east of Highway 101 during

high tides and impairing access to high priority utility assets in Area 3.

In Area 4, enhancement of Area 4B is likely to proceed without Area 4A as the two areas are and can be kept hydrologically separated, except during king tides, and there is just one property owner in Area 4B who is interested in moving forward with creating eelgrass habitat. While Area 4A, a separate hydrologic area, it has a mix of public and private property owners who need to collectively support any enhancement of tidal wetlands or eelgrass habitat. A lack of permission to proceed with enhancement activities from the private property owners in Area 4A would be a substantial constraint that would prevent authorization of any enhancement activities.

10.1 Area 1 and 2 Constraints

The following is a list of the most significant constraints to restoring estuary habitat in Area 1 and Area 2:

1. acquisition of the 50 ft. wide private parcel or permission to construct will be necessary to proceed;
2. rehabilitation and enhancement of NCRA's seawall may be necessary to prevent storm surge and extreme tide over wash from eroding railroad ballast and filling proposed tidal wetlands;
3. a living shoreline is proposed, consisting of placing fill along the Caltrans road prism to form a salt marsh plain/riparian slope (6 to 10 ft. elevation NAVD 88) that will buffer the road prism from tidal inundation;
4. two existing Caltrans culverts will need to be installed with tide gates to prevent tidal inundation of adjacent properties and Highway 101;
5. preventing tidal flooding of private property to the South of Area 2 will need to be addressed and avoided by increasing the elevation of an existing topographic divide to 10+ ft. (NAVD 88);
6. eleven of PG&E's electrical distribution poles are in areas designated for placement of fill. PG&E will need to modify or replace these poles to accommodate increased surface elevation of the proposed living shoreline;
7. issues with the conversion of agricultural lands, Aleutian geese habitat and placement of fill to protect the shoreline and existing structures, including Highway 101, will need to be resolved with the Coastal Commission; and
8. Spartina control will be required to reduce seed dispersal to other areas on Elk River Slough and Humboldt Bay.

10.2 Areas 3 and 4 Constraints

The following is a list of the most significant potential constraints to enhancing tidal wetlands and eelgrass habitat in Areas 3 and Area 4:

1. permission/collaboration from/with PG&E and other private property owners (n=2) and easement holders (n=2) will be necessary in Area 3, and from one private property owner in Area 4A;
2. rehabilitation and enhancement of NCRA's seawall may be necessary to prevent storm surge and extreme tide over wash from eroding railroad ballast and filling proposed tidal wetlands;
3. encroachment permits from the NCRA, Caltrans, and County would be required for proposed modifications to their culverts;
4. underground utilities that cross Buhne Slough may prevent excavation of the channel to increase depth or width;
5. stormwater runoff may increase flooding during high tides of property north of King Salmon Avenue, and east of Highway 101 if Area 3 and 4A were to become fully tidal;

6. the HCSD would have concerns over access to its underground sewer line if all of Area 3 were to become tidally inundated;
7. Spartina control in Area 3 and Area 4A will be required to reduce seed dispersal to other areas on Elk River Slough and Humboldt Bay; and
8. potential depth of tidal channels in Area 3 and Area 4 to create eelgrass habitat will likely be controlled by the water control structures in Area 3 and the depth of King Salmon Canal in Area 4A and the existing a South Bay channel adjacent to Area 4B.

10.3 Preferred Design Alternatives

Across Areas 1-4, the preferred design alternative maximized ecological benefits within the limitations of existing constraints. The potential enhancement of the estuarine habitat uniquely available near the mouth of the Elk River is ecologically significant to the broader Elk River watershed and Humboldt Bay hydrologic unit. Expanding the tidal prism on Elk River may have an added benefit of helping to flush sediments delivered from the upper watershed from the main channel. Every possible opportunity must be taken to best realize this rare opportunity to enhance estuary and tidal marsh habitat for the benefit of numerous aquatic species and the restoration of natural tidal function in a significantly altered landscape.

These actions are taken in concert with participating landowners, who have generously donated their time to learn about the project's goal and conceptual design approach. The preferred design alternatives for each of the four areas were also developed considerate of comments received from public agencies, which generally expressed a preference toward pursuing restoration actions that would result in the most significant restoration gains.

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Appendix C

Vegetation Survey Report

McBain Associates
APPLIED RIVER SCIENCES
980 7th Street, Arcata, CA 95521 · PO Box 663, Arcata, CA 95518 · ph (707) 826-7794 · fax (707)826-7795

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VEGETATION MAPPING AND RARE PLANT SURVEYS AT ELK RIVER ESTUARY, EUREKA, CALIFORNIA

Prepared for: *Aldaron Laird*
Trinity Associates
980 7th Street
Arcata, CA 95521

Prepared by: *Sunny Loya*
McBain Associates
980 7th Street
Arcata, CA 95521

1 INTRODUCTION

The Elk River Estuary and Inter-tidal Enhancement Project involves 123 acres owned by the City of Eureka: Area 1 to the north of the Elk River and Area 2 to the south. The goal is to expand and enhance the estuary of Elk River inter-tidal wetland habitats on former Bay lands. Describing vegetation in the project area is an integral part of project's impact analysis, and locating species of concern populations will inform project designs. The project is currently in Phase 1, which includes planning and developing conceptual design alternatives Areas 1 and 2 (Figure 1).

Figure 1. Elk River Estuary and Inter-tidal Enhancement Project areas. Vegetation mapping and rare plant surveys occurred in May 2016 in Areas 1 and 2.

2 VEGETATION MAPPING

2.1 Methods

Vegetation within Project Areas 1 and 2 was mapped on May 4 and May 12, 2016. Vegetation includes all the plant species in a region, and usually appears as a mosaic of numerous, definable plant cover types (Sawyer et al. 2009). The dominant plant species in the canopy defined the cover type. A botanist conducted the field survey by walking the entire site and visiting each distinct cover type. The field-based vegetation survey ensured a highly detailed and accurate vegetation map. Polygon boundaries were hand-drawn onto aerial photographs, scaled to 1 inch = 150 feet, around discrete cover types, and a cover attribute was assigned following the Manual of California Vegetation (Sawyer et al. 2009) alliances. Vegetation units mapped were no smaller than 100 ft^2. Unvegetated polygons were assigned a cover type based on visible substrate and level of human disturbance.

There are numerous vegetation classifications that have been developed for California vegetation. Classifications can be broad or specific, depending on the reason for describing the vegetation. It can be useful to compare the same vegetation using different classification systems, as they each yield a unique understanding of the vegetation. For instance, MCV alliances are the most recent and botanically rigorous classification in widespread use in California, although the naming system can be inaccessible to non-botanists (Table 1). Holland types (Holland 1986) tend to be broader and form the foundation upon which the more recent MCV descriptions are based; and the naming system is more user friendly. California Wildlife Habitat Relationships (CWHR) specifically relate to the habitats occupied by the birds, mammals, reptiles, and amphibians of California (Mayer and Laudenslayer 1988). The Cowardin classification (Cowardin et al. 1979) broadly describes coastal and inland wetland vegetation nationwide based on surface and groundwater influences, salinity, growth form of the dominant vegetation (i.e., herbaceous, shrubby, woody/tree), soil influences, and other information. A project-specific classification system of biological habitat types (hereafter "biohabitats") was developed based on overall growth form (woody/shrubby, herbaceous), water requirements, land use (grazed, ungrazed), and presumed salinity. Biohabitats were further simplified for permitting purposes into broad categories of wetland, riparian scrub, upland, and open water. The broad categories were operationally defined by approximate elevation above sea level: cover types mapped below approximately 8 ft were grouped into wetlands, cover types mapped between 8 and 10 ft were riparian, and cover types above 10 ft were upland. These elevation breaks have been accepted by regulatory agencies on nearby projects (e.g., the confluence of Swain and Martin sloughs). The broad categories are not based on wetland delineations. A crosswalk of the mapped alliances and their corresponding Holland, CWHR, and biohabitat classes can be found in Table 1. Descriptions for the 12 biohabitats developed for the Elk River Estuary project can be found below.

<u>Salt Marsh Biohabitats</u>

Salt marsh biohabitats dominated Area 1 and occurred along the ditches and natural seeps in Area 2. In Area 1, salt marsh biohabitats included *Spartina densiflora* marsh, salt grass (*Distichlis spicata*), pickleweed marsh (*Salicornia virginica*), and a cover type mapped as "brackish marsh" that was characterized by higher species richness than the other salt marsh types. It included higher abundance of *Jaumea carnosa*, seaside arrowgrass (*Triglochin maritima*), and salt sand-spurrey (*Spergularia marina*), as well as pickleweed and salt grass. In Area 2, the salt marsh biohabitat occurred in very narrow bands along some of the ditches throughout the pasture. It also occurred along the eastern edge of Area 2 where a ditch on the east side of Highway 101 likely flows under the highway and provides additional groundwater. The rare Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*) was found throughout Areas 1 and 2 in salt marsh biohabitats.

Brackish Marsh Biohabitats

Brackish marsh biohabitats consisted of slough sedge (*Carex obnupta*) and salt rush (*Juncus lescurii*) patches. They were found in Area 1 and along the Elk River in Area 2.

Pasture Biohabitats

Pasture biohabitats consisted of two cover types: tall fescue and annual grassland. Tall fescue (*Festuca arundinacea*) occurred throughout Area 1 on higher areas adjacent to salt and brackish marsh. Annual grassland occurred on a vegetated sand deposit on the south bank of the Elk River in Area 2 and extended along the road along the northwest boundary of Area 2. It was dominated by annual meadow grass (*Poa annua*), rat's tail fescue (*Vulpia myuros*), soft chess (*Bromus hordeaceous*), mouse barly (*Hordeum murinum*), and redstem stork's-bill (*Erodium cicutarium*).

Brackish Pasture Biohabitats

Brackish pasture biohabitats dominated the ditched portion of Area 2. Because they were actively grazed, a complete description of species occurring in brackish pastures was not possible. However, commonly encountered species included Kentucky bluegrass (*Poa pratensis*), Timothy-grass (*Phleum pretense*), brass buttons (*Cotula coronopifolia*), buttercups (*Ranunculus repens* and *R. muricata*), rushes (*Juncus effusus, J. patens, J. balticus*, and *J. lescurii*), velvet grass (*Holcus lanatus*), and manycolored lupine (*Lupinus variicolor*).

Riparian Scrub Biohabitats

Riparian scrub consisted of two Hooker's willow (*Salix hookeriana*) patches. Both patches had active homeless encampments, and therefore a full survey of these biohabitats was not conducted. However, it is unlikely that any rare plants occurred in either patch due to the level of ground disturbance.

Coastal Scrub Biohabitats

Coastal scrub biohabitats occurred throughout Areas 1 and 2, and consisted largely of blackberry patches, coyote brush (*Baccharis pilularis*), and rose brambles. The blackberry patches contained both the non-native Himalaya berry (*Rubus armeniacus*) and the native California blackberry (*R. ursinus*). Coastal scrub was particularly noticeable on higher surfaces (dikes) in the salt marsh, along pasture fences, and near the upland area by the Pound Road park-and-ride.

Coastal Pine Forest Biohabitat

Coastal pine forest occurred in Area 1 along the Highway 101 southbound onramp. It covered 0.1 acre and consisted of a small group of shore pine (*Pinus contorta* var. *contorta*) trees that were likely planted.

Dune Mat Biohabitat

The dune mat biohabitat occurred along the railroad grade in Area 2 where sand from the dunes on the northwest (bay) side of the railroad grade blew/was washed over to the southeast (landward)side. The sand deposit had yellow sand verbena (*Abronia latifolia*), sun cups (*Chamissonia cheiranthifolia*), and beach buckwheat (*Eriogonum nudum*). It also hosted very small populations of two rare plants, beach layia (*Layia carnosa*) and dark-eyed gilia (*Gilia millefoliata*).

Freshwater Marsh Biohabitats

The freshwater marsh biohabitat occurred in Area 2 and was dominated by spike rush (*Eleocharis macrostachya*).

Human Disturbance Biohabitats

The human disturbance biohabitats occurred at the north end of Area 1 and the south end of Area 2 and were associated with buildings and their access roads, trails, and outbuildings.

Open Biohabitats

Open biohabitats were unvegetated ground throughout the ditched portion of Area 2 associated mostly with seasonal ponding. It is likely that these open areas are filled with water during the wetter months, and that bare soil is left after the water evaporates. There were also some open areas along the northwest border of Area 2 where gravel from the railroad grade had washed into the pastures during winter storms.

Open Water Biohabitats

Open water biohabitats consisted of slough channels through the salt marsh in Area 1and the very northern portion of Area 2, and ditched water in the grazed pastures of Area 2. There were also small, isolated ponds along the southeast edge of Area 2.

Hand-drawn polygons were entered into a GIS in the office. Cover type acreages were calculated based on vegetation mapping. Typically, Cowardin classes are assigned based on the outcome of a wetland delineation, where a formal investigation of hydrology, soil characteristics, and plant species determines precise wetland boundaries. However, the project is located in the Coastal Zone where wetlands are defined by a single parameter. The location (estuary and behind diked shoreline) and characteristics (salt marsh, seasonally flooded pasture) of Areas 1 and 2 makes the majority of the project area a single-parameter wetland. Therefore, formal wetland delineations were not conducted. Cowardin classes were assigned to all polygons of a given cover type where appropriate, based on observed vegetation characteristics. In some instances, different Cowardin classes were assigned to individual polygons of the same cover type based on field observations (Table 2). The best example of this was the “pasture” biohabitat. Some upland pasture in Area 2 occurred on a higher elevation sand deposit, and was composed of annual grassland. Other pasture in Area 1A was tall fescue intermixed in salt rush and salt marsh cover types, and would likely qualify as a wetland. Open waters were assigned Cowardin classes based on vegetation observations. No soil or water salinity tests were conducted.

2.2 Results and Discussion

A total of 121.4 acres were mapped in Areas 1 and 2 (Figure 2, Figure 3, Figure 4). Twenty-three cover types were classified into alliances, Holland types, and WHR classes (Table 1). The total amount of each biological land habitat, or “biohabitat,” was calculated for Area 1 and Area 2 separately (Table 3). Area 1 consisted predominantly of salt marsh, coastal scrub, and pasture, with a lesser amount of brackish marsh (Table 2). Area 2 was predominantly brackish pasture, pasture, and localized areas of salt marsh (Table 3).

Table 1. Crosswalk between cover types mapped in the Elk River Estuary Project area and other vegetation classification systems. “Biohabitat” definitions are specific to this project.

Cover Type	MCV Alliance	Biohabitat	Holland Type	WHR Class
Open	None	Open	N/A	N/A
Juncus	*Juncus articulatus* (var. *balticus, mexicanus*) Herbaceous Alliance	Brackish pasture	Freshwater seep	Fresh emergent wetland
Road	None	Human disturbance	N/A	N/A
Pasture	*Agrostis* (*stolonifera, gigantea*)–*Festuca arundinacea* Semi-natural Stands	Pasture	Coastal terrace prairie	Perennial grassland
Rose	*Rosa californica* Shrubland Alliance	Coastal scrub	Great Valley riparian scrub	Valley foothill riparian

Cover Type	MCV Alliance	Biohabitat	Holland Type	WHR Class
Hemlock	*Conium maculatum–Foeniculum vulgare* Semi-natural Herbaceous Stands	Brackish pasture	Non-native grassland	Pasture
Hooker's willow	*Salix hookeriana* Shrubland Alliance	Riparian scrub	North Coast riparian scrub	Fresh emergent wetland
Annual grassland	Several corresponding types	Pasture	Non-native grassland	Annual grassland
Spike rush	*Eleocharis macrostachya* Herbaceous Alliance	Freshwater marsh	Coastal brackish marsh	Fresh emergent wetland
Brackish marsh[1]	*Salicornia pacifica* (*Salicornia depressa*) Herbaceous Alliance	Salt marsh	Coastal salt marsh	Saline emergent wetland
Salt marsh	*Salicornia pacifica* (*Salicornia depressa*) Herbaceous Alliance	Salt marsh	Coastal salt marsh	Saline emergent wetland
Human disturbance	None	Human disturbance	N/A	Urban
Salt rush	*Juncus lescurii* Herbaceous Alliance	Brackish marsh	Coastal brackish marsh	Coastal scrub
Slough sedge	*Carex obnupta* Herbaceous Alliance	Brackish marsh	Coastal brackish marsh	Saline emergent wetland
Spartina	*Spartina* (*alternifolia, densiflora*) Semi-natural Herbaceous Stands	Salt marsh	Northern coastal salt marsh	Saline emergent wetland
Coyote brush	*Baccharis pilularis* Shrubland Alliance	Coastal scrub	Northern (Franciscan) coastal bluff scrub	Coastal scrub
Tall fescue	*Agrostis* (*stolonifera, gigantea*)–*Festuca arundinacea* Semi-natural Stands	Pasture	Coastal terrace prairie	Perennial grassland
Open water	None	Open water	N/A	N/A
Salt grass	*Distichlis spicata* Herbaceous Alliance	Salt marsh	Northern coastal salt marsh	Saline emergent wetland
Brackish pasture	*Poa pratensis* Semi-natural Herbaceous Stands	Brackish pasture	Meadows and seeps	Perennial grassland
Blackberry	*Rubus armeniacus* Semi-natural Shrubland Alliance and *Rubus ursinus* Shrubland Alliance	Coastal scrub	Northern (Franciscan) coastal bluff scrub	Coastal scrub
Shore pine	*Pinus contorta* ssp. *contorta* Forest Alliance	Coastal pine forest	Beach pine forest	Closed-cone pine–cypress
Dune mat	*Abronia latifolia–Ambrosia chamissonis* Herbaceous Alliance	Dune mat	Active coastal dunes	Coastal scrub

[1] *Jaumea carnosa* and *Spergularia marina* had higher abundance in the mapped "brackish marsh" cover type than in the mapped "salt marsh" cover type; however, brackish marsh closely corresponded to salt marsh biohabitats, and thus was grouped into the salt marsh biohabitat class.

Table 2. Biohabitats and their corresponding Cowardin classes and broad cover categories described in the Elk River Estuary Project, Areas 1 and 2. Cowardin classes are defined in Table 4.

Biohabitat	Cowardin Class (Cowardin et al. 1979)	Broad Cover Categories	Total Area
Brackish pasture	PEM1C	Wetland	10.13
	PEM1Cd	Wetland	53.81
Brackish marsh	E2EM1N	Wetland	4.17
Coastal pine forest	Upland†	Upland	0.11
Coastal scrub	Upland†	Upland	5.45
Dune mat	Upland†	Upland	0.69
Freshwater marsh	E2EM1N	Wetland	0.68
Human disturbance	Human disturbance†	Upland	2.30
Open	PEM1C	Wetland	0.42
	PEM1Cd	Wetland	2.06
	Non-vegetated†	Upland	2.20
Open water	E1SB5	Open water	0.04
	E2SB5	Open water	1.22
	PUB3F	Open water	0.08
	PUB3F3	Open water	0.01
	PEM1Cd	Open water	1.32
Pasture	PEM1C	Wetland	0.69
	PEM1E	Wetland	3.74
	Upland†	Upland	10.14
Riparian scrub	PSS1C	Riparian scrub	1.17
Salt marsh	E2EM1N	Wetland	21.05
Grand Total			**121.41**

† Not a recognized Cowardin class. Applied to a non-wetland cover type.

When the Cowardin wetland classification was applied to the vegetation map, the majority of vegetation types within Areas 1 and 2 were wetlands (Figure 2 ,Table 4). Persistent estuarine emergent wetlands (i.e., salt marsh) dominated Area 1 and occurred along the ditches in Area 2 (Figure 3). Area 2 was dominated by seasonally flooded palustrine permanent emergent wetlands, with approximately 83% of those wetlands being ditched (Figure 3). Several non-standard cover types were used on the Cowardin maps: human disturbance, upland, and non-vegetated.

When biohabitats were simplified into broad categories for permitting requirements, there were 92.3 acres of wetlands, 25.3 acres of upland, 1.2 acres of riparian scrub, and 2.6 acres of open water (Table 5, Figure 4).

Table 3. Biohabitats and areas mapped in the Elk River Estuary Project, Areas 1 and 2.

Biohabitat	Area 1A	Area 1B	Area 1 Total	Area 2A	Area 2B	Area 2 Total	Total Area
Brackish marsh	1.3	0.2	1.5	2.7	0.0	2.7	4.2
Brackish pasture	0.0	0.0	0.0	21.0	42.9	63.9	63.9
Coastal pine forest	0.1	0.0	0.1	0.0	0.0	0.0	0.1
Coastal scrub	3.7	0.2	3.9	0.9	0.6	1.5	5.5
Dune mat	0.0	0.0	0.0	0.5	0.2	0.7	0.7
Freshwater marsh	0.0	0.0	0.0	0.0	0.7	0.7	0.7
Human disturbance	0.1	1.0	1.1	0.4	0.8	1.2	2.3
Open	0.0	0.0	0.0	0.0	4.6	4.7	4.7
Open water	0.9	0.0	0.9	0.5	1.2	1.7	2.6
Pasture	2.2	0.6	2.8	11.0	0.7	11.7	14.6
Riparian scrub	0.2	0.7	0.9	0.3	0.0	0.3	1.2
Salt marsh	17.1	0.2	17.3	2.3	1.4	3.7	21.0
Grand Total	**25.6**	**3.0**	**28.6**	**39.8**	**53.0**	**92.8**	**121.4**

Table 4. Area of wetlands described using the Cowardin classification in the Elk River Estuary Project, Areas 1 and 2.

Cowardin Class	Description	Area 1A	Area 1B	Area 1 Total	Area 2A	Area 2B	Area 2 Total	Total Acres
E1SB5	Estuarine subtidal mud streambed	0.0	0.0	0.0	0.04	0.0	0.0	0.04
E2SB5	Estuarine intertidal mud streambed	0.9	0.0	0.9	0.3	0.0	0.3	1.2
E2EM1N	Estuarine persistent emergent wetlands (tidally flooded regularly)	18.4	0.4	18.8	5.0	2.1	7.1	25.9
Human disturbance†	Areas disturbed by human use (roads, railroad grade, building sites)	0.1	1.0	1.1	0.4	0.8	0.0	2.3
Non-vegetated†	Gravel wash from railroad grade resulting from winter storms	0.0	0.0	0.0	0.0	2.2	0.0	2.2
PEM1C	Seasonally flooded palustrine permanent emergent wetlands	0.0	0.0	0.0	2.0	11.5	13.5	13.5
PEM1Cd	Seasonally flooded palustrine permanent ditched emergent wetlands	0.0	0.0	0.0	19.3	35.6	54.9	54.9
PEM1E	Seasonally flooded/saturated palustrine permanent emergent wetlands	2.2	0.6	2.8	0.9	0.0	0.9	3.7

Cowardin Class	Description	Area 1A	Area 1B	Area 1 Total	Area 2A	Area 2B	Area 2 Total	Total Acres
PSS1C	Seasonally flooded palustrine broad-leaved deciduous scrub-shrub wetlands	0.2	0.7	0.9	0.3	0.0	0.3	1.2
PUB3F	Semi-permanently flooded palustrine unconsolidated bottom mud (pond)	0.0	0.0	0.0	0.0	0.1	0.1	0.1
PUB3F3	Semi-permanently flooded palustrine brackish unconsolidated bottom mud (pond)	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Upland†	Non-wetland vegetation types	3.8	0.2	4.0	11.6	0.8	12.4	16.4
Grand Total		**25.6**	**3.0**	**28.6**	**39.8**	**53.0**	**92.8**	**121.4**

† Not a recognized Cowardin class. Applied to a non-wetland cover type.

Table 5. Broad cover categories based on vegetation cover types used for permitting requirements in the Elk River Estuary Project, Areas 1 and 2. Categories were defined by approximate elevation above sea level: wetlands occurred below 8 ft, riparian occurred between 8 and 10 ft, and upland was above 10 ft. Wetland delineations were not conducted as part of this investigation.

Broad Cover Category	Area 1A	Area 1B	Area 1 Total	Area 2A	Area 2B	Area 2 Total	Total Acres
Open Water	0.9	0.0	0.9	0.5	1.2	1.7	2.6
Wetlands	18.4	0.4	18.8	26.1	47.4	73.5	92.3
Riparian Scrub	0.2	0.7	0.9	0.3	0.0	0.3	1.2
Upland	6.1	1.9	8.0	12.9	4.4	17.3	25.3
Total	**25.6**	**3.0**	**28.6**	**39.8**	**53.0**	**92.8**	**121.4**

3 SPECIES OF CONCERN SURVEYS

In addition to vegetation mapping, a floristic survey was conducted to determine whether rare, threatened, or endangered plants or special habitats occur within Areas 1 and 2 of the Elk River Estuary Enhancement project.

3.1 Methods

Prior to conducting the survey, a list of target species was compiled by querying the California Native Plant Society (CNPS) Online Database, the California Natural Diversity Database (CNDDB), and the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) website for rare, threatened, and endangered species known to occur within the project area (Appendix A). The CNPS and CNDDB searches involved a "nine-quad" search centered around the USGS 7.5' quadrangle in which the project is located. In this case, the Elk River Estuary Project spans two quadrangles (Fields Landing and Eureka) and therefore two nine-quad searches were conducted and the results compiled into a single list of "target" species. A total of 53 target rare plant species and 4 special habitats have been documented within the nine-quad query area.

The floristic survey was conducted during the blooming period for many of the target species and a complete list of all species encountered in the project area was compiled (Appendix B). The survey was intuitively controlled such that the botanist focused on microsites within the habitats where target species were most likely to occur. Target species known to grow in salt marshes, freshwater marshes, coastal scrub, coastal bluff scrub, and (to a lesser extent) coastal dunes were the focus of the surveys. Species of forests and woodlands were not expected to occur within the project site. Unknown plants were identified to the taxonomic level required to determine rarity. Taxonomy follows the Jepson Manual, 2nd Edition (Baldwin et al. 2012).

3.2 Results and Discussion

Several rare plant species were encountered within the Project Area. Because the survey was conducted to support permitting, a full census of each rare plant population was not undertaken. Instead, each location was documented and an approximate population size or area covered was recorded. Additionally, rare plant surveys occurred in May, although other target species bloom later. Therefore, the rare plant surveys described in this report were not seasonally appropriate for all possible target species. Once the final project footprint is developed, intensive rare plant surveys should be conducted for all rare plants likely to occur within the project footprint.

Humboldt Bay owl's clover (*Castilleja affinis* ssp. *humboldtiensis*) occurred in several locations in the Project Area (Figure 5, Figure 6). The largest occurrence was on the south bank of the Elk River in Area 2, where it grew in an approximately continuous band (Figure 6). Other much smaller occurrences were found in salt marsh areas; none of the occurrences were larger than approximately 200 individuals, with the exception of the south bank occurrence.

Lyngbye's sedge (*Carex lyngbyei*) was found in two locations in the Project Area (Figure 5, Figure 6). The location in Area 1 consisted of a small clump approximately 15 ft × 20 ft. The location in Area 2 consisted of single stems growing along the south bank of the Elk River among salt rush, sweet vernal grass (*Anthoxanthum odoratum*), tall fescue, and other graminoids. Because it was so cryptic (i.e., difficult to find among the other marsh species), Lyngbye's sedge is likely more abundant in the project area. Intensive surveys within the final project footprint should focus on finding individual stems of this species as well as the rhizomatous, clumping form.

Two rare dune mat species were found on the railroad grade adjacent to Area 2 (Figure 7). Beach layia and dark-eyed gilia occurred in a small sand deposit that had blown over the railroad tracks from the northwest. The small occurrences (i.e., < 20 individuals) of beach layia, a state and federally endangered plant, and dark-eyed gilia were likely part of larger populations that grows on the adjacent sand dunes of Elk River Spit.

Sea-watch (*Angelica lucida*) was found scattered throughout Areas 1 and 2. The plants within Areas 1 and 2 of the Elk River Estuary Project may belong to the same population of plants that have been documented at the Humboldt Bay Power Plant (Stillwater Sciences 2016), although pollinator studies were not undertaken.

The surveys occurred in May and therefore did not capture the flowering period for later-blooming species. Other species that may occur in the project area include Oregon coast paintbrush (*Castilleja litoralis*), Point Reyes bird's-beak (*Chloropyron maritimum* ssp. *palustre*), Whitney's farewell-to-spring (*Clarkia amoena* ssp. *whitneyi*), dwarf alkali grass (*Puccinellia pumila*), western sand-spurrey (*Spergularia canadensis*), and perhaps western lily (*Lilium occidentale*), although habitat in the project area for this state and federally endangered species is marginal. Point Reyes bird's-beak is especially likely to occur in the project area due to its nearby occurrences both north of the project area in the Elk River Wildlife Area (Calflora 2016) and south of the project surrounding the Humboldt Bay Power Plant (Stillwater Sciences 2016).

Additional surveys conducted in June and July should capture the remaining species' blooming periods. Additional surveys should be conducted once the final project footprint has been developed so that the area can be intensively surveyed for rare species, many of which can be cryptic and difficult to find.

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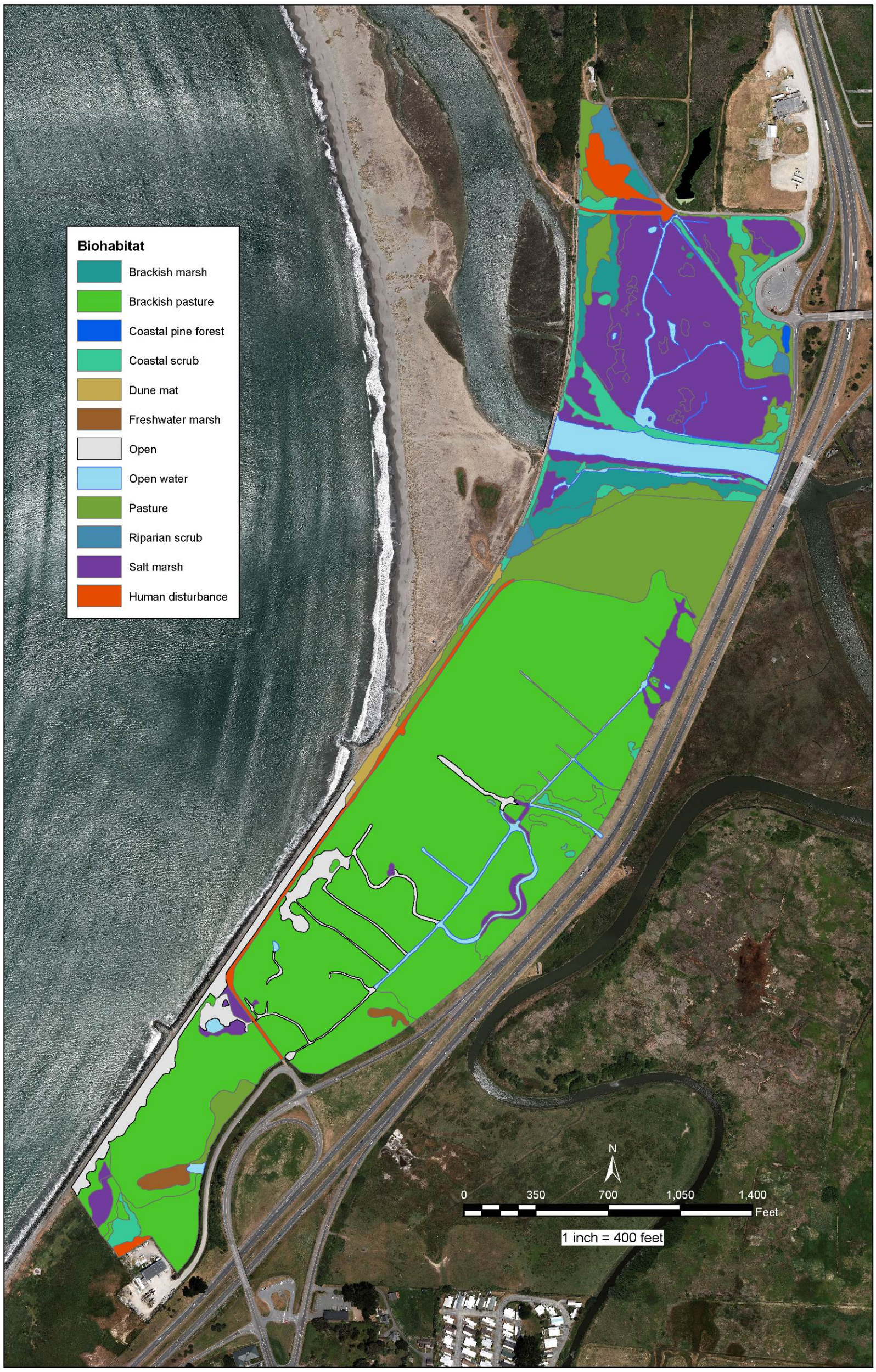

Figure 2. Biological land habitats, or "biohabitats," mapped in Areas 1 and 2 of the Elk River Estuary Project.

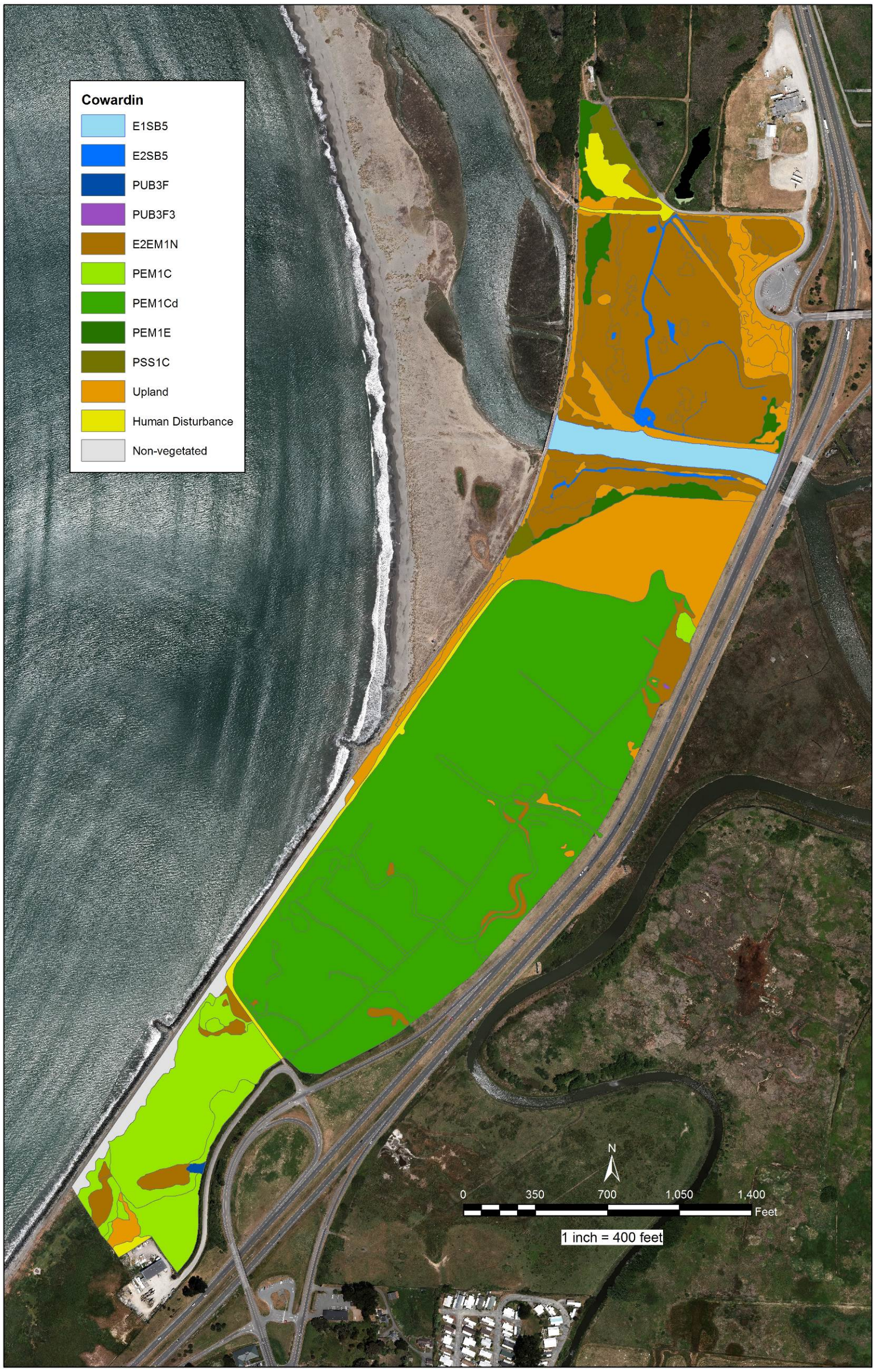

Figure 3. Cowardin classes mapped in Areas 1 and 2 of the Elk River Estuary Project.

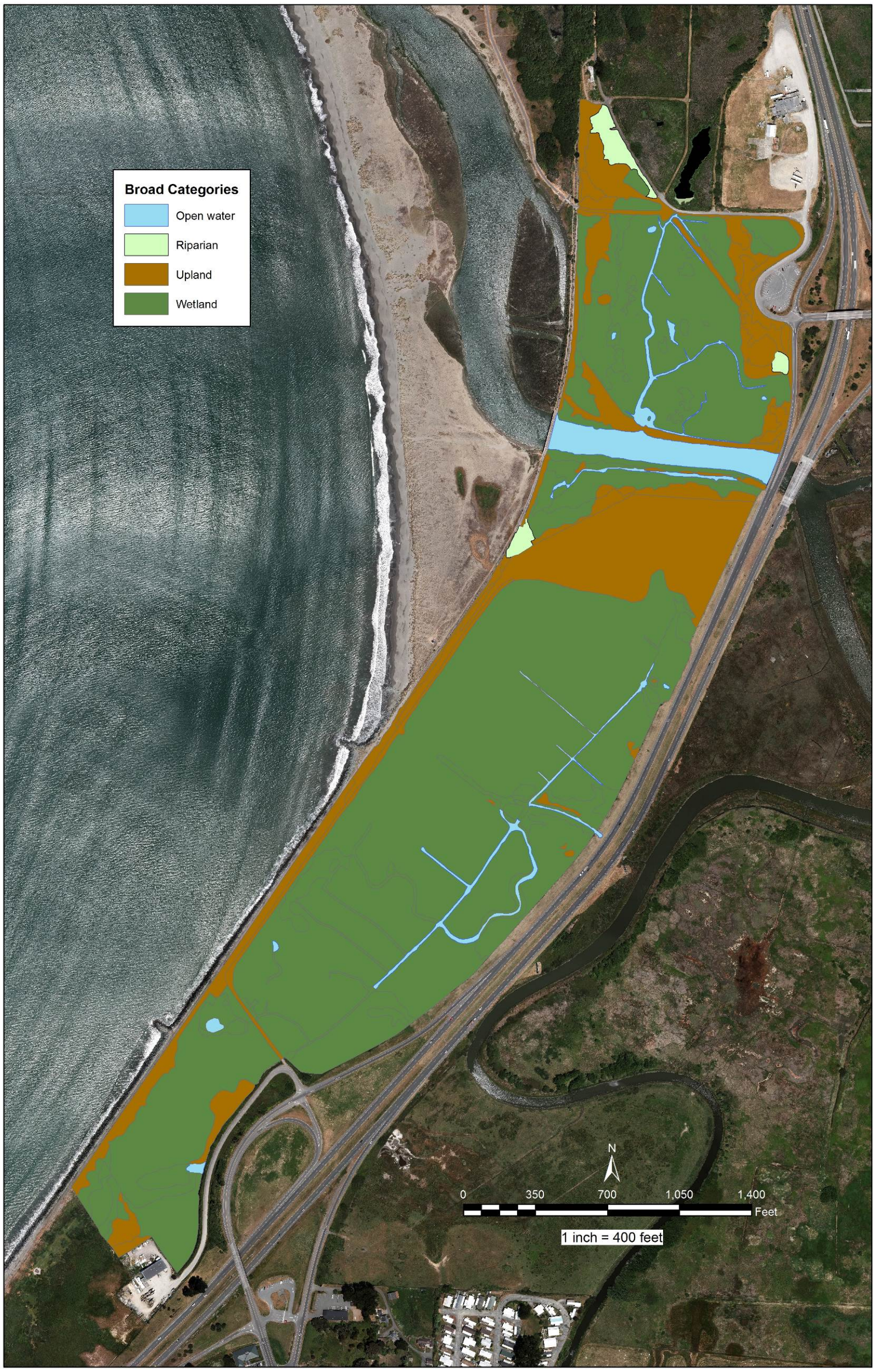

Figure 4. Broad cover categories based on vegetation cover types used for permitting requirements in the Elk River Estuary Project, Areas 1 and 2. The broad categories were defined by approximate elevation above sea level: wetlands occurred below 8 ft, riparian occurred between 8 and 10 ft, and upland was above 10 ft. Wetland delineations were not conducted.

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*Figure 5. Locations of Humboldt Bay owl's-clover (*Castilleja affinis *ssp.* humboldtiensis*) and Lyngbye's sedge (*Carex lyngbyei*) in Area 1 of the Elk River Estuary Enhancement project.*

*Figure 6. Locations of Humboldt Bay owl's-clover (*Castilleja affinis *ssp.* humboldtiensis*) and Lyngbye's sedge (*Carex lyngbyei*) in Area 2 of the Elk River Estuary Enhancement Project.*

*Figure 7. Location of beach layia (*Layia carnosa*) and dark-eyed gilia (*Gilia millefoliata*) in Area 2 of the Elk River Estuary Enhancement Project.*

Appendix D

Elevation Summary for Vegetation

McBain Associates
APPLIED RIVER SCIENCES
980 7th Street, Arcata, CA 95521 · PO Box 663, Arcata, CA 95518 · ph (707) 826-7794 · fax (707)826-7795

September 12, 2016

ELEVATION SUMMARY FOR VEGETATION IN THE ELK RIVER ESTUARY ENHANCEMENT PROJECT AREAS 1 AND 2

Prepared for: *Aldaron Laird*
Trinity Associates
980 7th Street
Arcata, CA 95521

Prepared by: *Sunny Loya*
McBain Associates
980 7th Street
Arcata, CA 95521

1 ELEVATION SUMMARY

On September 7, 2016, Sunny Loya (McBain Associates) and Keith Barnard (Greenway Partners) surveyed elevations of salt marsh and surrounding vegetation within the Elk River Estuary Enhancement Project. Surveys focused on Area 1 and the southwestern edge of Area 2. Individual plant rooting elevations were surveyed using a Total Station. Plant locations and elevations were exported into Excel, and plant species were grouped into their corresponding cover types (as defined during the vegetation mapping). Upper and lower elevation limits were summarized (Table 1). Cover types with a single elevation were surveyed at one point only and therefore may exist at a larger range in the field. Riparian scrub (*Salix hookeriana*) rooting elevation was approximated due to an active homeless encampment located within the willows.

Some observations made during the elevation surveys include:

- Coyote brush (*Baccharis pilularis*) was observed growing within the salt marsh as well as along the dikes. The coastal scrub patches were classified as uplands during the vegetation mapping based on previously established elevation breaks, but these patches may be tidally influenced near their roots.
- The dikes were covered with wetland and upland species.
- *Spartina densiflora* was the lowest and the highest plant surveyed in the salt marsh.
- Elevation does not appear to be a solely reliable way to define wetlands at this site: salt marsh was surveyed at almost 9.0 ft, coastal scrub was surveyed as low as 7.377 ft.
- Point Reyes bird's-beak (*Cordylanthus maritimus*) was observed in the salt marsh on the left bank of Elk River in Area 2, growing in the same area where Humboldt Bay owl's clover was observed. The extent of Point Reyes bird's-beak was likely more extensive than was observed on September 7. The owl's clover was no longer detectable.

Table 1. Upper and lower elevations of cover types surveyed at the Elk River Estuary Enhancement Project Area 1 and 2.

Cover Type	**Lower Elevation (ft)**	**Upper Elevation (ft)**	**Notes**
Brackish marsh	6.539	11.531	Includes salt rush and slough sedge cover types
Brackish pasture	9.648		*Juncus effusus*, single plant measured along dike
Coastal scrub	7.377	10.055	Coyote brush and California blackberry cover types
Open (mud)	4.782	6.332	
Pasture	7.17	9.015	Tall fescue cover type
Riparian scrub	9.505		Elevation approximate due to active homeless encampment within the willows
Salt marsh	5.225	8.991	*Spartina densiflora* was the lowest and the highest plant surveyed in the salt marsh

Appendix E

Soil and Geotechnical Survey Results

TECHNICAL MEMORANDUM

Elk River Slough Initial Soils Characterization

Proposed Slough Enhancement Site

City of Eureka
Portions of APNs 302-181-040 and 305-181-005

Date: July 11, 2016

Project No.: 104.15

Prepared By: Nathan Sanger PE, Project Engineer

INTRODUCTION

This technical memorandum presents the results of an initial soils characterization performed by Greenway Partners (Greenway) in support of the City of Eureka's proposed Elk River Slough Enhancements Project at the subject site. The subject property is located along the southern border of Eureka, California, and is located within Assessor's Parcel Numbers (APN) 302-181-040 and 305-181-005.

The site, commonly referred to as Parcel M, used to be the biosolids application area for the City of Eureka's waste water treatment facility from the late 1980s until 2009. The objective of the site investigation was to determine if subsurface soils at the Parcel M site contain elevated levels of heavy metals and/or nutrients which could have the potential to be mobilized by the proposed Elk River Slough Enhancement Project.

SITE SETTING

Currently, salt marsh habitat and relic sand dunes comprise the northern portion of the site and the southern portion consists of undeveloped open coastal pasture area that is used for raising cattle.

The site is located directly south of Elk River and is bounded on the east by Highway 101 and on the west by the Northwestern Railroad tracks (Figure 1). Although most of the site is flat, it rises to an elevation of approximately 16 feet above mean sea level at the southern portion of the site. The majority of the site is between an elevation 2 to 4 feet above mean sea level.

The predominant soil series for the site is known as a Bayside silty clay loam (McLaughlin and Harradine, 1965). The Bayside series are imperfectly to poorly drained, fine textured basin soils, developed in sedimentary alluvium from the Franciscan and Wildcat formations in the North Coast Range Mountains. They occur in a basin position with small streams and in a broader area of reclaimed tidal marsh flats near Humboldt Bay.

FIELD PROGRAM

On June 7 and 8, 2016, Greenway personnel hand-augered six soil borings (B-1 through B-6) at the site (Figure 1). Borings were installed to between 4 to 10 feet below ground surface (BGS) throughout the site using a 3 ¼-inch diameter hand auger.

Soil borings B-1 and B-2 were installed in the salt marsh area across the Elk River to north of the Parcel M site (Figure 1). These boring locations were sampled to represent naturally occurring background conditions for the area since they are proximal to the site but were not subject to historical biosolids application. Soil borings B-3 through B-6 were installed throughout Parcel M in locations where new tidal channels are being proposed for the site.

Soil samples were collected from each soil boring at four depth discrete sample intervals: 6"-12", 18"-24", 3'-3.5', and 6'-6.5'. Soils samples were not collected at the 6-6.5' sample depth at B-2 and B-4 due to low sample recovery. Soil at each sample location was inspected for lithologic interpretation and described in general accordance with the Unified Soil Classification System under the direction of a California-licensed professional engineer. Field notes and boring logs for each sample location are included in Appendix A.

Upon completion of soil sample collection, the soil borings were backfilled with soil cuttings and surrounding native soils to match existing grade.

Soil samples were placed in an iced cooler, shipped to the analytical laboratory under chain-of-custody documentation, and analyzed for the following constituents:

- CAM 17 metals in general accordance with U.S. Environmental Protection Agency (EPA) Method No. 6010B.
- Nitrate as nitrogen in general accordance with North American Proficiency Testing (NAPT) Method No. S – 3.10.
- Extractable Potassium in general accordance with NAPT Method No. S – 5.10.
- Extractable Phosphorous in general accordance with NAPT Method No. S – 4.20.
- Cation exchange capacity in general accordance with NAPT Method No. S – 10.10.
- pH in general accordance with NAPT Method No. S – 1.10.

North Coast Laboratories, a state-certified analytical laboratory located in Arcata, California, conducted CAM 17 metals analysis. A&L Western Laboratories, Inc., a state-certified analytical laboratory located in Modesto, California, conducted all general chemistry and nutrient analysis.

SOIL ANALYTICAL RESULTS

Analytical results from the soil samples are presented in Tables 1 and 2. The complete analytical test results, chain-of-custody, and laboratory quality control data are included in Appendix B.

Table 1
Soil Sampling Analytical Results – CAM 17 Metals[1]
Elk River Slough, Eureka, California (in mg/kg)

Sample Location & Depth (ft BGS[2])	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Tl	V	Zn	Hg
TTLC[3]	**500**	**500**	**10000**	**75**	**100**	**500**	**8000**	**2500**	**1000**	**3500**	**2000**	**100**	**500**	**700**	**2400**	**5000**	**20**
STLC Trigger[4]	**150**	**50**	**1000**	**7.5**	**10**	**50**	**800**	**250**	**50**	**3500**	**200**	**10**	**50**	**70**	**240**	**2500**	**2**
B1@6-12"	<5.0[6]	2.2	24	<0.50	<1.0	37	4.6	5.6	5.8	<1.0	29	<2.0	<1.0	<2.0	22	28	<0.10
B1@18-24"	<5.0	2.9	53	<0.50	<1.0	**58**	5.8	19	9.0	2.2	42	<2.0	<1.0	<2.0	37	39	<0.10
B1@3-3.5'	<5.0	3.2	54	<0.50	<1.0	**58**	5.5	15	10	1.9	42	<2.0	<1.0	<2.0	36	38	<0.10
B1@6-6.5'	<5.0	<2.0	60	<0.50	<1.0	**57**	7.3	18	9.4	1.6	54	<2.0	<1.0	<2.0	37	44	<0.10
B2@6-12"	<5.0	<2.0	32	<0.50	<1.0	45	6.7	7.7	7.0	<1.0	38	<2.0	<1.0	<2.0	26	31	<0.10
B2@18-24"	<5.0	<2.0	26	<0.50	<1.0	45	6.3	6.4	5.4	<1.0	37	<2.0	<1.0	<2.0	23	27	<0.10
B2@3-3.5'	<5.0	<2.0	26	<0.50	<1.0	36	5.7	4.9	4.8	<1.0	36	<2.0	<1.0	<2.0	20	23	<0.10
B3@6-12"	<5.0	2.5	86	0.55	<1.0	**67**	10	26	20	1.5	74	<2.0	<1.0	<2.0	36	60	<0.10
B3@18-24"	<5.0	2.1	57	<0.50	<1.0	**66**	7.0	23	12	3.8	47	<2.0	<1.0	<2.0	41	43	<0.10
B3@3-3.5'	<5.0	2.4	40	<0.50	<1.0	**51**	5.5	19	9.4	4.2	44	<2.0	<1.0	<2.0	38	38	<0.10
B3@6-6.5'	<5.0	2.2	58	<0.50	<1.0	**59**	8.3	23	10	1.1	58	2.5	<1.0	<2.0	36	48	<0.10
B4@6-12"	<5.0	<2.0	48	0.52	<1.0	**55**	6.3	27	14	2.2	55	2.5	<1.0	<2.0	39	53	<0.10
B4@18-24"	<5.0	6.3	64	<0.50	<1.0	**68**	7.3	22	13	3.4	51	<2.0	<1.0	<2.0	41	51	<0.10
B4@3-3.5'	<5.0	4.4	65	<0.50	<1.0	**64**	6.0	22	11	1.7	47	2.4	<1.0	<2.0	40	42	<0.10
B5@6-12"	<5.0	7.4	46	<0.50	<1.0	49	5.4	15	11	2.3	33	<2.0	<1.0	<2.0	38	35	<0.10
B5@18-24"	<5.0	<2.0	30	<0.50	<1.0	39	3.6	11	5.7	1.3	22	<2.0	<1.0	<2.0	23	23	<0.10
B5@3-3.5'	<5.0	2.5	30	<0.50	<1.0	41	7.9	12	7.3	1.8	44	2.3	<1.0	<2.0	25	34	<0.10
B5@6-6.5'	<5.0	<2.0	30	<0.50	<1.0	36	6.6	10	6.1	<1.0	34	<2.0	<1.0	<2.0	23	30	<0.10
B6@6-12"	<5.0	3.5	54	<0.50	<1.0	**68**	7.6	29	13	4.7	49	<2.0	<1.0	<2.0	49	60	<0.10
B6@18-24"	<5.0	5.7	41	<0.50	<1.0	**63**	6.5	23	11	4.3	41	<2.0	<1.0	<2.0	48	42	<0.10
B6@3-3.5'	<5.0	3.7	42	<0.50	<1.0	**55**	5.5	21	9.3	2.3	39	<2.0	<1.0	<2.0	40	38	<0.10
B6@6-6.5'	<5.0	2.3	53	<0.50	<1.0	**54**	6.6	22	9.2	1.4	46	<2.0	<1.0	<2.0	35	42	<0.10

1. CAM 17 Metals: heavy metals analyzed in general accordance with US EPA Method No. 6010B.
2. BGS: below ground surface.
3. TTLC: total threshold limit concentration (Title 22 of the California Code of Regulations). Soils with concentrations of metals exceeding the TTLC value are considered hazardous waste.
4. STLC trigger: soluble threshold limit concentration (STLC) trigger, which is equal to 10 times the STLC limit (Title 22 of the California Code of Regulations). If you have a soil sample analyzed for metals using a TTLC methodology (such as EPA Method No. 6010B) you must do a STLC test for those metals that are 10 times or greater than the STLC limit to see if they are hazardous waste.

Table 2 Soil Sampling Analytical Results – General Chemistry and Nutrient Analysis Elk River Slough, Eureka, California					
Sample Location & Depth (feet BGS[1])	Nitrate as Nitrogen (mg/kg[2])	Extractable Phosphorous (mg/kg)	Extractable Potassium (mg/kg)	Cation Exchange Capacity (meq/100g[3])	pH
B1@6-12"	3	32	389	17.5	7.3
B1@18-24"	3	13	325	14.6	6.5
B1@3-3.5'	2	9	376	21.6	6.2
B1@6-6.5'	3	10	417	26.0	6.2
B2@6-12"	2	15	406	23.1	6.7
B2@18-24"	3	11	266	12.8	7.5
B2@3-3.5'	2	8	226	14.1	7.3
B3@6-12"	2	24	451	19.4	8.4
B3@18-24"	10	3	312	22.3	6.5
B3@3-3.5'	6	5	308	25.7	5.7
B3@6-6.5'	10	41	184	15.3	6.6
B4@6-12"	4	34	365	16.8	6.0
B4@18-24"	3	8	320	43.6	4.6
B4@3-3.5'	2	6	253	54.2	4.6
B5@6-12"	4	3	210	15.0	4.6
B5@18-24"	5	3	115	10.6	5.2
B5@3-3.5'	3	12	129	13.6	4.8
B5@6-6.5'	3	7	145	6.4	7.1
B6@6-12"	5	8	224	24.8	6.1
B6@18-24"	4	51	270	33.5	5.1
B6@3-3.5'	3	10	296	51.3	4.5
B6@6-6.5'	3	51	324	34.1	5.1

1. BGS: below ground surface.
2. mg/kg: milligrams per kilogram.
3. meq/100g: milliequivalent of hydrogen per 100 grams of dry soil.

DISCUSSION

Laboratory analytical results demonstrate that metals concentrations throughout the site (from borings B-3 through B-6) are similar in magnitude to background concentrations nearby (at borings B-1 and B-2).

Title 22 of the California Code of Regulations sets the limits which designate whether or not a soil is designated as a hazardous waste. Title 22 of the California Code of Regulations states that soils with concentrations of metals exceeding their Total Threshold Limit Concentration (TTLC) value are considered hazardous waste.

A soil sample which has a metals concentration below its TTLC must be further compared to its associated Soluble Threshold Limit Concentration (STLC) limit to determine if it is a hazardous waste. If it is less than ten times its associated STLC limit, then it is not a hazardous waste. If it is ten times or greater than its STLC limit it must be further characterized by a STLC test. The STLC test determines

whether certain leachable compounds are present in large enough amounts in the sample that it need be dealt with as a hazardous waste.

With the exception of chromium, all metals concentrations at the Parcel M site were below the TTLC and STLC trigger limits, which means that the soils should not be considered a hazardous waste. Chromium levels at several locations were slightly above the STLC trigger value of 50 milligrams per kilogram (mg/kg). Chromium levels at several of the background sampling locations, however, were also above 50 mg/kg. Furthermore, naturally occurring chromium levels in soil in Humboldt County have also been documented to be above the 50 mg/kg trigger (Bradford et al, 1996).

Laboratory analytical results demonstrate that nutrient and general chemistry analytical concentrations throughout the site (from borings B-3 through B-6) are similar in magnitude to background concentrations nearby (at borings B-1 and B-2).

The normal background level of nitrates in soil not fertilized or used for commercial crops ranges from 5 to 10 parts per 1 million (ppm), and all soil sampling locations fall within that range (Leigh, 2008).

With the exception of the 18-24" sample interval at B-6 and the 6-6.5' sample intervals at B-3 and B-6, all sample locations fall within or below the "medium" range (20-40 ppm) of extractable phosphorous concentrations (Ogg, 2015). The 18-24" sample interval at B-6 and the 6-6.5' sample interval at B-3 and B-6 fall within "high" range (40-100 ppm) of extractable phosphorous concentrations (Ogg, 2015). Phosphorous levels below 150 ppm in soils will not mobilize and contribute to excess nutrient loading (Ogg, 2015).

Analytical results for potassium demonstrate the majority of subsurface soils -including the background locations- contain "high" (250-800 ppm) levels of extractable potassium (Horneck, et al, 2011). Biosolids contain only small amounts of potassium, and the contribution of historical biosolids application at the site to nutrient loading is considered insignificant (Horneck, et al, 2011).

Cation exchange capacity (CEC) is used as a measure of soil fertility, nutrient retention capacity, and the capacity to protect groundwater from cation contamination (Horneck, et al, 2011). In general, the higher the CEC, the higher the fertility of the soil. Most soils will have a CEC from 2-35 milliequivalents per 100 grams (meq/100g), depending on the soil type. Soils with higher CEC levels will generally have higher levels of clay and organic matter. Soil analytical results demonstrate most sample locations at concentrations between 2-35 meq/100g. Boring logs demonstrate that soil samples with elevated CEC concentrations at B-4 and B-6 are at locations with higher clay content relative to the rest of the sample locations.

pH analytical results demonstrate a wide range of pH values at the site, which range from 4.6-8.4. The pH level of existing site soils was not likely to have been altered significantly by the historical application of biosolids, which were documented to have a pH level of 6.6 (Veach, 2010).

CONCLUSION

Laboratory analytical results demonstrate that the historical application of biosolids at Parcel M does not appear to have negatively impacted the subsurface soils at the site. Metals concentrations in the subsurface are below the criteria for hazardous classification, and nutrient and general chemistry parameters are within the normal range for soil. This data supports the conclusion that subsurface soils

at the site are not hazardous, and if exposed or otherwise manipulated during the proposed Elk River Slough Enhancement Project they will not degrade waters of the state.

REFERENCES

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Ogg, B. (December 1, 2015). *Using Biosolids as a Source of Phosphorous*, University of Nebraska Lincoln Extension.

Veach, M. (January 28, 2010). *Report of Waste Discharge for Land Application of Biosolids for City of Eureka Parcel M,*

FIGURES

Figure 1. Location Map

APPENDIX

Appendix A: PACP Sewer Reports and CCTV Videos

Appendix B: City of Eureka Standard Drawings

Appendix C: Contact information for property owners in the Project area

REV#	REVISION NOTE	DATE
1	.	.

LICENSE STAMP

greenway
Solving community challenges

GREENWAY PARTNERS
1385 8TH STREET, SUITE 201 ARCATA, CA 95521
(707) 822-0597

SOIL SAMPLE LOCATIONS

ELK RIVER SLOU□H
EUREKA, CA
CITY OF EUREKA

DATE: 7/1/16	
Drawn By: KB	Checked By: SS
Last Revised:	Scale:

DRAWING NUMBER

FIG□1

Appendix A:

Field Notes and Boring Logs

greenway

DAILY FIELD REPORT

PROJECT NAME: Elk River Slough **DATE:** 6/7/2016

LOCATION: Elk River slough **WEATHER:** overcast

FIELD PERSONNEL: N Sanger, R. Brashear, S. Salzman, B. Marshall

ACTIVITIES/OBSERVATIONS:

9:30 Onsite. Conduct site safety meeting. Discuss sampling plan for the day and assess site conditions.

10:00 Begin hand augering at B-6 location. All soil cuttings discarded to ground surface. Hand auger with a 3 1/4" auger head. Collect soil samples at 6-12", 18-24", 3-3.5', and 6-6.5' BGS. Backfill borehole with native soil.

11:15 Begin hand augering at B-4 location in same manner as B-6. Unable to recover 6' sample due to apparent vapor lock of clayey sample.

12:30 Begin hand augering at B-3 location in same manner as B-6.

14:20 Hand auger B-5 in same manner as B-6.

15:00 Field sampling complete, begin site clean up

15:30 Close & lock entry gate, offsite.

7/5

greenway

DAILY FIELD REPORT

PROJECT NAME: Elk River Slough **DATE:** 6/8/2016

LOCATION: Elk River Slough **WEATHER:** Sunny

FIELD PERSONNEL: N. Sanger, R. Brashear

ACTIVITIES/OBSERVATIONS:

9:00 Onsite, conduct site safety meeting. Discuss sampling plan for the day.

9:15 Haul gear to first sample location.

10:00 Begin hand augering at B-1 sample location. All soil cuttings discarded to ground surface. Hand augering with a 3 1/4" auger head. Collect soil samples at 6-12", 18-24", 3-3.5', and 6-6.5' BGS. Backfill borehole with native soil.

11:20 Hand auger B-2 in same manner as B-1. Hole caved at ~4' BGS; no sample was collected at the 6' sample location.

12:00 Sampling complete, begin site clean up.

12:35 All gear loaded up, offsite.

greenway

FIELD BORING LOG

LOGGED BY:	Nathan Sanger	DATE:	6/8/2016
PROJECT NAME:	Elk River Slough	LOCATION:	Elk River Slough
PROJECT #:	140.15	GROUND ELEV.:	~6 ft
DRILLER:	Greenway	BORING DEPTH:	~6.5 ft
DRILL METHOD:	Hand Auger (3 ¼ in. dia)	INITIAL WATER LEVEL:	~2.5 ft
SAMPLER TYPE:	grab	STABILIZED WATER LEVEL:	NA

Boring No.

B-1

DEPTH (FT)	WATER LEVEL	SAMPLE % RECOVERY	SAMPLE LABORATORY	USCS	LITHOLOGY	SOIL DESCRIPTION	REMARKS
0	▽		☒	ML		**SILT WITH SAND:** dark gray, soft, wet, fine sand, trace clay.	
-1			☒	SM		**SAND WITH SILT:** gray, loose, wet, fine to medium sand, trace clay.	
						SILTY SAND: gray, loose, wet, fine to medium sand, trace clay.	
-2				ML		**SILT WITH SAND:** dark gray, soft, wet, fine sand, trace clay.	
-3			☒				
-4				CL		**SILT AND CLAY:** dark gray, medium stiff, wet, trace fine sand.	
-5							
-6			☒				
						Bottom of B-1 at 6.5 feet BGS	
-7							
-8							
-9							
-10							

FIELD BORING LOG

LOGGED BY:	Nathan Sanger	DATE:	6/8/2016
PROJECT NAME:	Elk River Slough	LOCATION:	Elk River Slough
PROJECT #:	140.15	GROUND ELEV.:	~6 ft
DRILLER:	Greenway	BORING DEPTH:	~4 ft
DRILL METHOD:	Hand Auger (3 ¼ in. dia)	INITIAL WATER LEVEL:	~1.5 ft
SAMPLER TYPE:	grab	STABILIZED WATER LEVEL:	NA

Boring No.

B-2

DEPTH (FT)	WATER LEVEL	SAMPLE % RECOVERY	SAMPLE LABORATORY	USCS	LITHOLOGY	SOIL DESCRIPTION	REMARKS
0				SM		**GRASS:** roots 0-2"	Roots to 12" BGS
				ML		**SILTY SAND:** dark brown, loose, wet, fine sand.	
-1	▽					**SANDY SILT:** dark gray, soft, wet, fine sand.	
				SM		**SAND WITH SILT:** dark gray, loose, wet, fine to medium sand.	
-2							
-3				SP		**SAND:** gray, loose, wet, fine to medium sand.	
-4						Bottom of B-2 at 4.0 due to hole caving	
-5							
-6							
-7							

FIELD BORING LOG

LOGGED BY:	Nathan Sanger	DATE:	6/7/2016
PROJECT NAME:	Elk River Slough	LOCATION:	Elk River Slough
PROJECT #:	140.15	GROUND ELEV.:	~6 ft
DRILLER:	Greenway	BORING DEPTH:	~8 ft
DRILL METHOD:	Hand Auger (3 ¼ in. dia)	INITIAL WATER LEVEL:	~3.5 ft
SAMPLER TYPE:	grab	STABILIZED WATER LEVEL:	NA

Boring No.

B-3

DEPTH (FT)	WATER LEVEL	SAMPLE % RECOVERY	SAMPLE LABORATORY	USCS	LITHOLOGY	SOIL DESCRIPTION	REMARKS
0				ML		**SILT AND CLAY:** olive gray, medium stiff, damp, fine sand, mottled.	
-1				CL		**SILTY CLAY:** olive gray, medium stiff, damp, fine sand, mottled.	
-2							
-3	▽			ML		**SILT WITH CLAY:** dark brown, soft, moist, fine sand.	Becomes wet at 3.5'
-4							
-5							
-6							Becomes dark gray at 6'
-7							
-8						Bottom of B-3 at 8.0 feet BGS due to low sample recovery.	
-9							

FIELD BORING LOG

LOGGED BY:	Nathan Sanger	DATE:	6/7/2016
PROJECT NAME:	Elk River Slough	LOCATION:	Elk River Slough
PROJECT #:	140.15	GROUND ELEV.:	~6 ft
DRILLER:	Greenway	BORING DEPTH:	~6 ft
DRILL METHOD:	Hand Auger (3 ¼ in. dia)	INITIAL WATER LEVEL:	~3 ft
SAMPLER TYPE:	grab	STABILIZED WATER LEVEL:	NA

Boring No.

B-4

DEPTH (FT)	WATER LEVEL	SAMPLE % RECOVERY	SAMPLE LABORATORY	USCS	LITHOLOGY	SOIL DESCRIPTION	REMARKS
0				ML		**GRASS:** roots 0-2"	
			☒			**SILT AND CLAY:** dark brown, medium stiff, moist, trace fine sand, mottled.	
-1			☒				
-2						**SILT WITH CLAY:** dark brown, medium stiff, moist, trace fine sand.	
	▽						
-3			☒	SM		**SILTY SAND:** dark brown, loose, wet, fine sand, mottled.	
				ML		**SILT WITH CLAY:** dark gray, soft, wet, trace fine sand.	
-4							
-5							
-6						Bottom of B-4 at 6.0 feet BGS due to low sample recovery.	Unable to retrieve 6' sample due to apparent vapor lock of soil sample.
-7							
-8							
-9							

FIELD BORING LOG

LOGGED BY:	Nathan Sanger	DATE:	6/7/2016
PROJECT NAME:	Elk River Slough	LOCATION:	Elk River Slough
PROJECT #:	140.15	GROUND ELEV.:	~9 ft
DRILLER:	Greenway	BORING DEPTH:	~10 ft
DRILL METHOD:	Hand Auger (3 ¼ in. dia)	INITIAL WATER LEVEL:	~6 ft
SAMPLER TYPE:	grab	STABILIZED WATER LEVEL:	NA

Boring No.

B-5

DEPTH (FT)	WATER LEVEL	SAMPLE % RECOVERY	SAMPLE LABORATORY	USCS	LITHOLOGY	SOIL DESCRIPTION	REMARKS
0				SM		**GRASS:** roots 0-4"	
						SILTY SAND: light brown, loose, damp, fine to medium sand.	
-1							
-2							
-3							Becomes wet at 3 ft BGS.
-4							
				ML		**SILT AND SAND:** dark gray, loose, wet, fine sand.	
-5				SM		**SILTY SAND:** dark gray, loose, wet, fine sand.	
-6	▽						
-7							
-8							
-9							
-10						Bottom of B-5 at 10.0 feet BGS	

FIELD BORING LOG

LOGGED BY:	Nathan Sanger	DATE:	6/7/2016
PROJECT NAME:	Elk River Slough	LOCATION:	Elk River Slough
PROJECT #:	140.15	GROUND ELEV.:	~6 ft
DRILLER:	Greenway	BORING DEPTH:	~9 ft
DRILL METHOD:	Hand Auger (3 ¼ in. dia)	INITIAL WATER LEVEL:	~2.5 ft
SAMPLER TYPE:	grab	STABILIZED WATER LEVEL:	NA

Boring No.

B-6

DEPTH (FT)	WATER LEVEL	SAMPLE % RECOVERY	SAMPLE LABORATORY	USCS	LITHOLOGY	SOIL DESCRIPTION	REMARKS
0				ML		**GRASS:** roots 0-2"	
						SILT WITH CLAY: dark brown, soft, damp, trace fine sand.	
-1				CL		**SILTY CLAY:** dark brown, soft, moist, trace fine sand.	
-2	▽						Becomes wet at 2.5 ft BGS.
-3							
-4							
-5				ML		**SILT WITH CLAY:** dark gray, soft, wet, trace fine sand.	
-6							
-7							
-8							
-9						Bottom of B-6 at 9.0 feet BGS due to low sample recovery	
-10							

Appendix B:

Laboratory Analytical Reports

A & L WESTERN AGRICULTURAL LABORATORIES

1311 WOODLAND AVE #1 • MODESTO, CALIFORNIA 95351 • (209) 529-4080 • FAX (209) 529-4736

REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

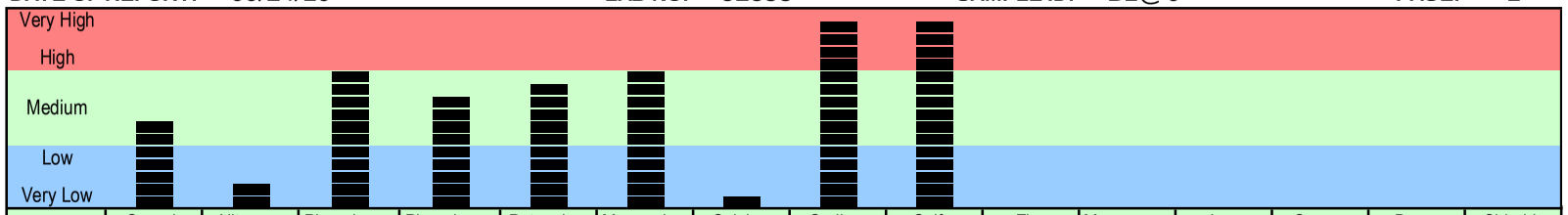
SEND TO: GREENWAY PARTNERS
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

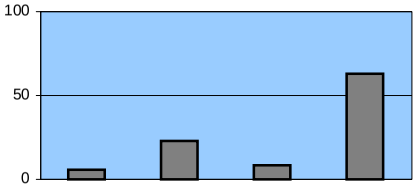
DATE OF REPORT: 06/24/16 **LAB NO:** 52588 **SAMPLE ID:** B1@6" **PAGE:** 1



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	3.1	3	32	12	389	487	298	2529	146						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
5.7	22.9	8.5	62.9

ACIDIC BASIC

2-260

ECe dS/m	CEC meq/100g	Ex. Lime	pH
14.9	17.5	L	7.3

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

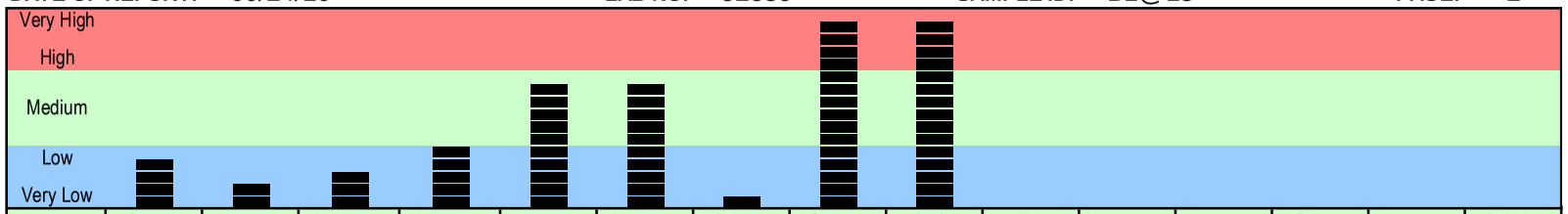
SEND TO: GREENWAY PARTNERS
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

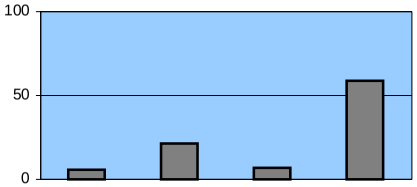
DATE OF REPORT: 06/24/16 **LAB NO:** 52589 **SAMPLE ID:** B1@18 **PAGE:** 2



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	1.9	3	13	14	325	381	197	1975	80						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
5.7	21.4	6.7	58.7

ACIDIC BASIC

2-261

8.2 **ECe** dS/m — INCREASING SALINITY →

14.6 **CEC** meq/100g

L **Ex. Lime**

6.5 **pH** — ← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

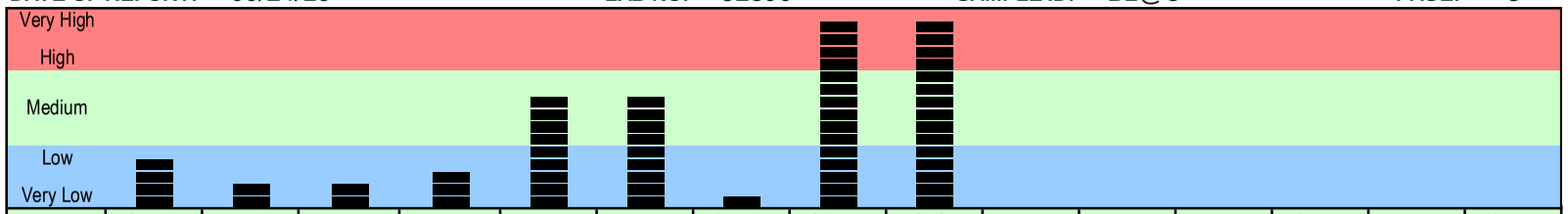
SEND TO: GREENWAY PARTNERS
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

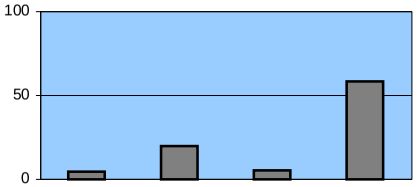
DATE OF REPORT: 06/24/16 **LAB NO:** 52590 **SAMPLE ID:** B1@3' **PAGE:** 3



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	1.8	2	9	16	376	519	236	2904	158						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
4.4	19.7	5.4	58.4

ACIDIC BASIC

2-262

ECe dS/m	CEC meq/100g	Ex. Lime	pH
7.4	21.6	L	6.2

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 6.7

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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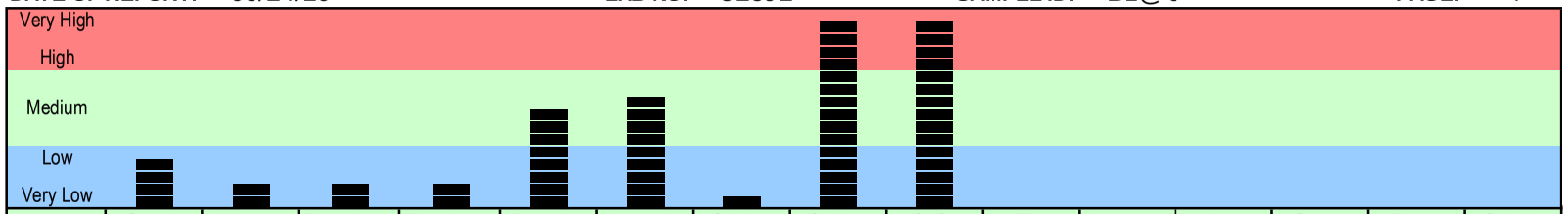
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

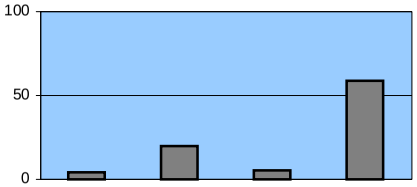
Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52591 **SAMPLE ID:** B1@6' **PAGE:** 4



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	2.2	3	10	12	417	625	277	3507	208						

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
4.1	19.8	5.3	58.8

ACIDIC BASIC

2-263

LOW AVERAGE HIGH

19.8 **ECe** dS/m — INCREASING SALINITY →

26.0 **CEC** meq/100g

L **Ex. Lime**

6.2 **pH** ← INCREASING NEED FOR LIME

Buffer pH: 6.6

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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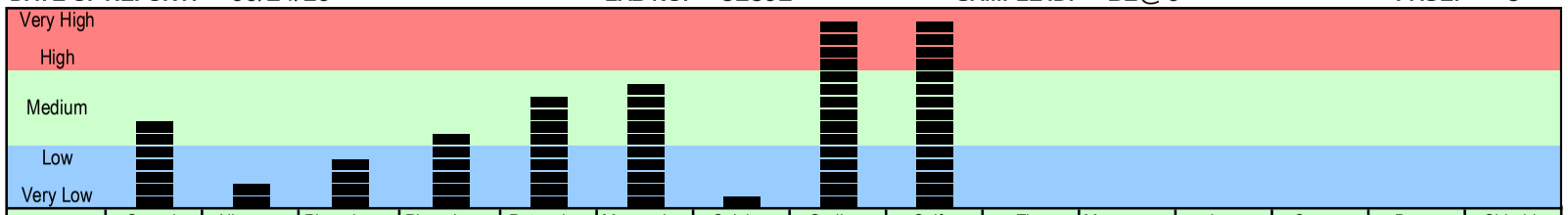
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

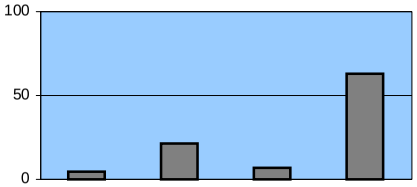
DATE OF REPORT: 06/24/16 **LAB NO:** 52592 **SAMPLE ID:** B2@6" **PAGE:** 5



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	3.1	2	15	9	406	597	321	3327	167						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
4.5	21.3	6.9	62.8

ACIDIC BASIC

2-264

14.1 **ECe** dS/m — INCREASING SALINITY →

23.1 **CEC** meq/100g

L **Ex. Lime**

6.7 **pH** — ← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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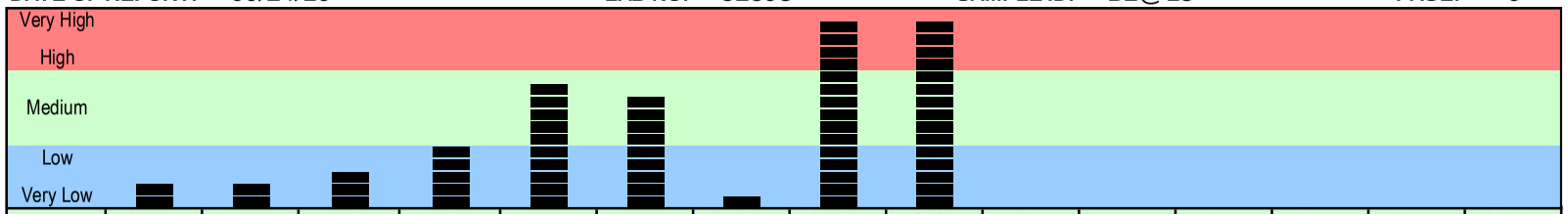
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

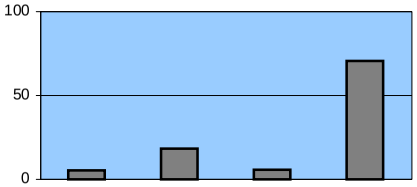
DATE OF REPORT: 06/24/16 **LAB NO:** 52593 **SAMPLE ID:** B2@18 **PAGE:** 6



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	0.6	3	11	8	266	289	146	2080	123						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
5.3	18.5	5.7	70.5

ACIDIC BASIC

2-265

ECe dS/m	CEC meq/100g	Ex. Lime	pH
9.8	12.8	L	7.5

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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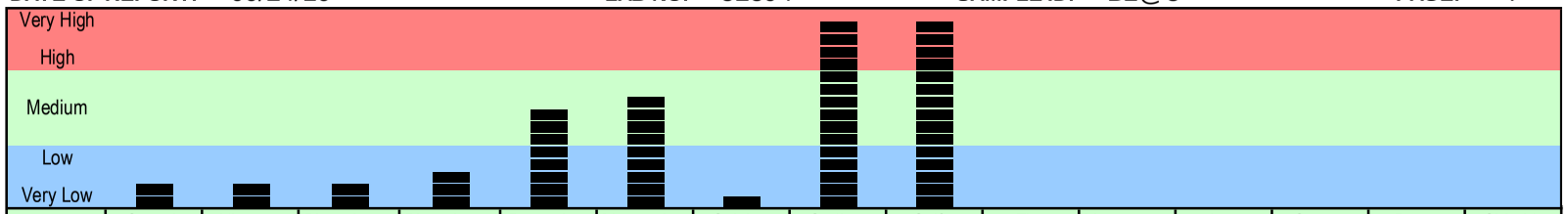
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

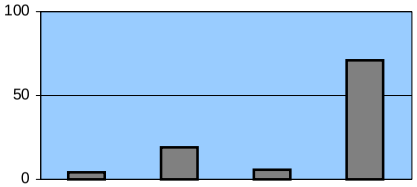
DATE OF REPORT: 06/24/16 **LAB NO:** 52594 **SAMPLE ID:** B2@3' **PAGE:** 7



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	0.5	2	8	5	226	327	166	2308	202						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
4.1	19.1	5.8	71.0

ACIDIC BASIC

2-266

23.7 **ECe** dS/m — INCREASING SALINITY →

14.1 **CEC** meq/100g

L **Ex. Lime**

7.3 **pH** — ← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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1311 WOODLAND AVE #1 • MODESTO, CALIFORNIA 95351 • (209) 529-4080 • FAX (209) 529-4736

REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

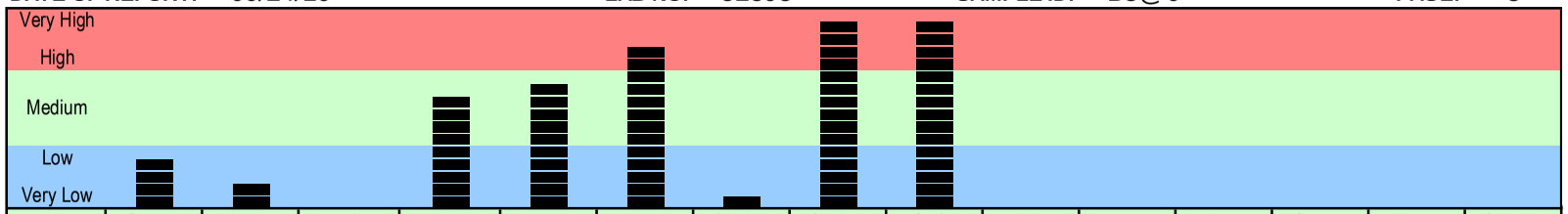
SEND TO: GREENWAY PARTNERS
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

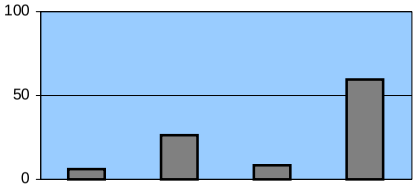
Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52595 **SAMPLE ID:** B3@6" **PAGE:** 8



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	1.8	2	24	12	451	620	323	2646	175						

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
6.0	26.3	8.3	59.4

ACIDIC BASIC

2-267

LOW AVERAGE HIGH

13.2 **ECe** dS/m — INCREASING SALINITY →

19.4 **CEC** meq/100g

L **Ex. Lime**

8.4 **pH** ← INCREASING NEED FOR LIME

Buffer pH:

Weak Bray P unreliable at M or H excess lime or pH > 7.5

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

SEND TO: GREENWAY PARTNERS
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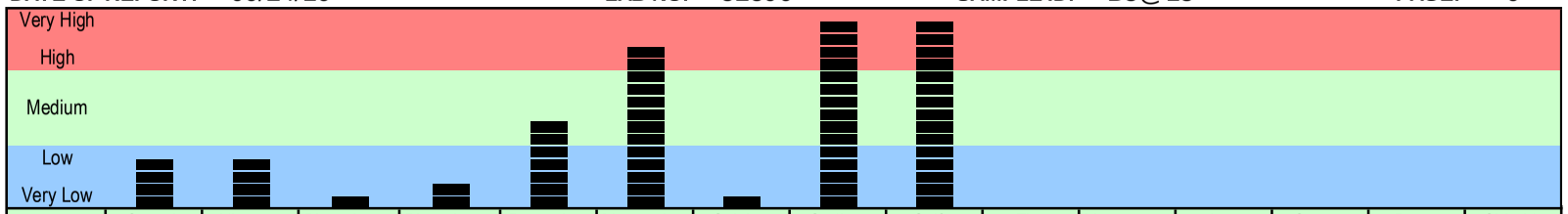
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52596 **SAMPLE ID:** B3@18 **PAGE:** 9

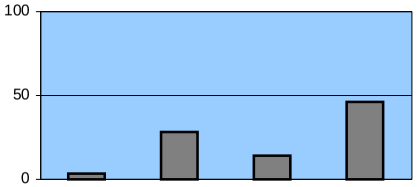


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	2.2	10	3	8	312	768	639	2371	193						

LOW AVERAGE HIGH

2-268

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
3.6	28.3	14.3	46.3

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
7.8	22.3	L	6.5

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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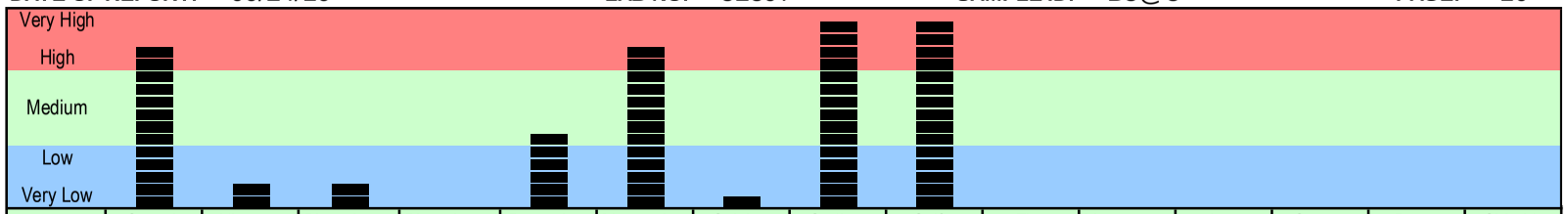
GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52597 **SAMPLE ID:** B3@3' **PAGE:** 10

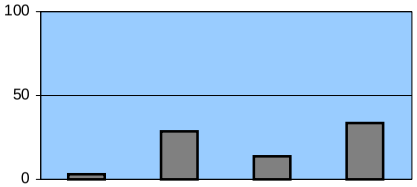


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	5.3	6	5	15	308	900	708	1974	170						

2-269

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
3.1	28.8	13.8	33.4

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
6.8	25.7	L	5.7

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 6.5

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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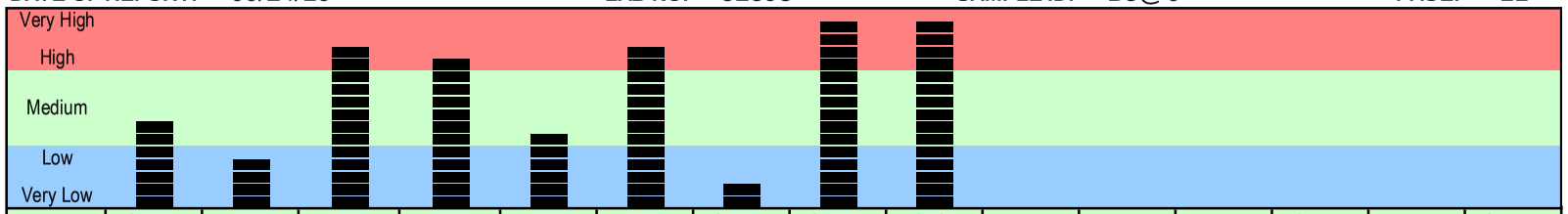
GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

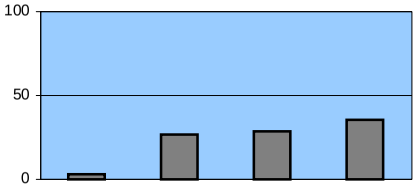
DATE OF REPORT: 06/24/16 **LAB NO:** 52598 **SAMPLE ID:** B3@6' **PAGE:** 11



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	3.1	10	41	21	184	496	877	1247	137						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
3.1	26.7	28.7	35.5

ACIDIC BASIC

2-270

ECe dS/m	CEC meq/100g	Ex. Lime	pH
6.0	15.3	L	6.6

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH:

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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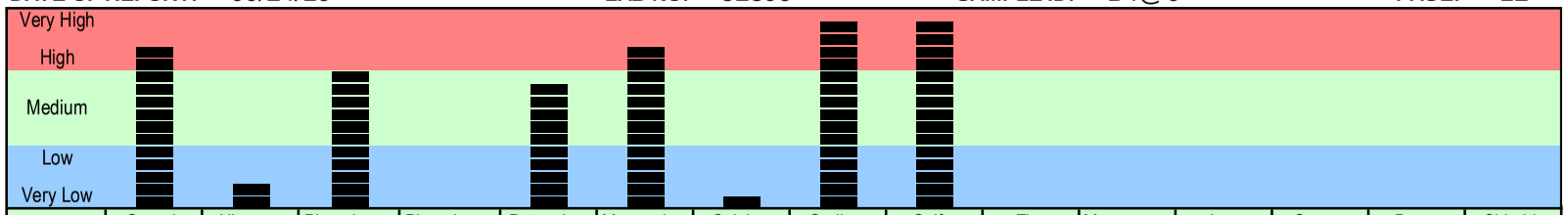
SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52599 **SAMPLE ID:** B4@6" **PAGE:** 12

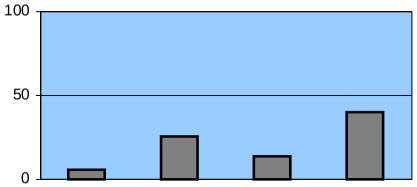


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	6.3	4	34	29	365	524	459	1550	134						

2-271

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
5.6	25.7	13.6	40.2

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
2.2	16.8	L	6.0

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 6.7

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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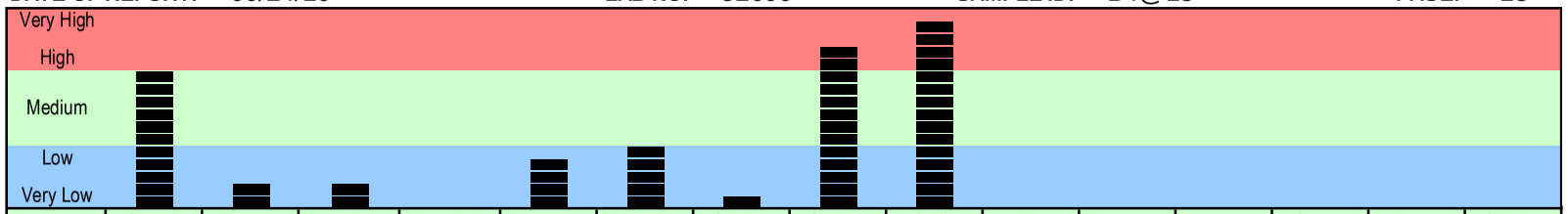
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52600 **SAMPLE ID:** B4@18 **PAGE:** 13



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	4.5	3	8	91	320	554	360	2966	354						

2-272

LOW AVERAGE HIGH

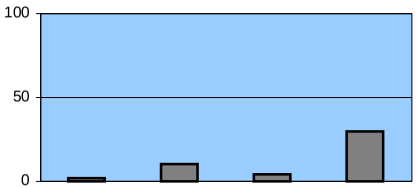
ECe dS/m	CEC meq/100g	Ex. Lime	pH
11.1	43.6	L	4.6

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 5.2

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
1.9	10.4	4.1	29.6

ACIDIC BASIC

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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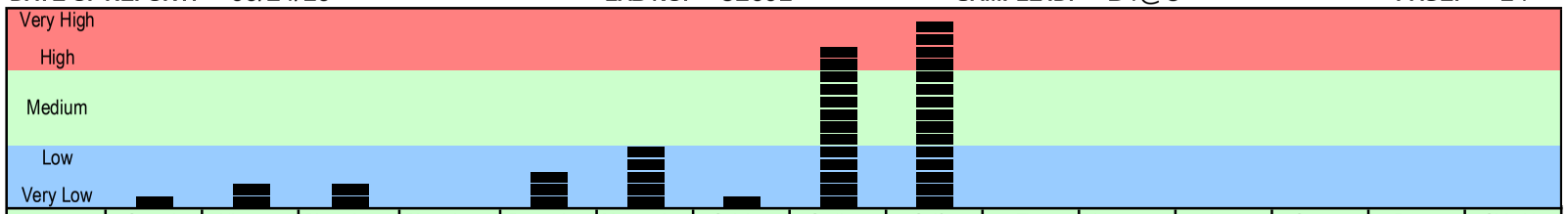
SUBMITTED BY: NATHAN

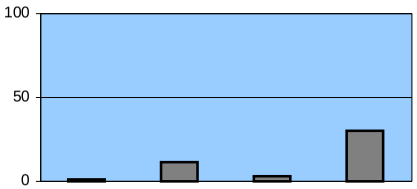
Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52601 **SAMPLE ID:** B4@3' **PAGE:** 14



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	0.1	2	6	10	253	765	350	3740	591						

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
1.2	11.6	3.2	30.0

2-273

LOW AVERAGE HIGH

26.8 **ECe** dS/m — INCREASING SALINITY →

54.2 **CEC** meq/100g

L **Ex. Lime**

4.6 **pH** — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

Buffer pH: 4.8

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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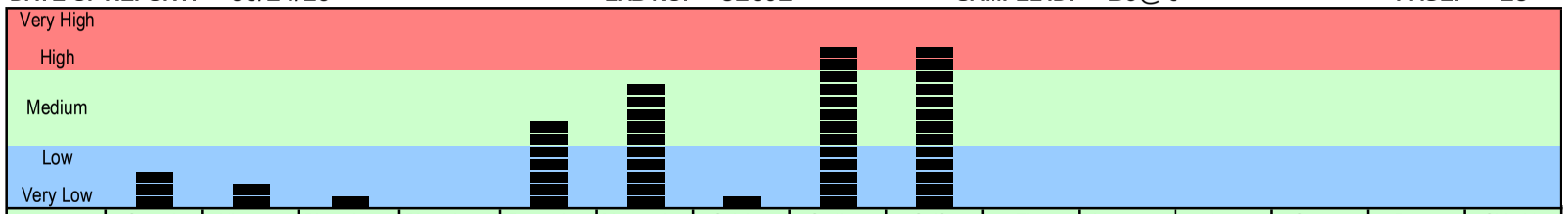
GROWER:

SUBMITTED BY: NATHAN

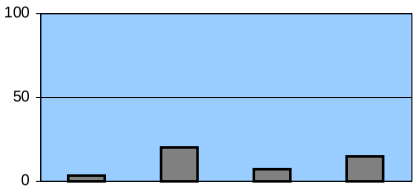
Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52602 **SAMPLE ID:** B5@6" **PAGE:** 15



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	1.1	4	3	4	210	368	222	514	40						

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
3.6	20.2	7.4	14.9

2-274

LOW AVERAGE HIGH

3.4 **ECe** dS/m — INCREASING SALINITY →

15.0 **CEC** meq/100g

L **Ex. Lime**

4.6 **pH** — ACIDIC ← BASIC — INCREASING NEED FOR LIME

Buffer pH: 6.3

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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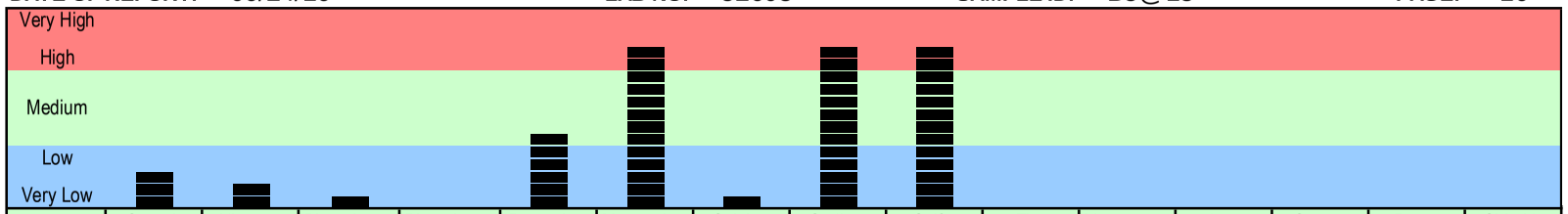
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52603 **SAMPLE ID:** B5@18 **PAGE:** 16



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	1.2	5	3	5	115	321	196	692	54						

2-275

LOW AVERAGE HIGH

3.5 ECe dS/m — INCREASING SALINITY →

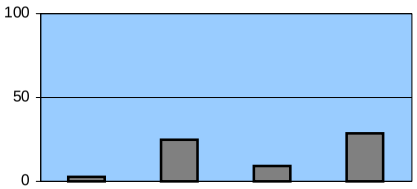
10.6 CEC meq/100g

L Ex. Lime

5.2 pH — ← INCREASING NEED FOR LIME

Buffer pH: 6.6

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.8	25.0	9.2	28.5

ACIDIC BASIC

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

COMMENTS

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1311 WOODLAND AVE #1 • MODESTO, CALIFORNIA 95351 • (209) 529-4080 • FAX (209) 529-4736

REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

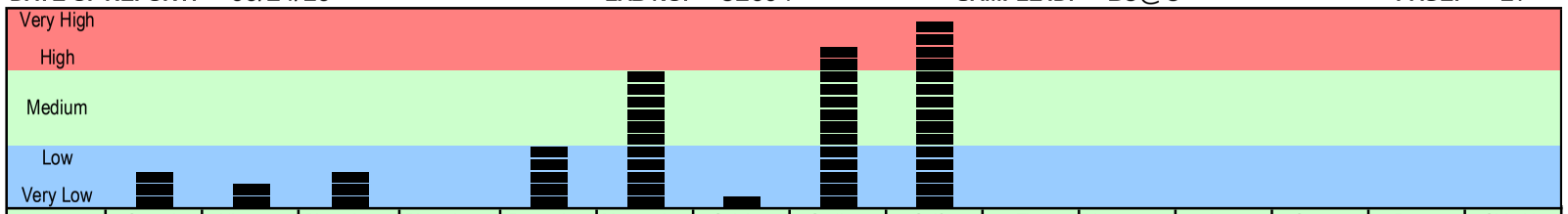
SEND TO: GREENWAY PARTNERS
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

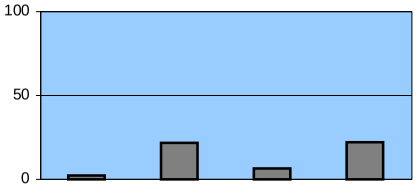
DATE OF REPORT: 06/24/16 **LAB NO:** 52604 **SAMPLE ID:** B5@3' **PAGE:** 17



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	1.2	3	12	10	129	361	175	699	64						

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.4	21.8	6.4	22.3

ACIDIC BASIC

2-276

ECe dS/m	CEC meq/100g	Ex. Lime	pH
4.7	13.6	L	4.8

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 6.4

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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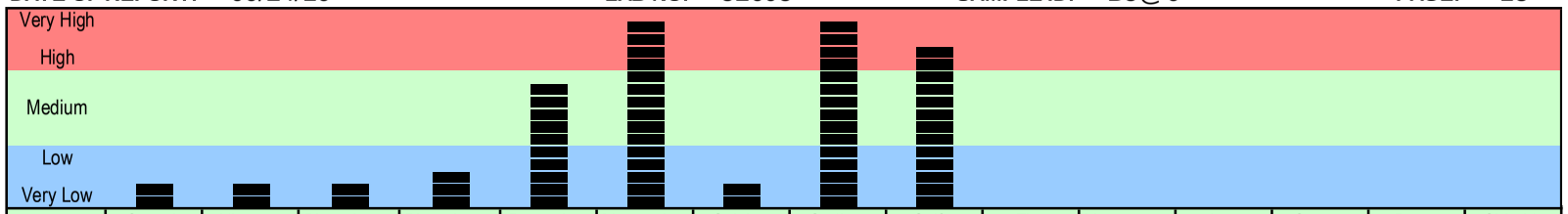
GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52605 **SAMPLE ID:** B5@6' **PAGE:** 18



Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	0.5	3	7	5	145	357	209	465	39						

2-277

LOW AVERAGE HIGH

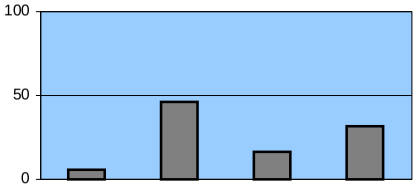
ECe dS/m	CEC meq/100g	Ex. Lime	pH
1.4	6.4	L	7.1

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH:

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
5.8	46.1	16.4	31.7

ACIDIC BASIC

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

SEND TO: GREENWAY PARTNERS
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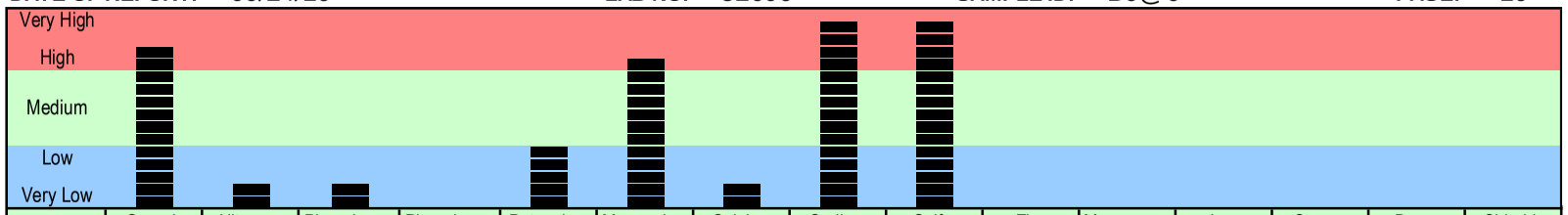
GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52606 **SAMPLE ID:** B6@6" **PAGE:** 19

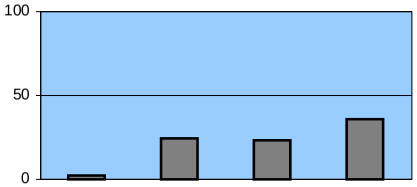


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	7.7	5	8	40	224	738	1157	2052	191						

2-278

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.3	24.5	23.3	36.0

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
7.3	24.8	L	6.1

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 6.6

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

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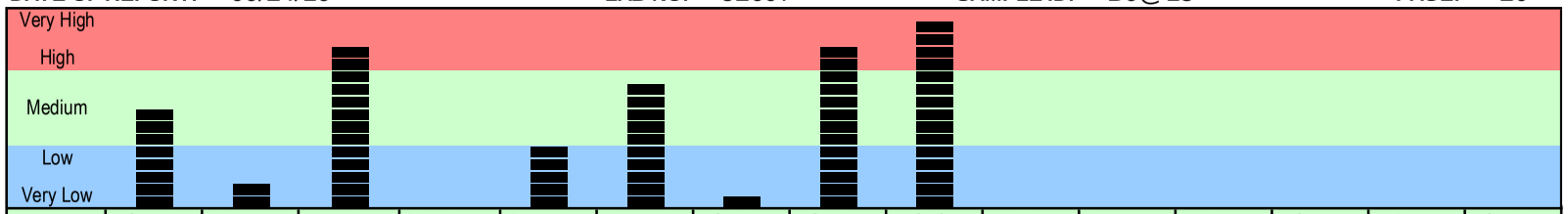
GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52607 **SAMPLE ID:** B6@18 **PAGE:** 20

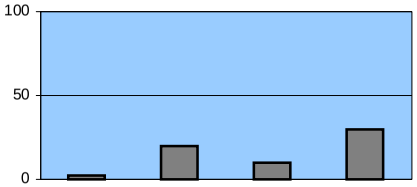


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	3.2	4	51	9	270	814	676	2297	279						

2-279

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.1	20.0	10.1	29.9

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
8.0	33.5	L	5.1

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 5.9

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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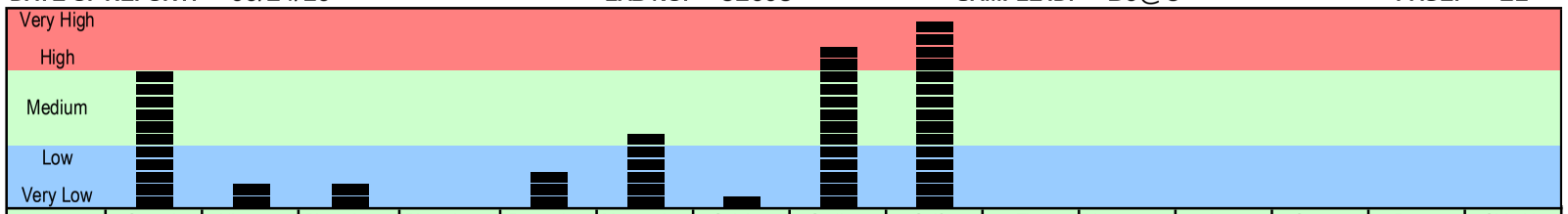
GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52608 **SAMPLE ID:** B6@3' **PAGE:** 21

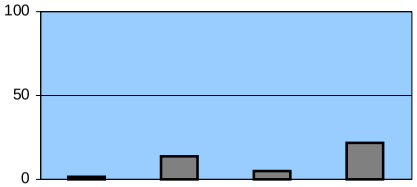


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	4.6	3	10	18	296	854	525	2563	437						

2-280

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
1.5	13.7	5.1	21.7

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
9.0	51.3	L	4.5

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 4.8

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

COMMENTS

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REPORT NUMBER: 16-166-092 **CLIENT NO:** 99999

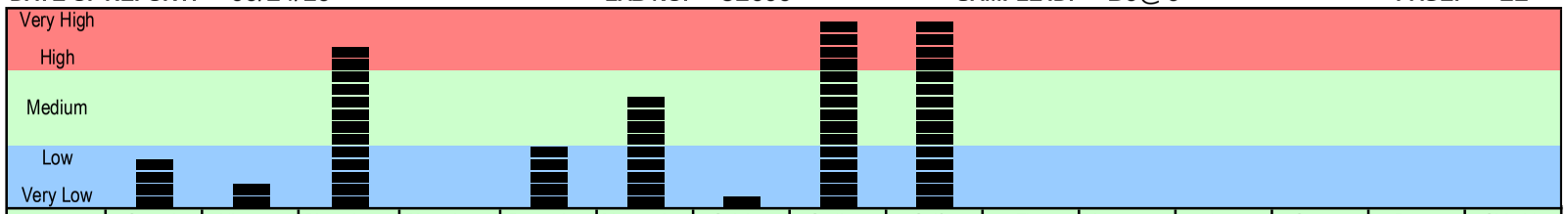
SEND TO: GREENWAY PARTNERS
1385 8TH ST
ARCATA, CA 95521-

GROWER:

SUBMITTED BY: NATHAN

Graphical Soil Analysis Report

DATE OF REPORT: 06/24/16 **LAB NO:** 52609 **SAMPLE ID:** B6@6' **PAGE:** 22

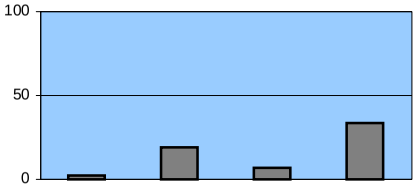


Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	2.2	3	51	15	324	791	476	2631	455						

2-281

LOW AVERAGE HIGH

Percent Cation Saturation (computed)



Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.4	19.1	7.0	33.6

ACIDIC BASIC

ECe dS/m	CEC meq/100g	Ex. Lime	pH
15.1	34.1	L	5.1

INCREASING SALINITY →

← INCREASING NEED FOR LIME

Buffer pH: 5.9

NaHCO3-P unreliable at this soil pH

Soil Fertility Guidelines

CROP: **RATE:** **NOTES:**

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

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NORTH COAST LABORATORIES LTD.

June 20, 2016

Greenway Partners
1385 8th St. Suite 201
Arcata, CA 95521

Order No.: 1606141
Invoice No.: 127995
PO No.:

Attn: Steve Salzman

ELAP No.1247-Expires July 2016

RE: 104.15 Elk River Slough

SAMPLE IDENTIFICATION

Fraction	Client Sample Description
01A	B1@6-12"
02A	B1@18-24"
03A	B1@3-3.5'
04A	B1@6-6.5'
05A	B2@6-12"
06A	B2@18-24"
07A	B2@3-3.5'
08A	B3@6-12"
09A	B3@18-24"
10A	B3@3-3.5'
11A	B3@6-6.5'
12A	B4@6-12"
13A	B4@18-24"
14A	B4@3-3.5'
15A	B5@6-12"
16A	B5@18-24"
17A	B5@3-3.5'
18A	B5@6-6.5'
19A	B6@6-12"
20A	B6@18-24"
21A	B6@3-3.5'
22A	B6@6-6.5'

ND = Not Detected at the Reporting Limit

Limit = Reporting Limit

Flag = Explanation in Case Narrative

All solid results are expressed on a wet-weight basis unless otherwise noted.

Approved for release by:

Roxanne Moore, Project Manager

Date: 20-Jun-2016
WorkOrder: 1606141

CASE NARRATIVE

Antimony:
The matrix spike/matrix spike duplicate (MS/MSD) recoveries were below the acceptance limit. This may indicate a negative sample matrix interference for this analyte.

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B1@6-12"
Lab ID: 1606141-01A

Received: 6/8/2016
Collected: 6/8/2016 10:00

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.2		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	24		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	37		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	4.6		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	5.6		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	5.8		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	29		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	22		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	28		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B1@18-24"
Lab ID: 1606141-02A

Received: 6/8/2016
Collected: 6/8/2016 10:10

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.9		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	53		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	58		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	5.8		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	19		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	9.0		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	2.2		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	42		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	37		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	39		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B1@3-3.5'
Lab ID: 1606141-03A

Received: 6/8/2016
Collected: 6/8/2016 10:40

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	3.2		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	54		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	58		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	5.5		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	15		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	10		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.9		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	42		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	36		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	38		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B1@6-6.5'
Lab ID: 1606141-04A

Received: 6/8/2016
Collected: 6/8/2016 11:00

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	60		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	57		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	7.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	18		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	9.4		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.6		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	54		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	37		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	44		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B2@6-12"
Lab ID: 1606141-05A

Received: 6/8/2016
Collected: 6/8/2016 11:20

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	32		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	45		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	6.7		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	7.7		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	7.0		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	38		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	26		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	31		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B2@18-24"
Lab ID: 1606141-06A

Received: 6/8/2016
Collected: 6/8/2016 11:30

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	26		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	45		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	6.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	6.4		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	5.4		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	37		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	27		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B2@3-3.5'
Lab ID: 1606141-07A

Received: 6/8/2016
Collected: 6/8/2016 11:50

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	26		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	36		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	5.7		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	4.9		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	4.8		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	36		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	20		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B3@6-12"
Lab ID: 1606141-08A

Received: 6/8/2016
Collected: 6/7/2016 12:30

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.5		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	86		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	0.55		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	67		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	10		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	26		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	20		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.5		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	74		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	36		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	60		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B3@18-24"
Lab ID: 1606141-09A

Received: 6/8/2016
Collected: 6/7/2016 12:45

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.1		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	57		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	66		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	7.0		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	12		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	3.8		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	47		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	41		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	43		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B3@3-3.5'
Lab ID: 1606141-10A

Received: 6/8/2016
Collected: 6/7/2016 13:00

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.4		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	40		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	51		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	5.5		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	19		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	9.4		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	4.2		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	44		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	38		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	38		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B3@6-6.5'
Lab ID: 1606141-11A

Received: 6/8/2016
Collected: 6/7/2016 13:30

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.2		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	58		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	59		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	8.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	10		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.1		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	58		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	2.5		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	36		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	48		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B4@6-12"
Lab ID: 1606141-12A

Received: 6/8/2016
Collected: 6/7/2016 11:15

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	48		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	0.52		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	55		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	6.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	27		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	14		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	2.2		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	55		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	2.5		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	39		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	53		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B4@18-24"
Lab ID: 1606141-13A

Received: 6/8/2016
Collected: 6/7/2016 11:25

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	6.3		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	64		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	68		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	7.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	22		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	13		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	3.4		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	51		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	41		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	51		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B4@3-3.5'
Lab ID: 1606141-14A

Received: 6/8/2016
Collected: 6/7/2016 11:40

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	4.4		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	65		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	64		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	6.0		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	22		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	11		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.7		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	47		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	2.4		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	40		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	42		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B5@6-12"
Lab ID: 1606141-15A

Received: 6/8/2016
Collected: 6/7/2016 14:20

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	7.4		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	46		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	49		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	5.4		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	15		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	11		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	2.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	33		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	38		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	35		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B5@18-24"
Lab ID: 1606141-16A

Received: 6/8/2016
Collected: 6/7/2016 14:30

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	30		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	39		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	3.6		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	11		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	5.7		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	22		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B5@3-3.5'
Lab ID: 1606141-17A

Received: 6/8/2016
Collected: 6/7/2016 14:45

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	2.5		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	30		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	41		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	7.9		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	12		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	7.3		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	1.8		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	44		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	2.3		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	25		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	34		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Client Sample ID: B5@6-6.5'
Lab ID: 1606141-18A

Received: 6/8/2016
Collected: 6/7/2016 15:00

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/14/2016	6/16/2016
Arsenic	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Barium	30		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/14/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Chromium	36		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Cobalt	6.6		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Copper	10		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Lead	6.1		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Molybdenum	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Nickel	34		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/14/2016	6/16/2016
Vanadium	23		1.0	mg/kg	1.0	6/14/2016	6/16/2016
Zinc	30		1.0	mg/kg	1.0	6/14/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/14/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B6@6-12"
Lab ID: 1606141-19A

Received: 6/8/2016
Collected: 6/7/2016 10:00

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/15/2016	6/16/2016
Arsenic	3.5		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Barium	54		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/15/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Chromium	68		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Cobalt	7.6		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Copper	29		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Lead	13		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Molybdenum	4.7		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Nickel	49		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Vanadium	49		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Zinc	60		1.0	mg/kg	1.0	6/15/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/16/2016	6/17/2016

Client Sample ID: B6@18-24"
Lab ID: 1606141-20A

Received: 6/8/2016
Collected: 6/7/2016 10:15

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/15/2016	6/16/2016
Arsenic	5.7		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Barium	41		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/15/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Chromium	63		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Cobalt	6.5		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Copper	23		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Lead	11		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Molybdenum	4.3		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Nickel	41		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Vanadium	48		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Zinc	42		1.0	mg/kg	1.0	6/15/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/16/2016	6/17/2016

Date: 20-Jun-2016
WorkOrder: 1606141

ANALYTICAL REPORT

Client Sample ID: B6@3-3.5'
Lab ID: 1606141-21A

Received: 6/8/2016
Collected: 6/7/2016 10:40

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/15/2016	6/16/2016
Arsenic	3.7		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Barium	42		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/15/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Chromium	55		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Cobalt	5.5		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Copper	21		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Lead	9.3		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Molybdenum	2.3		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Nickel	39		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Vanadium	40		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Zinc	38		1.0	mg/kg	1.0	6/15/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/16/2016	6/17/2016

Client Sample ID: B6@6-6.5'
Lab ID: 1606141-22A

Received: 6/8/2016
Collected: 6/7/2016 11:00

Test Name: EPA 6010B **Reference:** EPA 6010B

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Antimony	ND		5.0	mg/kg	1.0	6/15/2016	6/16/2016
Arsenic	2.3		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Barium	53		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Beryllium	ND		0.50	mg/kg	1.0	6/15/2016	6/16/2016
Cadmium	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Chromium	54		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Cobalt	6.6		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Copper	22		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Lead	9.2		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Molybdenum	1.4		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Nickel	46		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Selenium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Silver	ND		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Thallium	ND		2.0	mg/kg	1.0	6/15/2016	6/16/2016
Vanadium	35		1.0	mg/kg	1.0	6/15/2016	6/16/2016
Zinc	42		1.0	mg/kg	1.0	6/15/2016	6/16/2016

Test Name: Mercury **Reference:** EPA 7471A

Parameter	Result	Flag	Limit	Units	DF	Extracted	Analyzed
Mercury	ND		0.10	mg/kg	1.0	6/16/2016	6/17/2016

North Coast Laboratories, Ltd.

Date: 6/20/2016

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Method Blank

Sample ID **MB-33467** Batch ID: **33467** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 11:48:48 AM** Prep Date **6/14/2016**

Client ID: Run ID: **INICP2_160616A** SeqNo: **1251041**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	5.0									
Arsenic	ND	2.0									
Barium	ND	1.0									
Beryllium	ND	0.50									
Cadmium	ND	1.0									
Chromium	ND	2.0									
Cobalt	ND	1.0									
Copper	ND	1.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	2.0									
Silver	ND	1.0									
Thallium	ND	2.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

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Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Method Blank

Sample ID **MB-33474** Batch ID: **33474** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 1:12:31 PM** Prep Date **6/15/2016**
Client ID: Run ID: **INICP2_160616A** SeqNo: **1251068**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	5.0									
Arsenic	ND	2.0									
Barium	ND	1.0									
Beryllium	ND	0.50									
Cadmium	ND	1.0									
Chromium	ND	2.0									
Cobalt	ND	1.0									
Copper	ND	1.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	2.0									
Silver	ND	1.0									
Thallium	ND	2.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID **MB-33468** Batch ID: **33468** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 1:47:04 PM** Prep Date **6/14/2016**
Client ID: Run ID: **CVAA1_160617A** SeqNo: **1251299**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID **MB-33485** Batch ID: **33485** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:46:55 PM** Prep Date **6/16/2016**
Client ID: Run ID: **CVAA1_160617B** SeqNo: **1251331**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

North Coast Laboratories, Ltd.

Date: 6/20/2016

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID **1606141-06AMS** Batch ID: **33467** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 12:14:57 PM** Prep Date **6/14/2016**

Client ID: **B2@18-24"** Run ID: **INICP2_160616A** SeqNo: **1251050**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	48.20	5.0	100	0	48.2%	75	125	0			S
Arsenic	88.08	2.0	100	0	88.1%	75	125	0			
Barium	102.7	1.0	100	25.7	77.0%	75	125	0			
Beryllium	88.69	0.50	100	0.205	88.5%	75	125	0			
Cadmium	88.07	1.0	100	0.0692	88.0%	75	125	0			
Chromium	132.5	2.0	100	44.8	87.7%	75	125	0			
Cobalt	88.88	1.0	100	6.30	82.6%	75	125	0			
Copper	102.4	1.0	100	6.45	95.9%	75	125	0			
Lead	88.95	1.0	100	5.42	83.5%	75	125	0			
Molybdenum	100.1	1.0	100	0.317	99.8%	75	125	0			
Nickel	119.5	1.0	100	37.4	82.1%	75	125	0			
Selenium	92.11	2.0	100	1.00	91.1%	75	125	0			
Silver	10.33	1.0	12.5	0	82.7%	75	125	0			
Thallium	77.01	2.0	100	0	77.0%	75	125	0			
Vanadium	111.3	1.0	100	23.0	88.4%	75	125	0			
Zinc	108.5	1.0	100	27.4	81.1%	75	125	0			

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Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Sample ID **1606141-06AMSD** Batch ID: **33467** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 12:22:56 PM** Prep Date **6/14/2016**
Client ID: **B2@18-24"** Run ID: **INICP2_160616A** SeqNo: **1251053**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	50.12	5.0	100	0	50.1%	75	125	48.2	3.89%	20	S
Arsenic	88.35	2.0	100	0	88.3%	75	125	88.1	0.308%	20	
Barium	108.7	1.0	100	25.7	83.1%	75	125	103	5.71%	20	
Beryllium	89.38	0.50	100	0.205	89.2%	75	125	88.7	0.774%	20	
Cadmium	89.03	1.0	100	0.0692	89.0%	75	125	88.1	1.09%	20	
Chromium	132.5	2.0	100	44.8	87.7%	75	125	132	0.00377%	20	
Cobalt	89.08	1.0	100	6.30	82.8%	75	125	88.9	0.224%	20	
Copper	103.1	1.0	100	6.45	96.6%	75	125	102	0.717%	20	
Lead	89.33	1.0	100	5.42	83.9%	75	125	89.0	0.420%	20	
Molybdenum	96.62	1.0	100	0.317	96.3%	75	125	100	3.51%	20	
Nickel	118.0	1.0	100	37.4	80.6%	75	125	120	1.28%	20	
Selenium	92.47	2.0	100	1.00	91.5%	75	125	92.1	0.393%	20	
Silver	10.54	1.0	12.5	0	84.3%	75	125	10.3	1.97%	20	
Thallium	77.92	2.0	100	0	77.9%	75	125	77.0	1.17%	20	
Vanadium	111.4	1.0	100	23.0	88.5%	75	125	111	0.0826%	20	
Zinc	109.0	1.0	100	27.4	81.6%	75	125	108	0.408%	20	

Sample ID **1606141-07AMS** Batch ID: **33468** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:03:15 PM** Prep Date **6/14/2016**
Client ID: **B2@3-3.5'** Run ID: **CVAA1_160617A** SeqNo: **1251311**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5500	0.10	0.500	0	110%	70	130	0			

Sample ID **1606141-07AMSD** Batch ID: **33468** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:04:37 PM** Prep Date **6/14/2016**
Client ID: **B2@3-3.5'** Run ID: **CVAA1_160617A** SeqNo: **1251312**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5500	0.10	0.500	0	110%	70	130	0.550	0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID **1606141-22AMS** Batch ID: **33485** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:56:20 PM** Prep Date **6/16/2016**
Client ID: **B6@6-6.5'** Run ID: **CVAA1_160617B** SeqNo: **1251338**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5300	0.10	0.500	0.0300	100%	70	130	0			

Sample ID **1606141-22AMSD** Batch ID: **33485** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:57:43 PM** Prep Date **6/16/2016**
Client ID: **B6@6-6.5'** Run ID: **CVAA1_160617B** SeqNo: **1251339**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5400	0.10	0.500	0.0300	102%	70	130	0.530	1.87%	20	

2-299

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

North Coast Laboratories, Ltd.

Date: 6/20/2016

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-33467** Batch ID: **33467** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 11:50:50 AM** Prep Date **6/14/2016**

Client ID: Run ID: **INICP2_160616A** SeqNo: **1251042**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	103.2	5.0	100	2.87	100%	80	120	0			
Arsenic	94.42	2.0	100	0	94.4%	80	120	0			
Barium	94.26	1.0	100	0	94.3%	80	120	0			
Beryllium	96.47	0.50	100	0.0132	96.5%	80	120	0			
Cadmium	94.77	1.0	100	0	94.8%	80	120	0			
Chromium	96.78	2.0	100	0	96.8%	80	120	0			
Cobalt	96.08	1.0	100	0	96.1%	80	120	0			
Copper	103.8	1.0	100	0	104%	80	120	0			
Lead	96.74	1.0	100	0	96.7%	80	120	0			
Molybdenum	106.7	1.0	100	0.282	106%	80	120	0			
Nickel	96.20	1.0	100	0	96.2%	80	120	0			
Selenium	95.12	2.0	100	0	95.1%	80	120	0			
Silver	11.78	1.0	12.5	0	94.3%	80	120	0			
Thallium	93.17	2.0	100	0	93.2%	80	120	0			
Vanadium	97.32	1.0	100	0	97.3%	80	120	0			
Zinc	90.17	1.0	100	0	90.2%	80	120	0			

2-300

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID **LCSD-33467** Batch ID: **33467** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 11:52:59 AM** Prep Date **6/14/2016**

Client ID: Run ID: **INICP2_160616A** SeqNo: **1251043**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	101.5	5.0	100	2.87	98.7%	80	120	103	1.63%	20	
Arsenic	94.08	2.0	100	0	94.1%	80	120	94.4	0.361%	20	
Barium	96.04	1.0	100	0	96.0%	80	120	94.3	1.87%	20	
Beryllium	96.32	0.50	100	0.0132	96.3%	80	120	96.5	0.154%	20	
Cadmium	94.09	1.0	100	0	94.1%	80	120	94.8	0.718%	20	
Chromium	95.96	2.0	100	0	96.0%	80	120	96.8	0.852%	20	
Cobalt	95.54	1.0	100	0	95.5%	80	120	96.1	0.562%	20	
Copper	103.4	1.0	100	0	103%	80	120	104	0.409%	20	
Lead	96.25	1.0	100	0	96.2%	80	120	96.7	0.512%	20	
Molybdenum	106.6	1.0	100	0.282	106%	80	120	107	0.0525%	20	
Nickel	95.91	1.0	100	0	95.9%	80	120	96.2	0.307%	20	
Selenium	94.60	2.0	100	0	94.6%	80	120	95.1	0.550%	20	
Silver	11.84	1.0	12.5	0	94.7%	80	120	11.8	0.516%	20	
Thallium	92.90	2.0	100	0	92.9%	80	120	93.2	0.298%	20	
Vanadium	96.83	1.0	100	0	96.8%	80	120	97.3	0.511%	20	
Zinc	89.97	1.0	100	0	90.0%	80	120	90.2	0.221%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-33474** Batch ID: **33474** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 1:14:52 PM** Prep Date **6/15/2016**

Client ID: Run ID: **INICP2_160616A** SeqNo: **1251069**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	98.41	5.0	100	0	98.4%	80	120	0			
Arsenic	91.51	2.0	100	0	91.5%	80	120	0			
Barium	92.30	1.0	100	0	92.3%	80	120	0			
Beryllium	91.99	0.50	100	0	92.0%	80	120	0			
Cadmium	90.05	1.0	100	0	90.1%	80	120	0			
Chromium	91.67	2.0	100	0	91.7%	80	120	0			
Cobalt	91.61	1.0	100	0	91.6%	80	120	0			
Copper	101.6	1.0	100	0	102%	80	120	0			
Lead	92.70	1.0	100	0	92.7%	80	120	0			
Molybdenum	102.5	1.0	100	0	103%	80	120	0			
Nickel	91.73	1.0	100	0	91.7%	80	120	0			
Selenium	92.30	2.0	100	0	92.3%	80	120	0			
Silver	11.32	1.0	12.5	0	90.6%	80	120	0			
Thallium	89.57	2.0	100	0	89.6%	80	120	0			
Vanadium	93.21	1.0	100	0	93.2%	80	120	0			
Zinc	85.63	1.0	100	0	85.6%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID **LCSD-33474** Batch ID: **33474** Test Code: **6ICPS** Units: **mg/kg** Analysis Date **6/16/2016 1:18:17 PM** Prep Date **6/15/2016**
Client ID: Run ID: **INICP2_160616A** SeqNo: **1251070**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	97.40	5.0	100	0	97.4%	80	120	98.4	1.03%	20	
Arsenic	90.36	2.0	100	0	90.4%	80	120	91.5	1.27%	20	
Barium	92.00	1.0	100	0	92.0%	80	120	92.3	0.322%	20	
Beryllium	90.93	0.50	100	0	90.9%	80	120	92.0	1.15%	20	
Cadmium	89.20	1.0	100	0	89.2%	80	120	90.0	0.957%	20	
Chromium	91.53	2.0	100	0	91.5%	80	120	91.7	0.153%	20	
Cobalt	91.26	1.0	100	0	91.3%	80	120	91.6	0.390%	20	
Copper	99.59	1.0	100	0	99.6%	80	120	102	1.95%	20	
Lead	92.05	1.0	100	0	92.0%	80	120	92.7	0.703%	20	
Molybdenum	102.5	1.0	100	0	102%	80	120	102	0.0322%	20	
Nickel	91.62	1.0	100	0	91.6%	80	120	91.7	0.112%	20	
Selenium	93.36	2.0	100	0	93.4%	80	120	92.3	1.15%	20	
Silver	11.21	1.0	12.5	0	89.7%	80	120	11.3	0.943%	20	
Thallium	89.51	2.0	100	0	89.5%	80	120	89.6	0.0682%	20	
Vanadium	92.94	1.0	100	0	92.9%	80	120	93.2	0.288%	20	
Zinc	85.60	1.0	100	0	85.6%	80	120	85.6	0.0290%	20	

Sample ID **LCS-33468** Batch ID: **33468** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 1:48:23 PM** Prep Date **6/14/2016**
Client ID: Run ID: **CVAA1_160617A** SeqNo: **1251300**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5100	0.10	0.500	0	102%	85	115	0			

Sample ID **LCSD-33468** Batch ID: **33468** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 1:49:43 PM** Prep Date **6/14/2016**
Client ID: Run ID: **CVAA1_160617A** SeqNo: **1251301**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5100	0.10	0.500	0	102%	85	115	0.510	0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Greenway Partners
Work Order: 1606141
Project: 104.15 Elk River Slough

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-33485** Batch ID: **33485** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:48:15 PM** Prep Date **6/16/2016**
Client ID: Run ID: **CVAA1_160617B** SeqNo: **1251332**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5000	0.10	0.500	0	100%	85	115	0			

Sample ID **LCSD-33485** Batch ID: **33485** Test Code: **MERCS** Units: **mg/kg** Analysis Date **6/17/2016 2:49:35 PM** Prep Date **6/16/2016**
Client ID: Run ID: **CVAA1_160617B** SeqNo: **1251333**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.5100	0.10	0.500	0	102%	85	115	0.500	1.98%	20	

2-304

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

P. 1 of 3

NORTH COAST LABORATORIES LTD.
5680 West End Road • Arcata • CA 95521-9202
707-822-4649 Fax 707-822-6831

Chain of Custody

LABORATORY NUMBER: 1606141

Attention: Greenway Partners
Results & Invoice to: Steve Salzman, Nathan Sanger
Address: 1385 8th St, Arcata, CA, 95521

Phone: 707-822-0597
Copies of Report to: salzman@greenwaypartners.net, sanger@greenwaypartners.net
Sampler (Sign & Print): Nathan Sanger

TAT: ☑ STD (2-3 Wk) ☐ Other:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH SAMPLES.

REPORTING REQUIREMENTS:
☐ State Forms
☐ Geotracker ☐ SWAMP ☐ Other EDD:
☑ Final Report PDF ☐ FAX By:

CONTAINER CODES: 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—40 ml VOA; 9—60 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other
PRESERVATIVE CODES: a—HNO_3; b—HCl; c—H_2SO_4; d—$Na_2S_2O_3$; e—NaOH; f—$C_2H_3O_2Cl$; g—other

PROJECT INFORMATION

Project Number: 104.15
Project Name: Elk River Slough
Purchase Order Number:

2-305

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	ANALYSIS: EPA 6010: CAM 17 metals	CONTAINER: 1	PRESERVATIVE: -
	B1@6-12"	6/8/16	10:00	S	X		
	B1@18-24"		10:10		X		
	B1@3-3.5'		10:40		X		
	B1@6-6.5'		11:00		X		
	B2@6-12"		10:20		X		
	B2@18-24"		10:30		X		
	B2@3-3.5'		10:50		X		
	B3@6-12"	6/7/16	12:30		X		
	B3@18-24"		12:45		X		
	B3@3-3.5'		13:00		X		

SAMPLE CONDITION/SPECIAL INSTRUCTIONS

3.0 19.0°C on ice
Samples labeled as Eureka Slough, please re-label as Elk River Slough

004 AD

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
Nathan Sanger	6/8/16 16:50	Ashley Dunnal	6-8-16 16:50

SAMPLE DISPOSAL
☑ NCL Disposal of Non-Contaminated
☐ Return ☐ Pickup

CHAIN OF CUSTODY SEALS Y/N/NA
SHIPPED VIA: UPS Fed-Ex Hand

***MATRIX:** DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; WW=Waste Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

P. 2 of 3

NORTH COAST LABORATORIES LTD.
5680 West End Road • Arcata • CA 95521-9202
707-822-4649 Fax 707-822-6831

Chain of Custody

LABORATORY NUMBER: 1606141

Attention: Greenway Partners
Results & Invoice to: Steve Salzman, Nathan Sanger
Address: 1385 8th St, Arcata, CA, 95521

Phone: 707-822-0597
Copies of Report to: salzman@greenwaypartners.net, sanger@greenwaypartners.net
Sampler (Sign & Print): Nathan Sanger

TAT: ☑ STD (2-3 Wk) ☐ Other:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH SAMPLES.

REPORTING REQUIREMENTS:
☐ State Forms
☐ Geotracker ☐ SWAMP ☐ Other EDD:
☑ Final Report PDF ☐ FAX By:

CONTAINER CODES: 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—40 ml VOA; 9—60 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other
PRESERVATIVE CODES: a—HNO_3; b—HCl; c—H_2SO_4; d—$Na_2S_2O_3$; e—NaOH; f—$C_2H_3O_2Cl$; g—other

PROJECT INFORMATION

Project Number: 104.15
Project Name: Elk River Slough
Purchase Order Number:

2-306

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	PRESERVATIVE: -	CONTAINER: 1	ANALYSIS: EPA 6010: CAM 17 metals
	B3@ 6-6.5'	6/7/16	13:30	S			X
	B4@ 6-12"	↓	11:15	↓			X
	B4@ 18-24"		11:25				X
	B4@ 3-3.5'		11:40				X
	B5@ 6-12"		14:20				X
	B5@ 18-24"		14:30				X
	B5@ 3-3.5'		14:45				X
	B5@ 6-6.5'		15:00				X
	B6@ 6-12"		10:00				X
	B6@ 18-24"	↓	10:15	↓			X

SAMPLE CONDITION/SPECIAL INSTRUCTIONS

3.6 19.6°C on ice

004 AD

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
Nathan Sanger	6/8/16 16:50	Ashley Dawal	6-8-16 16:50

SAMPLE DISPOSAL
☑ NCL Disposal of Non-Contaminated
☐ Return ☐ Pickup

CHAIN OF CUSTODY SEALS Y/N/NA
SHIPPED VIA: UPS Fed-Ex Hand

***MATRIX:** DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; WW=Waste Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

P. 3 of 3

NORTH COAST LABORATORIES LTD.
5680 West End Road • Arcata • CA 95521-9202
707-822-4649 Fax 707-822-6831

Chain of Custody

LABORATORY NUMBER: 1006141

Attention: Greenway Partners
Results & Invoice to: Steve Salzman, Nathan Sanger
Address: 1385 8th St, Arcata, CA, 95521

Phone: 707-822-0597
Copies of Report to: salzman@greenwaypartners.net, sanger@greenwaypartners.net
Sampler (Sign & Print): Nathan Sanger

TAT: ☑ STD (2-3 Wk) ☐ Other:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH SAMPLES.

REPORTING REQUIREMENTS:
☐ State Forms
☐ Geotracker ☐ SWAMP ☐ Other EDD:
☑ Final Report PDF ☐ FAX By:

CONTAINER CODES: 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—40 ml VOA; 9—60 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other
PRESERVATIVE CODES: a—HNO_3; b—HCl; c—H_2SO_4; d—$Na_2S_2O_3$; e—NaOH; f—$C_2H_3O_2Cl$; g—other

PROJECT INFORMATION

Project Number: 104.15
Project Name: Elk River Slough
Purchase Order Number:

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	PRESERVATIVE	CONTAINER	ANALYSIS: EPA 6010: CAM 17 metals
	B6@3-3.5'	6/7/16	10:40	S	--	1	X
	B6@6-6.5'	6/7/16	11:00	S			X

SAMPLE CONDITION/SPECIAL INSTRUCTIONS

3.6 / 19.6°C on ice

004 AD

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
Nathan Sanger	6/8/16 16:50	Ashley Durand	6-8-16

SAMPLE DISPOSAL
☑ NCL Disposal of Non-Contaminated
☐ Return ☐ Pickup

CHAIN OF CUSTODY SEALS Y/N/NA
SHIPPED VIA: UPS Fed-Ex Hand

***MATRIX:** DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; WW=Waste Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

2-307

Appendix F

Hydrology Evaluation

Hydrologic Evaluation for the

Elk River Estuary and Intertidal Enhancement Project

Greenway Partners

June 30, 2016

T I D A L D A T U M S

Tidal datums at SAMOA, HUMBOLDT BAY based on:

LENGTH OF SERIES:	3 MONTHS
TIME PERIOD:	December 2010 - February 2011
TIDAL EPOCH:	1983-2001
CONTROL TIDE STATION:	9418767 NORTH SPIT, HUMBOLDT BAY

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

MEAN HIGHER HIGH WATER	MHHW	=	2.245
MEAN HIGH WATER	MHW	=	2.026
MEAN SEA LEVEL	MSL	=	1.215
MEAN TIDE LEVEL	MTL	=	1.211
MEAN LOW WATER	MLW	=	0.395
North American Vertical Datum	NAVD88	=	0.219
MEAN LOWER LOW WATER	MLLW	=	0.000

North American Vertical Datum (NAVD88)

Bench Mark Elevation Information	In METERS above:	
Stamping or Designation	MLLW	MHW
8817 B 1978	5.629	3.603
NO 2 1962	3.465	1.439
F 735 1944	5.312	3.286
Z 109 1967	4.974	2.948
W 1403 1988	8.022	5.996

STEVE, I put this in to show that there is a pretty sizeable difference between MSL and NAVD88 on the north spit. You were referring to the elevations you're using as MSL. Where did you get the MSL reference? As far as I know, the LiDAR surface I've been working with is in NAVD88.

Background

This multi-phase, multi-year Project will expand the Elk River estuary resulting in enhanced and restored inter-tidal wetlands on up to approximately 223 acres, between U.S. Highway 101 and

the North Coast Railroad Authority's right-of-way, stretching from Hikshari' Trail south to King Salmon. The work will include removal of dikes and tide gates and the excavation of tidal channels that facilitate the flooding of these former, diked bay lands. The process will restore salt marsh and provide brackish water habitat for marine organisms and shore birds. The Project will include treatments such as living shorelines along Highway 101 and the railroad right-of-way to protect them from the impact of sea level rise and tide gates to protect upstream properties from inundation.

The Project is divided into 4 areas (Figure 1). Areas 1 and 2 are owned by the City of Eureka. Areas 3 and 4 are owned by multiple private parties. Phase I of the Project has been funded by the State Coastal Conservancy and will result in conceptual designs for all 4 Areas, 30% design and the completion of environmental documents and permit applications for Areas 1 and 2. Phase II (Design) will result in completed designs and construction costs estimates for Areas 1 and 2. Phase III will be for construction of Areas 1 and 2. A project proponent must step forward for the additional work to be done on Areas 3 and 4.

This study characterizes the existing hydrologic characteristics of each Area, describes their stormwater and tide water control structures and discusses the potential impacts of the Project.

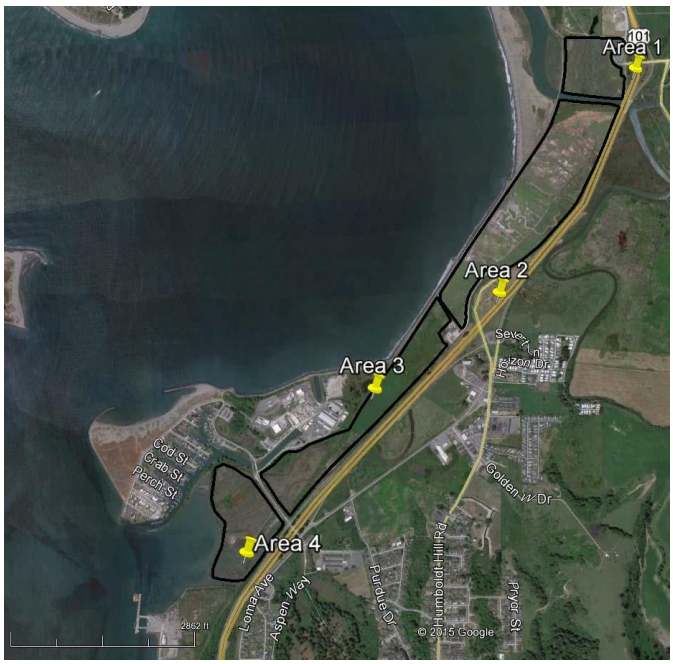

Figure 1. Elk River estuary and inter-tidal wetlands enhancement Areas 1-4.

The vegetative mapping of the Areas is presented in Figure 2.

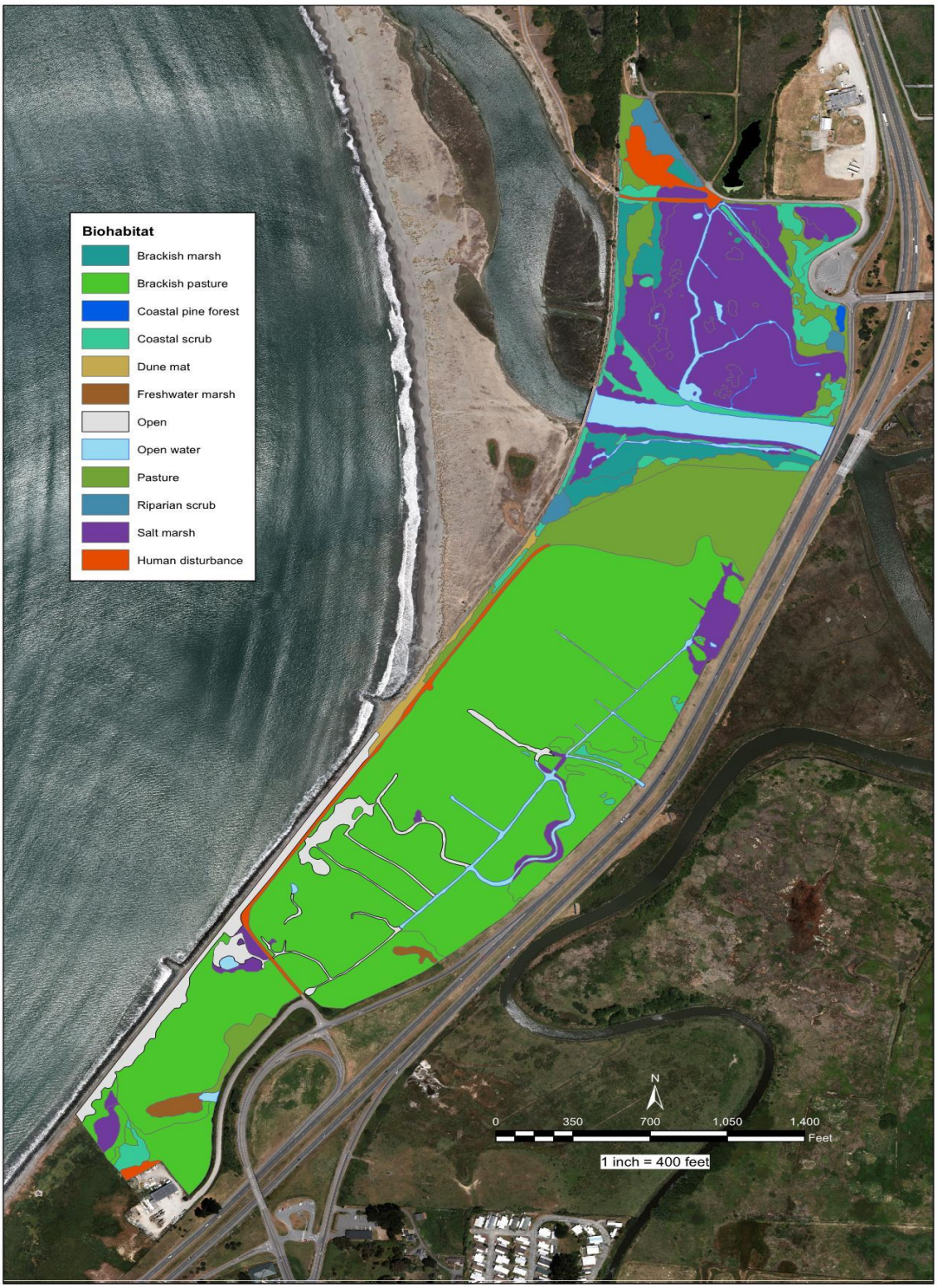

Figure 2. Elk River Estuary Vegetative Mapping, Areas 1-2.

Area 1

Area 1 is approximately 23 acres, in size (Figure 3). Historically, this was part of a much larger Elk River estuary complex and was probably salt marsh. In the early 1900's, the area was diked off from the river, crisscrossed with roads and railroads and developed for farming and/or

grazing. A regular system of drainage ditches were dug and connected to the existing tidal channels. The tidal channels were connected to the river through tide gates.

Area 1 is currently a salt marsh dominated by Spartina (a non-native, invasive salt marsh species). The historic channels are still present but the drainage ditches are no longer visible. The tidal channels are 15’ to 20’ wide and taper to 2’ wide as they reach up into the site. A set of dual tide gates (xx” diameter) are fairly new and are adjusted to produce a muted tide cycle in the existing channels. Elevations across the site range from 11’ (NAVD 88) to 5’ with the channel thalweg running from xx’ at the tide gates to approximately 3’ at the upper ends. Most of the channel completely dewaters between cycles.

The channels are also fed with freshwater (stormwater and groundwater) from seasonal wetlands and upstream sources. This freshwater enters the tidal channels through old, malfunctioning tide gates (12” – 18” diameter), at three locations. The freshwater wetlands have a very-muted tidal cycle and show minor signs of brackish water entering these areas through the tide gates. There is also a xx” diameter culvert that allows runoff from the Caltrans roadside ditch to enter the area. Its inlet appears to be plugged with vegetation and sediment.

The concept for enhancement of Area 1 includes the widening and deepening of the channels and removal of the dual tide gates and most of the earthen levy along the Elk River boundary. The channel thalweg would be lowered to coincide with the thalweg in Elk River. This would allow for a non-muted tidal cycle and more complete inundation of the salt marsh plain. It is anticipated that eel grass will colonize the deeper zones within the channels. A series of techniques will be employed (experimented with) to eradicate the Spartina.

The tide gates protecting the freshwater seasonal marshes would have to be repaired unless the adjoining property owners would like to participate in the enhancement project, in which case they would be removed.

Figure 3. Elk River estuary and inter-tidal wetlands enhancement Area 1.

Area 2Area 2 is approximately 95 acres, in size (Figure 3). It was also part of the historic Elk River estuary complex and was probably a salt marsh. Prior to being diked, it was separated from the bay by a sand dune shoreline. It is likely that waves overtopped the dunes and flooded the area with salt water during storm events. It was also diked, crisscrossed with roads/railroads and a regular system of drainage ditches was installed connecting the historic tidal channels with tide gates.

Area 2 is currently a brackish pasture separated from the river by a sand dune on the north side and Highway 101 on the east side and from the bay by a sea wall/railroad bed on the west. Between 1985 and 2006, the City used the parcel for the land application of biosolids and leased it to a cattle rancher. The biosolids application was discontinued in 2006, but the grazing

lease is still active. Elevations across the site range from approximately 4’ to 10’. Much of the land has subsided due to oxidation of the organics and compaction from the cattle. The historic tidal channels and drainage ditches are still present but have a very diminished capacity as they have been trampled by cows and repeated disking. Rainwater imperfectly drains from the field through two xx” diameter tide gates and culverts located under the highway. The tide gates leak or possibly leaked in the past as the pasture shows signs of brackish water influences. The soils are heavy clayey-silt and are poorly drained. Two weeks after the last rain, water was still standing in some of the drainage ditches. Groundwater was approximately 2.5 feet below the surface. Aleutian Geese also utilize the site as it is very good short-grass grazing habitat.

The concept for enhancement of Area 2 is very similar to that for Area 1. Plan includes widening and deepening the historic tidal channels, filling of the regular system of ditches, and removal of the most of the earthen levy along the Elk River boundary. The channel thalweg would be designed to coincide with the thalweg in Elk River. This would allow for a non-muted tidal cycle and unobstructed inundation of the salt marsh plain. It is anticipated that sediments from Elk River would accrete in the low-lying areas raising the topography back to an ideal elevation for salt marsh, over time. This phenomenon will allow the marsh to migrate uphill as sea levels rise. It is also anticipated that eel grass will colonize the deeper zones within the channel.

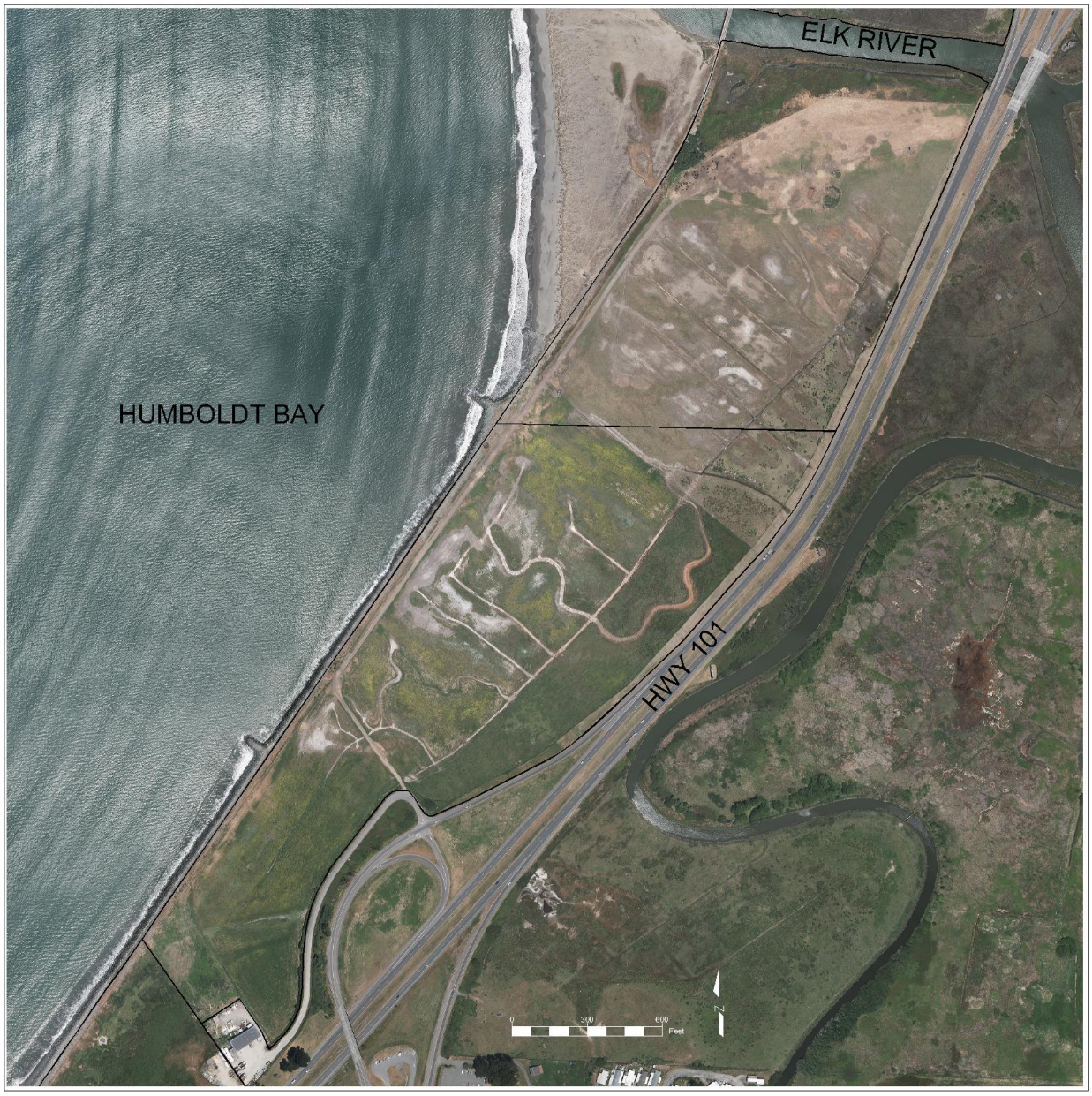

Figure 4. Elk River estuary and inter-tidal wetlands enhancement Area 2.

Area 3

Area 3 is approximately 56 acres (Figure 4) and was part of the historic Buhne Slough complex and probably mostly salt marsh. From an examination of old aerial photos and survey maps, it appears that Buhne Slough had two connection points with the bay; one south of King Salmon and the other a little to the north. The slough also probably collected and conveyed stormwater runoff from the current Humboldt Hill area. Area 3 was diked off and isolated from the bay and stormwater runoff by Old Highway 101 (South Broadway) and the railroad bed/sea wall. The

oxbow was cut off and the northern terminus of the slough was isolated when the new Highway 101 was built. Tide gates and culverts under Highway 101 and the railroad allowed stormwater to drain from the oxbow and through the remaining southern end of the slough out into the bay by King Salmon. The southern end of the slough was deepened and widened to allow boat access into King Salmon. When the power plant and cooling water intake was constructed, Buhne Slough was separated from the channel with a tide gate.

Area 3 is currently a brackish pasture used for cattle grazing. Elevations across the site range from approximately 4’ to 10’. Much of the land has subsided due to oxidation of the organics and compaction from the cattle. The northern portion of the channel of Buhne Slough on that side of the Highway is barely visible as it has been trampled by cows and is no longer connected to the bay or to the remainder of the slough on the east side of the Highway. Rainwater imperfectly drains from the field through a Caltrans roadside ditch that conveys runoff to the south where it enters the remaining portion of Buhne Slough. The conveyance of stormwaters through the remnants of Buhne Slough is very restricted as the culverts and slough channel have not been maintained. This results in stormwater flooding on the east side of Highway 101 and South Broadway. Buhne Slough’s tide gate is old and malfunctioning and allows a very muted tidal cycle part way up the slough, possibly as far as the highway.

The concept for enhancement of Area 3 is to open up the tide gate and reestablish a non-muted tidal cycle, in Buhne Slough up to the highway. The existing drainage system would have to be cleaned out and a tide gate installed on the 4’x10’ box culvert under the highway to protect the pastures on the east side. An add-on concept is to extend the tidal prism further north up to the historic terminus of Buhne Slough. The existing drainage ways would have to be deepened and widened. It is anticipated that like in Area 2, sediments from the bay would accrete in the low-lying areas raising the topography back to an ideal elevation for salt marsh, over time. This phenomenon will allow the marsh to migrate uphill as sea levels rise. It is also anticipated that eel grass will colonize the deeper zones within the channel. The presence of a 10” diameter natural gas line feeding the power plant may severely restrict any excavation in that area.

Figure 5. Elk River estuary and inter-tidal wetlands enhancement Area 3.

Area 4

Area 4 is a 33 acre section east of Highway 101 and south of the Humboldt Bay Power Plant (Figure 5). Most of the section is around 4' elevation and rises to around 8' along the railroad and highway. Similar to Area 3, the area has been diked off from Humboldt Bay and contains the southern terminus of Buhne Slough and a narrow branch slough which drains from the highway and Humbold Hill. It appears that Buhne Slough is blocked and only drains to the

intake channel through a poorly maintained tidegate. Along the southern section, the dike has breached and opens tidally to the bay

In the mid 1960's, there was some development in Area 4. Two rectangular (salt/oxidation?) ponds were developed within a 2 acre parcel owned by Humboldt County. These ponds have been abandoned and show only traces of their outline. On an adjoining private parcel, a new commercial business (boat yard, restaurant?) with a building and parking area is evident in the early 1960's photos and through the mid 1970's. The business had been clearly abandoned by the 1980's.

The restoration concept for Area 4 is to remove the tidegate between the Intake Channel and Buhne Slough, develop a wider, deeper channel for the small lateral which is open to the bay, and develop a new drainage way from the south breach into the interior. It is anticipated that similar to Area 3, sediments from the bay would accrete in the low-lying areas raising the topography back to an ideal elevation for salt marsh, over time. This phenomenon will allow the marsh to migrate uphill as sea levels rise. It is also anticipated that eel grass will colonize the deeper zones within the channel.

Figure 6. Elk River estuary and inter-tidal wetlands enhancement Area 4.

Appendix G

Results of the Nine-Quadrangle Search for Special Status Species

Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project

Special Status Species Resulting from the USGS Nine-Quadrangle Search

Trinity Associates

June 2017

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Presence of Special Status Species

Special status species are legally protected pursuant to the California Environmental Quality Act (CEQA) Section 15380, and include species protected under California and federal Endangered Species Acts, and California's "Fully Protected Species" statutes (Fish and Game Code Sections 3503.5, 3505, 3511, 4700, 5050, and 5515). The species list assembled for the Elk River includes species that are likely to be present or were found to be present during field surveys conducted by qualified scientific staff. This list has been developed from field surveys, online databases maintained by the CDFW and U.S. Fish & Wildlife Service (USFWS) for a standard nine-quadrangle search focused on the project location (USGS "Eureka" and "Fields Landing" quadrangles) and additional adjacent USGS quadrangles (Tyee City, Arcata North, McWhinney Creek, Arcata South, and Cannibal Island) and from DFW's List of Special Animals and List of Special Plants. Note the USGS quadrangles reported sum to seven (not nine) due to the adjacency of the Pacific Ocean. The list of target plant species was compiled by querying the California Native Plant Society (CNPS) Online Database, the California Natural Diversity Database (CNDDB), and the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) website for rare, threatened, and endangered species known to occur within the project area.

Birds and Wildlife

Special status wildlife species that may occur in the project area as a result of the USGS nine-*quadrangle* search have been assessed to highlight those species for which suitable habitat exists in the project area (Table 1).

There are several bird species covered under California's Protected Species statutes (Fish and Game Code Sections: 3503.5, 3505, 3511). While not given the *designation of "Fully Prot*ected", birds in the orders Falconiformes and Strigiformes have special status under Section 3503.5 since "take" (capture or kill) cannot be authorized. The same can be said for egrets (as specified in Section 3505) since "take" is considered unlawful. The general breeding period for those species likely to nest near the project area is February through August.

Federally Threatened Species

The California clapper rail *(Rallus longirostris obsoletus)* is federally endangered and potentially found in the Eureka quadrangle. The California clapper rail preferred habitat is salt marsh vegetation (cordgrass and pickleweed). Once common in coastal salt marshes in northern and central California, the California Clapper Rail has declined precipitously in both range and number. Hunters killed thousands of rails each week prior to 1900, and widespread urbanization and diking of wetlands led to massive destruction of the California Clapper Rail's habitats. With project implementation, habitat for the California Clapper Rail should increase. Any impacts will be temporary.

Western snowy plover *(Charadrius alexandrinus nivosus)* if federally threatened. The species nests in dune habitat, which occurs in upland areas of Area 2. These upland areas are co-located with homeless encampments and impacted by transient individuals and dogs. Given these impacts, the likelihood of snowy plover presence in these areas is small.

Bitterns, Herons and Egrets (Ardeidae)

Four species in the family Ardeidae may utilize the project area: great blue heron (*Ardea Herodias)*, great egret (*Ardea alba*), snowy egret (*Egretta thula*), and black-crowned night heron

(*Nycticorax nycticorax*). Great blue heron, snowy egret, and black-crowned night heron forage in freshwater, brackish-water, and tidewater environments. Great egrets forage in seasonal freshwater wetlands or pastures. Great blue heron, great egret, snowy egret, and black-crowned night heron are colonially nesting species. There nearest known rookery is located on Indian Island, more than four miles north in Humboldt Bay. Green heron is a solitary nester that utilizes riparian habitat, which is presently limited to 0.2 acres in Area 2.

Diurnal Raptors (Accipitridae)

Eight species of diurnal raptors may utilize the project area: northern harrier (*Circus cyaneus*), white-tailed kite (*Elanus leucurus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), merlin (*Falco columbarius*), and Peregrine falcon (*F. peregrinus anatum*). These raptors can occupy a wide variety of habitats such as open pastures, forest edges, and open water.

Owls (Strigiformes)

The one owl species that might utilize the project area is the great grey owl *(Strix nebulosa), which is listed as State endangered.* They are rare in California and not believed to be present in the project area. In 2016, a great grey owl was spotted in Prairie Creek Redwoods State Park, the first sighting in Humboldt County in 15 years.

Additional Species

There are several special-status species that may utilize the project area, including black-capped chickadee (*Poecile atricapillus*), yellow-breated chat (*Icteria virens*), and yellow warbler (*Dendroica petechia*), and bank swallow (*Riparia riparia*). The double-crested cormorant *(Phalacrocorax auritus)* is on the State watch list and could potentially be present within the project area.

The California brown pelican (*Pelecanus occidentalis californicus)* is common on nearby Humboldt Bay, but there are no known breeding colonies within the project area.

Potential Adverse Impacts to Bird Species Habitats

The project will directly affect brackish marsh habitat utilized by several bird special species of concern. In the short-term, 20.8 acres of degraded brackish marsh habitat will be impacted from placement of fill to restore a mosaic of tidal marsh. This short-term impact will result in a long-term benefit, enhancing salt marsh and tidal wetland habitats for numerous bird species. The project will also create 12.6 acres of new riparian habitat that will benefit numerous bird species. Under existing conditions, riparian habitat is limited to 0.2 acres.

Table 1. *List of special status bird species potentially present based on a nine USGS quadrangle search from the CDFW BIOSExport web mapping tool.*

Common Name	Scientific Name	Status	Potential to be Present in Project Area
American peregrine falcon	*Falco peregrinus anatum*	State Fully Protected	Yes
Bald eagle	*Haliaeetus leucocephalus*	State Endangered, State Fully Protected	Yes
Bank swallow	*Riparia riparia*	State Threatened	Yes
Black-capped chickadee	*Poecile atricapillus*	State Watch List	Yes
California brown pelican	*Pelecanus occidentalis californicus*	State Fully Protected	No
California Clapper Rail	*Rallus longirostris obsoletus*	Federally Endangered, State Endangered, State Fully Protected	Yes
Double-crested cormorant	*Phalacrocorax auritus*	State Watch List	Yes
Great grey owl	*Strix nebulosa*	State Endangered	No
Long-billed curlew	*Numenius americanus*	State Watch List	
Marbled murrelet	*Brachyramphus marmoratus*	Federal Threatened, State Endangered	No
Mountain plover	*Charadrius montanus*	State Species of Concern	No
Northern harrier	*Circus cyaneus*	State Species of Concern	Yes
Western snowy plover	*Charadrius alexandrinus nivosus*	Federal Threatened, State Species of Concern	Yes
White-tailed kite	*Elanus leucurus*	State Fully Protected	Yes
Yellow-breasted chat	*Icteria virens*	State Species of Concern	Yes
Yellow warbler	*Setophaga petechia*	State Species of Concern	Yes
Black-crowned night heron	*Nycticorax*	None	Yes

	nycticorax		
Cooper's hawk	*Accipiter cooperii*	None	Yes
Great blue heron	*Ardea herodias*	None	Yes
Great egret	*Ardea alba*	None	Yes
Merlin	*Falco columbarius*	None	Yes
Osprey	*Pandion haliaetus*	None	Yes
Sharp-shinned hawk	*Accipiter striatus*	None	Yes
Snowy egret	*Egretta thula*	None	Yes

Fish

Special status fish species that may occur in or adjacent to the project area as a result of the USGS nine-quadrangle search (Table 2). Impacts to fish will be avoided by sequencing construction to excavating new inter-tidal channels before they are connected to the existing estuary's channel network, timing construction to coincide with low tides, and closing the tide gates in Area 1 to minimize fish presence. New channels will be inundated for the first time as a final step, eliminating the any possible impacts or take. Species may be present within the mainstem Elk River; however, the mainstem Elk River is not included in Area 1 or Area 2 and is thus not in the project area.

Current habitat is largely limited to the mainstem Elk River habitat as a result of existing dikes and tide gates in Area 1 that limit fish access into tributary slough channels and in-board ditches in Area 1. Fish entry into Area 2 is presently not possible, with the exception of a small in-board ditch parallel to the Elk River.

Protected species and species of concern during various life stages are likely to occupy open water habitats in the project area, at various times of year. According to CDFW monitoring ((Wallace and Allen 2007, Wallace and Allen 2009, Wallace and Allen 2012), salmonids currently utilizing the estuary include:

- Chinook Salmon -- federally threatened,
- Coho Salmon -- federally and state endangered,
- Northern California Steelhead) -- federally threatened, and
- Coast Cutthroat Trout -- state species of concern.

The project area has been designated by NMFS as Critical Habitat and Essential Fish Habitat for Chinook and Coho Salmon, as well as northern California Steelhead Trout. These species utilize the Elk River estuary during all life stages (juvenile rearing through adult holding).

A primary goal of this project is to increase the quantity and quality of available salmonid habitat in the Elk River estuary to benefit the watershed (and region) as a whole. Region-wide overwintering habitat for juvenile Coho Salmon is considered a limiting factor in species recovery (NOAA 2014). The NMFS Southern Oregon/Northern California (SONC) Coho Recovery Plan (2012) prioritizes restoration actions that will increase overwintering habitat for Coho juveniles. This project will significantly increase the amount of estuary habitat available for

overwintering coho salmon juveniles, as well as other juvenile salmonid species.

A Tidewater Goby eDNA survey was conducted by Humboldt State University at 9 locations throughout the project area in July 2016. Survey results indicated the area is not presently utilized by tidewater goby (Kinzinger 2016). According to USFWS (2005), Tidewater Goby is a small fish, rarely exceeding two ines in length. Most individuals complete their life cycle in one year, but in northern California fish can live as long as three years (Chamberlain 2005). Tidewater goby are exclusive to brackish habitats for their entire life cycle, and prefer water with salinity less than 12 parts per thousand (ppt), but can be found in water of 0-41 ppt. The project area is considered Critical Habitat for Tidewater Goby. While not currently present, the project will result in the expansion of Tidewater Goby habitat, currently limited under existing conditions, to expand their future utilization of the Elk River estuary.

Longfin smelt are a state-listed species. Monitoring conducted by CDFW between 2005 and 2009 in the lower Elk River estuary detect a small number of longfin smelt present during winter months only (CDFW 2005, CDFW 2006, CDFW 2007, CDFW 2008, and CDFW 2009). Once complete, this project will increase the availability of the type of estuary habitat preferred by the longfin smelt and may benefit the species greatly.

Eulachon, green sturgeon, and Pacific Lamprey may be present in the mainstem Elk River but will not be impacted because construction will not occur within the wetted footprint of the mainstem channel. There is a small chance these species may be present in small tributary slough channels or in-board ditches located in Area 1; however, protection measures outlined, in combination with standard BMPs, will ensure these species are also unharmed during project implementation. There is federally designated Critical Habitat in the project area for green sturgeon.

Table 2. *List of fish species potentially present based on a nine USGS quadrangle search from the CDFW BIOSExport web mapping tool.*

Common Name	Scientific Name	Status	Habitat Present in Project Area
Chinook salmon-California Coast ESU	*Oncorhynchus tshawytscha*	Federal Threatened, Critical Habitat, Essential Fish Habitat	Yes
Coast cutthroat trout	*Oncorhynchus clarkii clarkii*	State Species of Concern	Yes
Coho salmon - southern Oregon / northern California ESU	*Oncorhynchus kisutch*	Federal Threatened, State Threatened, Critical Habitat, Essential Fish Habitat	Yes
Eulachon	*Thaleichthys pacificus*	Federal Threatened	Yes
Green sturgeon	*Acipenser medirostris*	Federal Threatened, Critical Habitat (Humboldt Bay)	Yes
Longfin smelt	*Spirinchus thaleichthys*	Federal Candidate, State Threatened, State Species of Concern	Yes
Pacific Lamprey	*Entosphenus tridentatus*	State Species of Concern	Yes
Steelhead - northern California DPS	*Oncorhynchus mykiss irideus*	Federal Threatened, Critical Habitat, Essential Fish Habitat	Yes
Summer-run steelhead trout	*Oncorhynchus mykiss irideus*	State Species of Concern	Yes
Tidewater goby	*Eucyclogobius newberryi*	Federal Endangered, Critical Habitat	Yes

Plants

McBain Associates conducted nine-quadrangle database searches for sensitive plant species listed for the project area on CNDDB (CDFW 2014), California Native Plant Society online listings, and USFWS species list (Table 3). The database searches were conducted to identify known occurrences of threatened, endangered, or special-status plant species as well as sensitive-listed plant species with potential to occur in the project area. Most sensitive-listed plants were determined to not require further consideration because habitat requirements were not present within the project study boundary. Many of the plants eliminated from further consideration are associated with coastal sand dunes, coastal bluffs, or forested environments, which are not present in the project area and thus these species have a low likelihood of occurrence in the project study boundary.

Several sensitive-listed plants are generally associated with coastal salt marsh habitat, which does occur in portions of the project study boundary, and thus have potential to occur on the project site. Species observed during the vegetation investigation (McBain Associates 2016) include:

- Humboldt Bay owl's clover occurred in several locations in the project area (Figure 1 and Figure 2) The largest occurrence was on the south bank of the Elk River in Area 2, where it grew in an approximately continuous band (Figure 1). Other much smaller occurrences were found in salt marsh areas; none of the occurrences were larger than approximately 200 individuals, with the exception of the south bank occurrence.

- Lyngbye's sedge was found in two locations in the project area (Figure 1 and Figure 2). The location in Area 1 consisted of a small clump approximately 15 ft × 20 ft. The location in Area 2 consisted of single stems growing along the south bank of the Elk River among salt rush, sweet vernal grass (*Anthoxanthum odoratum*), tall fescue, and other graminoids.

- Two rare dune mat species were found on the railroad grade adjacent to Area 2 (Figure 3), Beach layia and dark-eyed gilia occurred in a small sand deposit that had blown over the railroad tracks from the northwest. The small occurrences (i.e., < 20 individuals) of beach layia, a state and federally endangered plant, and dark-eyed gilia were likely part of larger populations that grows on the adjacent sand dunes of Elk River Spit.

- Sea-watch was found scattered throughout Areas 1 and 2.

- Eelgrass has not been observed in Area 1 or Area 2 and is presently limited to the mainstem Elk River, outside of the project area. High flows from the recent (2016/2017) wet winter may have impacted local eelgrass populations due to high levels of freshwater. The upper elevational limit of eelgrass may ultimately be constrained by decreasing salinity associated with mainstem Elk River freshwater inflows to the project area. Eelgrass is known to grow well in the sand and silt substrate expected through the restored tidal channel network in the project area. The project will result in up to nine new acres of eelgrass habitat.

Figure 1. Area 1 rare plant locations for Humboldt Bay owl's clover and Lyngbye's sedge.

Figure 2. Area 2 rare plant locations for Humboldt Bay owl's clover and Lyngbye's sedge.

Figure 3. Location of beach layia and dark-eyed gilia in Area in

Table 3. *List of target plant species compiled by querying the California Native Plant Society (CNPS) Online Database, the California Natural Diversity Database (CNDDB), and the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) website for rare, threatened, and endangered species known to occur within and adjacent to the project area (nine USGS quadrangle search). Adapted from McBain Associates 2016.*

Common Name	Scientific Name	State/Fed. Status	Habitat Present in Project Area
Pink sand-verbena	*Abronia umbellata var. breviflora*	None	No, but habitat present adjacent to project
Sea-watch	*Angelica lucida*	None	Yes
Slender silver moss	*Anomobryum julaceum*	None	No
Coastal marsh milk-vetch	*Astragalus pycnostachyus var. pycnostachyus*	None	Yes
Rattan's milk-vetch	*Astragalus rattanii var. rattanii*	None	No
False gray horsehair lichen	*Bryoria pseudocapillaris*	None	Yes, but coniferous forest not present
Twisted horsehair lichen	*Bryoria spiralifera*	None	Yes, but coniferous forest not present
Seaside bittercress	*Cardamine angulata*	None	Yes

Common Name	Scientific Name	State/Fed. Status	Habitat Present in Project Area
Northern clustered sedge	*Carex arcta*	None	Yes
Bristle-stalked sedge	*Carex leptalea*	None	Yes
Lyngbye's sedge	*Carex lyngbyei*	None	Yes
Northern meadow sedge	*Carex praticola*	None	Yes
Humboldt Bay owl's-clover	*Castilleja ambigua var. humboldtiensis*	None	Yes
Oregon coast paintbrush	*Castilleja litoralis*	None	Yes
Point Reyes bird's-beak	*Chloropyron maritimum ssp. palustre*	None	Yes
Pacific golden saxifrage	*Chrysosplenium glechomifolium*	None	Yes
Whitney's farewell-to-spring	*Clarkia amoena ssp. whitneyi*	None	Yes
Tracy's collomia	*Collomia tracyi*	None	No
Small spikerush	*Eleocharis parvula*	None	Yes
Menzies' wallflower	*Erysimum menziesii*	Federal Endangered, State Endangered	No, but habitat present adjacent to project
Coast fawn lily	*Erythronium revolutum*	None	Yes, but not likely
Minute pocket moss	*Fissidens pauperculus*	None	No
Pacific gilia	*Gilia capitata ssp. pacifica*	None	Yes
Dark-eyed gilia	*Gilia millefoliata*	None	No, but habitat present adjacent to project
American glehnia	*Glehnia littoralis ssp. leiocarpa*	None	No, but habitat present adjacent to project
Short-leaved evax	*Hesperevax sparsiflora var. brevifolia*	None	Yes
Glandular western flax	*Hesperolinon adenophyllum*	None	No
Harlequin lotus	*Hosackia gracilis*	None	Yes
Seaside pea	*Lathyrus japonicus*	None	No, but habitat present adjacent to project

Common Name	Scientific Name	State/Fed. Status	Habitat Present in Project Area
Marsh pea	*Lathyrus palustris*	None	Yes
Beach layia	*Layia carnosa*	Federal Endangered, State Endangered	no, but habitat present adjacent to project
Kellogg's lily	*Lilium kelloggii*	None	No
Western lily	*Lilium occidentale*	Federal Endangered, State Endangered	Yes
Redwood lily	*Lilium rubescens*	None	No
Heart-leaved twayblade	*Listera cordata*	None	Yes, but not likely
Running-pine	*Lycopodium clavatum*	None	Yes
Leafy-stemmed miterwort	*Mitellastra caulescens*	None	No
Ghost-pipe	*Monotropa uniflora*	None	No
Howell's montia	*Montia howellii*	None	Yes
Wolf's evening primrose	*Oenothera wolfii*	None	Yes
Seacoast ragwort	*Packera bolanderi var. bolanderi*	None	Yes
California pinefoot	*Pityopus californicus*	None	No
Nodding semaphore grass	*Pleuropogon refractus*	None	Yes
Oregon polemonium	*Polemonium carneum*	None	Yes
Dwarf alkali grass	*Puccinellia pumila*	None	Yes
Trailing black currant	*Ribes laxiflorum*	None	No
Maple-leaved checkerbloom	*Sidalcea malachroides*	None	Yes
Siskiyou checkerbloom	*Sidalcea malviflora ssp. patula*	None	Yes
Coast checkerbloom	*Sidalcea oregana ssp. eximia*	None	Yes
Western sand-spurrey	*Spergularia canadensis*	None	Yes
Cylindrical trichodon	*Trichodon cylindricus*	None	Yes
Methuselah's beard	*Usnea longissima*	None	No
Alpine marsh violet	*Viola palustris*	None	Yes

Potential Adverse Impacts to Plant Species Habitats

There is a potential to damage populations of special status plant species of concern if present due to scraping and placement of fill. Over the long-term, the project is expected to have a substantial benefit to species present in Table 3 by significantly increasing the amount and quality of wetland and riparian habitats.

Amphibians and Reptiles

Amphibians resulting from the CNDDB databased search for the project area and adjacent USGS quadrangles are summarized in Table 4.

Northern Red Legged Frog

Of the identified species, northern red-legged frog (*Rana aurora*), which is a State Species of Concern, may be present in small, shallow, isolated freshwater wetlands within the existing project area, but not during the period of construction (July through October). Northern red-legged frog breed December to April in ponds and streams, tadpoles develop through the spring and undergo metamorphosis June through August, adult frogs seek out water greater than three ft deep for escape from predators (USFWS 2002).

The northern red-legged frog are not salt tolerant. They utilize freshwater emergent wetlands, freshwater streams and riparian areas as well as seasonal freshwater wetland (pasture) in the project area. When not breeding adult red-legged frogs tend to spend time away from aquatic breeding areas in riparian and upland habitats (van Hattem 2010), which is not present in the project area under existing conditions. While tidal influence will be restored to the project area, only a small area of freshwater habitat appropriate for red-legged frogs is currently present. A similar or greater area of freshwater wetland will remain after project implementation.

If metamorphosing red-legged frog tadpoles are present in the project area in July or August, or adult frogs from July through October, they could be affected by construction activities, including Spartina removal. Survey and relocation will minimize these effects. Due to the leakiness of existing dikes and tidegates, most of the open water areas on the site are saline, and are unlikely to support red-legged frog tadpoles.

Northern red-legged frogs complete their metamorphosis by the end of August. Eggs and tadpoles are not expected to be present during low flow season (July through October) when construction activities are planned in these areas as warm, brackish water conditions are not utilized by this species.

Western Pond Turtles

Western pond turtles (*Actinemys marmorata marmorata*) may also be found in the project area. Northwestern pond turtles occupy a wide variety of habitats and breed April to May; nests are built along stream or pond margins and in upland areas and eggs are laid from April through August, with hatchlings emerging twelve weeks later, July through November. Pond turtles can tolerate brackish and even tidewater; they prefer pools to shallow water but can be found in wetlands, ponds, irrigation ditches and streams (www.CaliforniaHerps.Com).

Northwestern pond turtles build their nests along stream or pond margins and in upland areas and lay eggs from April through August, with hatchlings emerging twelve weeks later July through November. Excavation of the slough channels and/or Spartina removal could directly impact turtles if they have made nests and laid eggs in stream banks or levee sides in these areas.

If northwestern pond turtle hatchlings or adults are present from July through October, they could be affected when flow diverted to support construction activities. However, these reptiles would be capable of moving overland from the old channel to suitable habitat in the new channel.

Northwestern pond turtles could be affected when vegetation is cleared for excavation. To minimize possible effects, surveys will be made prior to vegetation clearing and nests will be flagged for avoidance until after hatchling emergence; adults and hatchlings will be relocated out of the work area.

Additional Species

Foothill yellow-legged frogs (*Rana boylii),* southern torrent salamanders (*Rhyacotriton variegatus*), and Pacific tailed frogs (*Ascaphus truei*) are not known to occur in the project area.

Table 4. *List of amphibians potentially found based on a nine USGS quadrangle search from the CDFW BIOSExport web mapping tool.*

Common Name	Scientific Name	Status	Habitat Present in Project Area
Foothill yellow-legged frog	*Rana boylii*	State Species of Special Concern	No
Northern red-legged frog	*Rana aurora*	State Species of Special Concern	Yes
Pacific tailed frog	*Ascaphus truei*	State Species of Special Concern	No
Southern torrent salamander	*Rhyacotriton variegatus*	State Species of Special Concern	No
Western pond turtle	*Actinemys marmorata marmorata*	State Species of Special Concern	Yes

Potential Adverse Impacts to Reptiles and Amphibians Habitats

There is a potential to damage populations of special status plant species of concern if present due to scraping and placement of fill, site dewatering, and Spartina removal. Over the long-term, the project is expected to have a substantial benefit to species present in Table 4Table 3 by significantly increasing the amount and quality of wetland and riparian habitats.

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Appendix H

Synthesis of Existing Fisheries Data and Potential Fisheries Impacts Assessment

Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project

Fisheries Summary:

Synthesis of Existing Fisheries Data

Trinity Associates

June 2017

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Summary of Project Benefits

The Elk River Estuary Enhancement Project will result in 11.3 acres of new channel, including up to 9.7 acres of potential Eelgrass habitat. In Area 1, the project will enhance 3,385 ft of existing fully tidal channels, in addition to developing 2,395 ft of new tidal channels. In Area 2, 8,8168 ft of fully tidal channels will be created.

Project implementation will also remove the large mainstem Elk River tide gates in Area 1 and allow an unrestricted tidal cycle in the entire project area. This will eliminate existing fish passage constraints in to Area 1.

Additional project elements include removing invasive Spartina, restoring 78.8 acres of wetlands (freshwater, brackish, and salt marsh), and creating 13.2 new acres of riparian habitat. The project also will extend the existing Waterfront Trail and install a small non-motorized boat landing, creating new opportunities for passive recreation and public education.

Enhancing the Elk River estuary will significantly increase the amount and quality of rearing habitat available for salmonids and other aquatic species. This rare environmental setting is one of the few areas on the North Coast that would support a large-scale estuary restoration opportunity.

Southern Oregon/Northern California (SONC) Coho Salmon are listed as endangered under the Endangered Species Act. According to data collected by CDFW (Wallace and Allen 2007, 2009 and 2012), juvenile Coho Salmon were the most abundant salmonid species observed in the lower 2.25 river miles of the Elk River. Coho Salmon and other salmonid and marine species will benefit significantly from this landscape-scale increase in restored habitat, including improved hydrology and water quality and a substantial increase in potential Eelgrass habitat.

Area 1 Habitat Description

Aquatic habitat in Area 1 is presently limited by two tide gates that restrict tidal processes and fish movement into Area 1 (Figure 1 - Figure 2). There is presently a gap between the tide gate doors and the cement housing structure that allows water, and potentially aquatic organisms, to pass.

Tidal channels behind the tide gates are dominated by a silt-clay substrate with overhanging salt marsh banks (Figure 3 - Figure 5). Salt marsh vegetation is dominated by invasive Spartina. Water present in the tidal channels is turbid and depth is unknown. There are 3,385 ft of existing tidal channels in Area 1, many of which consist of simple, linear inboard ditches.

Water salinity varies throughout the year. Salinity is lower during winter and spring months when freshwater inflow to the site via several culverts on the northern boundary of Area 1 is greater. This freshwater inflow dissipates in summer and fall, resulting in higher levels of salinity in a fully tidal environment.

Water quality in Area 1 was sampled in June 2017 during the morning hours of an ebb tide by Hans Voight of Thomas Gast and Associates (2017). Salinity was found to be 23.4 ppt, slightly higher than the salinity measured in the mainstem Elk River (20.3 ppt). Water temperature was 17.3 °C, and dissolved oxygen (DO) was 5.5 mg/l at 66.0% saturation. These water quality conditions are suitable for rearing salmonids utilizing brackish habitats. Water temperatures are likely to increase through the day due to typical diurnal fluctuations as well as throughout the

summer months. Longfin smelt will utilize area of high salinity but are rarely observed when water temperatures exceed 20.5 °C (Rosenfield 2010, cited by Voight 2017). Area 1 water temperatures are likely to approach and exceed 20.5 °C during the construction season (July through October), substantially decreasing the chances of potential Longfin smelt interactions (Voight 2017).

Concurrent with June 2017 water quality sampling during an ebb tide, the observed depth of the residual pool was 0.55 m (Voight 2017). The estimated width of the residual pool was 65 ft (19.8 m). No inflows were occurring at the time of sampling, and the tide gate was closed due to a very low tide (Voight 2017).

Figure 1. The Elk River tide gates will be removed through project actions.

Figure 2. Side view of the Elk River tide gates. Note tide gate doors are mounted away from the cement housing and are never fully sealed.

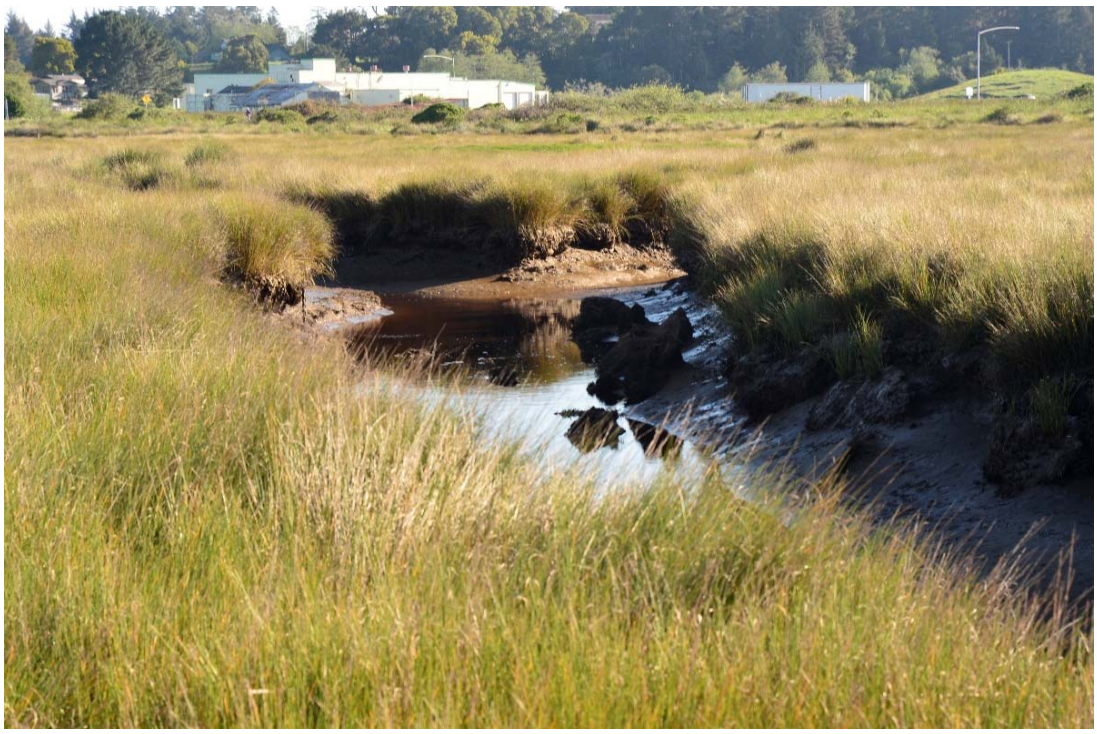

Figure 3. Existing tidal channel behind Elk River tide gates in Area 1 at first fork.

Figure 4. Residual east-side pool behind the Elk River tide gates showing small island feature.

Figure 5. Residual west-side pool behind the Elk River tide gates, looking north.

Area 2 Habitat Description

Area 2 primarily consists of a grazed pasture (Figure 6) and offers almost no habitat to salmonids or other aquatic species. The quality of any existing wetland habitat within Area 2 is poor and degraded.

There is a narrow, linear ditch behind the berm on the southern bank of the Elk River (parallel to the berm) that remains watered at low tide (Figure 7). The ditch was sampled for Tidewater Goby using EDNA and none were detected (Kinziger and Sutter 2016). The ditch has not been sampled for any other aquatic species. There is a small amount of connectivity to the mainstem Elk River through a small inlet near Highway 101 and thus a potential for fish presence.

Water quality in the ditch was sampled in June 2017 during the morning hours of an ebb tide. Salinity was observed at 31.6 ppt and 32.0 ppt, which is considered to be full strength sea water and not suitable for rearing salmonids (Voight 2017). Water temperature was observed to be 16.9 °C and 17.1 °C. Dissolved oxygen was measured at 3.78 mg/l (47.3% saturation) and 2.86 mg/l (36.0% saturation), which is much lower than the comparable DO measured concurrently in the mainstem Elk River of 7.33 mg/l (86.4% saturation). Based on these observations, rearing salmonids and longfin smelt are anticipated to be utilizing the in-board ditch habitat.

Figure 6. Existing conditions in Area 2 showing grazed pasture and Aleutian goose habitat.

Figure 7. Small area of existing ditch will be impacted for 1 to 2 days while the new Area 2 channel inlet is connected to the mainstem Elk River. Salinity in this ditch was sampled and found to be extremely high and generally unsuitable for most fish species (Voight 2017).

Summary of Existing Fisheries Data

The most recent fisheries data in the Elk River results from California Department of Fish and Wildlife's juvenile salmonid monitoring from 2005 through the middle of 2009 (Wallace and Allen 2007, 2009 and 2012.) Through this monitoring, crews made single hauls at specific sites in the mainstem Elk River estuary using a 9.1 m x 1.8 m and 6.4 mm mesh beach seine deployed by hand or boat. The bag was 1.5 m deep with 6.4 mm mesh. Sites were sampled as varying frequency over the monitoring period, at times limited by high streamflows. CDFW conducted sampling in both the lower and upper Elk River estuary; this summary focuses on results from the lower estuary only (Figure 6, Table 1 – Table 6). The monitoring effort included a limited amount of PIT tagging, but not enough data exists to develop population estimates for the Elk River.

Young of year (YOY) and 1+ Coho were the most abundantly observed across all years (Table 6). The highest number of observed individuals were consistently observed in the month of May. Smaller numbers were observed during almost all other months of the year.

YOY Chinook (123 total observations) were less common than Coho and were observed from late May through early September (Table 6). Work conducted by Wallace and Allen (2007, 2009, and 2012) also noted 33 total juvenile Steelhead and 25 total Coastal Cutthroat Trout (Table 6). Steelhead were observed in all months except for December; Coastal Cutthroat Trout were observed from late April through early November.

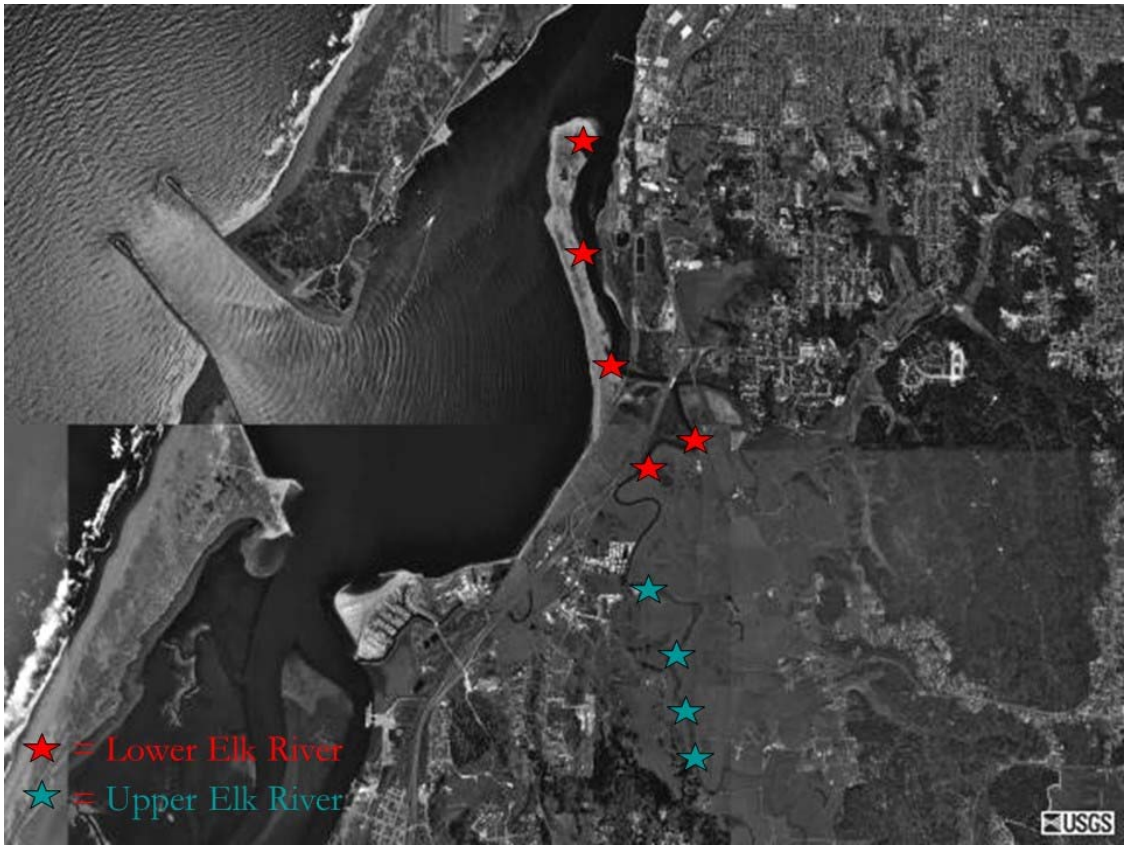

Figure 8. Location of CDFW sampling sites in the lower Elk River. Note the center red star (Site #3) is the closest in location to the project area. Figure from Mike Wallace, CDFW.

Table 1. Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2005.

Species	No. Observed Individuals	Months Observed
Coho YOY	28	Mid-Apr. to Mid-Nov. Abundance peaked in May.
Coho 1+	138+	Late Jan. to early Jul.
Chinook YOY	35	Late May to early Sept.
Steelhead Juveniles	5	Late Feb. to mid Oct.
Coastal Cutthroat Trout	4	Late Apr. to early Nov.

Table 2. Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2006.

	No. Observed Individuals	Months Observed
Coho YOY	24	Late Nov. (caught 23 of 24)
Coho 1+	150 + total upper and lower estuary	Early Mar. to mid-July, with a peak in May.
Chinook YOY	12	Late Jun. to late Aug.
Steelhead Juveniles	8	Early Jan. to early May.
Coastal Cutthroat Trout	8	Early May to early Dec.

Table 3. Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2007.

	No. Observed Individuals	Months Observed
Coho YOY	10	May
Coho 1+	267	Mar. to Jun., with a peak in May.
Chinook YOY	26	Jun. to Aug.
Steelhead Juveniles	19	Mar. to Aug.
Coastal Cutthroat Trout	10	May to Jul.

Table 4. Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2008.

	No. Observed Individuals	Months Observed
Coho YOY	0	None observed.
Coho 1+	131	Jan. to Jul., with a peak in May.
Chinook YOY	49	Jun. to Sept., with a peak in July.
Steelhead Juveniles	1	Apr.
Coastal Cutthroat Trout	0	None observed.

Table 5. Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2009. Note the available data set ends in July 2009 because of state budget cuts.

	No. Observed Individuals	Months Observed
Coho YOY	0	None observed.
Coho 1+	71	Feb. to May, with a peak in May.
Chinook YOY	1	Jun.
Steelhead Juveniles	0	None observed.
Coastal Cutthroat Trout	3	May

Table 6. Summary of CDFW observed juvenile salmonids in the lower Elk River estuary, 2005-2009

	No. Observed Individuals					
	2005	**2006**	**2007**	**2008**	**2009**	**TOTAL**
Coho YOY	28	24	10	0	0	62
Coho 1+	138+	150 *	267	131	71	757[1,2]
Chinook YOY	35	12	26	49	1	123
Steelhead Juveniles	5	8	19	1	0	33
Coastal Cutthroat Trout	4	8	10	0	3	25

[1]An unspecified number of YOY Coho were caught in the lower estuary, but 138 individuals were noted as PIT tagged.

[2]Includes Upper Estuary catch as well.

While the monitoring conducted by CDFW focused on juvenile anadromous salmonids, they did document other captured species, include a wide variety of marine species. When observed, adult salmonids, Longfin Smelt, Pacific Lamprey, and Tidewater Goby were also documented (Table 7). The CDFW data indicates adult Coho were not observed. Adult Chinook were not included in the list of observed species and presumably also not observed. A single adult Steelhead was observed in 2005 at the mouth of the Elk River. numbers of Longfin Smelt were observed in winter months only. A single Pacific Lamprey was observed upstream of the project area in July 2007. Several other Pacific Lamprey were observed the following winter. Tidewater Goby were not observed during any year.

Table 7. Summary of additional species documented by CDFW in the lower Elk River estuary.

	2005	2006	2007	2008	2009
Adult Coho	0	0	0	0	0
Longfin Smelt[1]	Yes	11	0	1	0
Pacific Lamprey[2]	0	0	1	3	0
Tidewater Goby	0	0	0	0	0
Adult Steelhead[3]	1	0	0	0	0

[1]In 2005, an unspecified number of Longfin Smelt were observed upstream of the project area at CDFW Site 5 and CDFW Site 4 in February and March, respectively. In 2006, the 11 observations span all CDFW lower estuary sites. The 2008 observation of a single Longfin Smelt occurred at CDFW Site 3 (closest to the project area) in January.

[2]In 2007, a single Pacific Lamprey was observed at CDFW Site 4 (upstream of the project area) in July. In 2008, a single Pacific Lamprey was observed at Site 3, Site 4, and Site 6 in the month of February.

[3] In 2005, a single adult steelhead was observed at the mouth of the Elk River during the month of March.

Fish Avoidance Plan

Construction will begin in the month of July after freshwater inflows to Area 1 diminish. Site preparation and initial dewatering will be scheduled to occur during a low tide to minimize the amount of wetted channel and potential fisheries impacts. Passive seine netting will not be feasible due to the thick bay muds that parallel the wetted edge of tidal channels during low tides.

Dewatering Area 1

1. Before the construction period, City of Eureka will close tide gates along the northern boundary of Area 1 to minimize/eliminate freshwater inflow, reducing the residual volume of water in the pool behind the Elk River tide gates at a low tide to 0.15 acres. This will occur 30 days prior to construction and will result in the gradual change in salinity in Area 1. As the salinity increases, fish will likely exit Area 1 on ebbing tides voluntarily before the start of construction.

2. Immediately prior to dewatering, the Elk River tide gate will be immediately closed and sealed to provide the re-entry of fish back into Area 1.

3. While it is unlikely, if any fish were to remain in the pool behind the tide gate after seine netting they would be trapped.

4. Sump pumps will be installed to dewater Area 1 during construction in accordance with the project's dewatering plan.

Area 1 Elk River Tide Gate Removal

1. Removal of the Elk River tide gates will be the final enhancement action to occur in Area 1 before the project area becomes rewetted.

2. To minimize the duration of impact, a jack hammer attached to an excavator will be used to chip away the cement of the large tide gate structure. A metal saw will also be needed to cut and remove the rebar within the cement. The cement and rebar will be hauled off site for recycling and/or disposal at appropriate solid waste facilities. Jack hammering will result in noise and vibration that may be harmful to fish in the immediate area.

3. The cement structure that houses the tide gates likely extends an unknown distance below the wetted mainstem channel surface. The tide gates also sit atop a cement structure that extends north into the residual pool to an unknown distance. As much of this structure as possible will be removed.

4. Once the tide gate structure is removed, Area 1 will become rewetted and fully tidal, allowing fish to reenter the site undisturbed to explore their new habitat.

Dewatering Area 2

Construction will begin during the month of July. Construction in Area will start at the terminus of the new channels at the southern end of Area 2 and work north toward the mainstem Elk River. Connecting the new channels across the in-board ditch in Area 2 will be the only impact to existing open water habitat in Area 2. Note water quality was sampling in the in-board ditch in June 2017, and the results were not suitable for most fish species, including salmonids, as a result of extremely high salinity (Voight 2017).

1. Before the new Area 2 channel mouth is connect to the Elk River, an exit channel will be constructed to allow any fish potential present in the in-board ditch (unlikely due to water quality limitations) to passively escape. The in-board ditch will be allowed to passively drain over a low tide.

2. The in-board ditch on either side of the new channel opening will be temporarily blocked off to keep fish away from active excavation. Excavation/grading the tributary connection with Elk River could be completed in a single day. The reach of the in-board ditch to the west would be re-connected within a day to the new channel and tidal inundation from Elk River. The in-board ditch reach to the east of the new channel would still have its connection with Elk River via the culvert next to Highway 101; therefore, no impact would occur to any fish in this reach as a result of the temporary blockage of the 200-foot reach to the west of the new channel confluence with the mainstem Elk River.

3. Alternatively, for Area 2, the 12-inch culvert that connects the in-board ditch to Elk River could be removed on an ebbing tide to allow the ditch to de-water and move fish, if present, out into Elk River. The in-board ditch could then be blocked off to prevent fish from re-entering.

Potential Impacts

Area 1

Proposed project actions with a potential for direct impacts to listed salmonids:

1. Closing the Elk River tide gates on a minus tide ebb in June will temporarily block fish access from Elk River to the channels in Area 1 during construction.

2. Once the Elk River tide gates are closed, there will be a residual pond and possible channel area remaining behind the tide gates in Area 1. The residual wetted area of pool is estimated at 0.15 acres. The residual wetted area of the lower primary tidal channel is approximately for 0.10 acres (Figure 9). If the City ceases its discharge from their property to the north into Area 1 prior to the ebb tide when the Elk River tide gates are closed, the residual channel may not exist. Combined the potential residual area could be 0.25 acres.

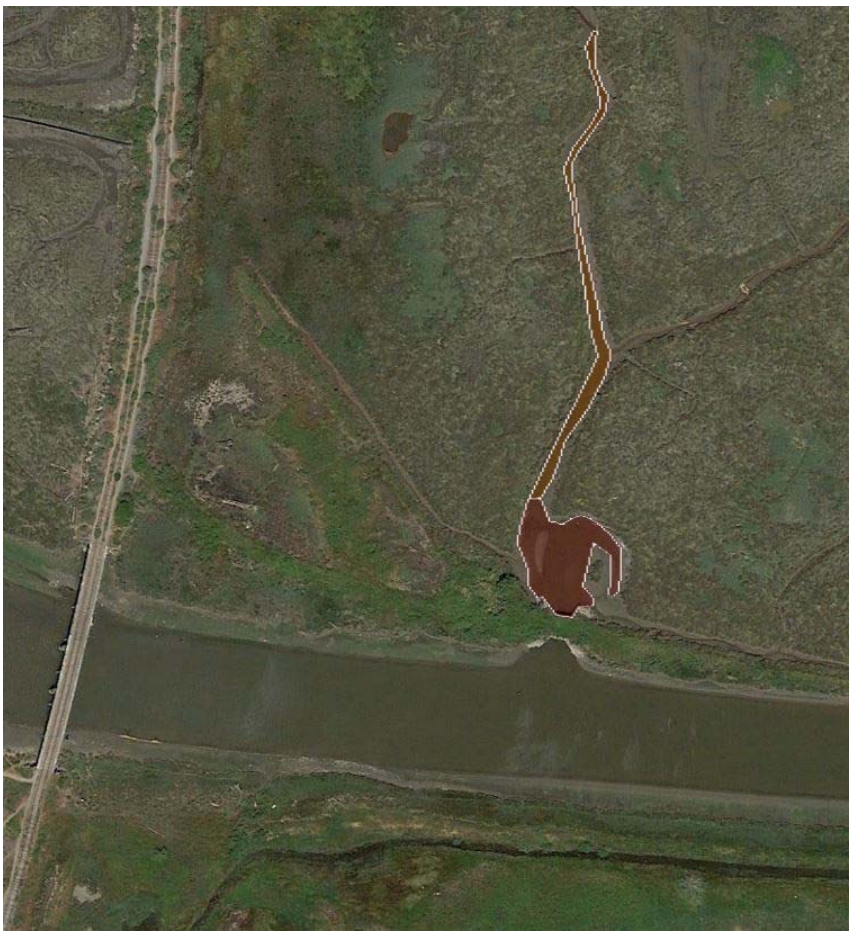

Figure 9. Potential residual wetted area estimated for Area 1 once the Elk River tide gates are sealed on a minus ebb tide, shown in brown. The polygon was developed using a minus tide when the City was discharging freshwater to the channel during the month of April.

3. Demolition of concrete tide gate structure by a jack hammer device and excavators will create vibrations and noise. These impacts may occur over a couple of days in October. Any fish residing in front of the tide gates in Elk River will likely be displaced during demolition.

4. Short-term spike in turbidity in elk River once the newly formed inter-tidal channels and salt marsh plains are tidally inundated.

Area 2

1. Temporarily displacing fish if present when blocking off approximately 200 ft of in-board ditch with a muted tide cycle in Area 2 where the new channel will connect with Elk River (see attached figure). Alternatively, breaching the dike and letting the in-board ditch drain on an ebbing tide. Water quality in Area 2 (sampled June 2017) indicates extremely high salinity; therefore, protected fish species are not expected to be present.

2. Short-term spike in turbidity in elk River once the newly formed inter-tidal channels and salt marsh plains are tidally inundated.

Estimation of Take

To be as conservative as possible, potential adverse impacts to fisheries have been estimated using the greatest number of annual individual counts for each species/life stage monitored by CDFW from 2005 through 2009 (Table 8). This data was developed from netting fish in the lowest 2.25 miles of mainstem Elk River channel. The mainstem discharge during the periods of observed fish individuals varied throughout a given year and was often significant. Because the Elk River is not gaged, it is not possible to assembly annual flow hydrographs to accompany fish observations. CDFW data indicates the fish observances peaking in May for Coho (by far the most common species observed), which will be outside of the project window. Thus, actual fish presence during the construction window is expected to be lower than the numbers cited in Table 8.

The mainstem channel has variable depth but is arguably consistently considerably deeper and wider than the small residual pool or channel that may remain in Area 1 once the Elk River tide gates are sealed prior to dewatering. The width of the mainstem Elk River between Area 1 and Area 2 varies from roughly 90 ft to more than 130 ft, depending on the tidal elevation. By comparison, the primary tidal channel behind the Elk River tide gates varies from 8 ft to 20 ft depending on the tidal elevation, with significantly shallower channel depths compared to the mainstem channel.

It is difficult to hypothesize what proportion of fish individuals observed by CDFW from 2005 through mid-2009 may be present in the project area at one time. Fish may utilize smaller tidal channels, such as those present in the project area—even in their deteriorated, unrestored condition—differently than mainstem habitat throughout the course of the year. Additionally, the CDFW data, which is the most comprehensive contemporary data set known to be available for the lower Elk River, is limited and cannot be assumed to fully characterize standing stock of

species of interest during any one point in time. Limited as it may be, the CDFW data set still represents the best available data.

Several alternative analyses considered are presented to estimate potential impact to the fish as a result of project actions:

Table 8. Maximum number of observed individuals by species and life stage. Data from CDFW. With the exception of Longfin Smelt, all species were observed during a portion of the anticipated construction window (June through October).

	Peak No. Observed	Year of Observation	Month of Observation
Adult Coho	0	N/A	N/A
Longfin Smelt*	11	2006	Feb. and Mar.
Pacific Lamprey+	3	2008	Feb. and Jul.
Tidewater Goby	0	N/A	N/A
Adult Steelhead	1	2005	Mar.
Coho YOY	28	2005	Mid-Apr. to Mid-Nov. Abundance peaked in May.
Coho 1+	267	2007	Mar. to Jun., with a peak in May.
Chinook YOY	49	2008	Jun. to Sept., with a peak in July.
Steelhead Juveniles	19	2007	Mar. to Aug.
Coastal Cutthroat Trout	10	2007	May to Jul.

Alternative 1: Channel Width Ratio

Based on channel width comparisons, the Area 1 tidal channel averages approximately 13% of the mainstem channel width, averaging low and high tidal widths. Similarly, the Area 2 ditch is less than 1% of the mainstem channel width. This ratio can be used to estimate the number of individuals by species and life stage that may be present in the project area (Table 8). Using this method, as many as 4 YOY Coho Salmon, 38 1+ Coho Salmon, 7 YOY Chinook Salmon,3 juvenile Steelhead, and 2 Coastal Cutthroat Trout may be impacted.

Table 8. Results of using the channel width ratio impact method to estimate the potential number of fish that could be impacted as a result of project implementation. Note fish are not expected to be present in the Area 2 in-board ditch due to extremely high salinity observed during water quality sampling.

	Peak No. Observed	Area 1 Ratio (13%)	Area 2 Ratio (1%)
	Number of Individual Fish		
Adult Coho	0	0	N/A
Longfin Smelt*	11	1	N/A
Pacific Lamprey+	3	0	N/A
Tidewater Goby	0	0	N/A
Adult Steelhead	1	0	N/A
Coho YOY	28	4	N/A
Coho 1+	267	35	N/A
Chinook YOY	49	6	N/A
Steelhead Juveniles	19	3	N/A
Coastal Cutthroat Trout	10	2	N/A

Alternative 2: Wetted Area Ratio

The wetted area of the lower estuary sampled by CDFW is approximately 70 acres at low tide. By comparison, the impacted wetted area in Area 1 is 0.25 acres, or 0.3%. Area 2 impacts are limited to 300 square feet, which is essentially a ratio of 0% compared to 70 acres. Using a ratio of the wetted area (acres) of the mainstem Elk River sampled by CDFW compared to the wetted area of the residual wetted tidal channels in the project area, one YOY of Coho Salmon may be impacted. No other fish species would be expected to be present and thus not likely to be impacted.

Table 9. Results of using the wetted area ratio impact method to estimate the potential number of fish that could be impacted as a result of project implementation. Note fish are not expected to be present in the Area 2 in-board ditch due to extremely high salinity observed during water quality sampling.

	Peak No. Observed	Area 1 Ratio (.3%)	Area 2 Ratio (0%)
	Number of Individual Fish		
Adult Coho	0	0	N/A
Longfin Smelt*	11	0	N/A
Pacific Lamprey+	3	0	N/A
Tidewater Goby	0	0	N/A
Adult Steelhead	1	0	N/A
Coho YOY	28	0	N/A
Coho 1+	267	1	N/A
Chinook YOY	49	0	N/A
Steelhead Juveniles	19	0	N/A
Coastal Cutthroat Trout	10	0	N/A

Alternative 3: Assume Equal Presence

Alternative 3 takes the most conservative approach and assumes that the maximum annual number of fish observed by CDFW between 2005 and mid-July in the lower mainstem Elk River (2.25 river miles) may be present within the project area during construction (Table 10). While unlikely, application of this alternative assumes the greatest amount of impact on potentially present.

Table 10. Results of assuming equal presence to estimate the potential number of fish that could be impacted as a result of project implementation. This method assumes the annual peak observed by CDFW between 2005 and mid-2009 may be present and potentially impacted within the project area (Area 1 and Area 2 combined). Note fish are not expected to be present in the Area 2 in-board ditch due to extremely high salinity observed during water quality sampling.

	Annual Peak Number Observed	Potentially Affected in Project Area
Adult Coho	0	N/A
Longfin Smelt*	11	N/A
Pacific Lamprey+	3	N/A
Tidewater Goby	0	N/A
Adult Steelhead	1	N/A
Coho YOY	28	N/A
Coho 1+	267	N/A
Chinook YOY	49	N/A
Steelhead Juveniles	19	N/A
Coastal Cutthroat Trout	10	N/A

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Thomas Gast & Associates
Environmental Consultants

Memo # and Date:	20170627TA, June 27, 2017
Project:	Water quality sampling at minus ebb tide, Lower Elk River, Eureka, CA
Prepared for:	Aldaron Laird Trinity Associates 980 7th Street, Arcata, CA 95521

Submitted by:	Thomas Gast & Associates Environmental Consultants P.O. Box 1137 Arcata, CA 95518
Contact Person:	Hans Voight, Fisheries Biologist
Phone:	707-822-8544
Email:	hvoight@tgaec.com
Website:	www.tgaec.com

Mr. Aldaron Laird of Trinity Associates (TA) contacted Mr. Hans Voight of Thomas Gast & Associates Environmental Consultants (TGAEC) to request an assessment of water quality (WQ) conditions during a minus ebb tide at five sites in the Lower Elk River, Eureka California (Table 1, Figure 1). On the morning of 26-June-2017, Mr. Voight met Mr. Laird at the frontage road pasture access on the south side of the lower Elk River, and sampled water quality parameters from a tidally influenced inboard ditch on the south bank of the Elk River downstream of U.S. Highway 101 (Figures 1, 2-7). Mr. Voight also assessed WQ at one site on the south bank of the mainstem Elk River adjacent to the inboard ditch, and one site in tidal slough habitat, on the upstream side of the tidegate structure, across from WQ site #4 on the north bank of the Elk River (Figures 1, 8-11).

OBJECTIVES

1. Collect Dissolved Oxygen (DO) and salinity spot readings at five sites in the Lower Elk River, coinciding with low tidal conditions (-1.9 ft., predicted at 0819 hrs. at Humboldt Bay North Spit tide gauge) on 26 June 2017; and

2. Photo document site conditions at time of sampling for each WQ location

Table 1. Results from water quality sampling from five sites on 26-June-2017, Lower Elk River (downstream of U.S. highway 101), Eureka, California.

Site #/ Description	Coordinates (Lat./Long)	Time of Day	Dissolved O_2 (mg/l)	Dissolved O_2 (% Saturation)	Conductivity (uS/cm)	Salinity (ppt)	Water Temp. (°C)
#1. Inboard ditch, south bank	40.755603 -124.191059	0854 hrs.	3.78	47.3	40920	31.6	16.9
#2. Inboard ditch, south bank	40.755772 -124.192625	0910 hrs.	2.86	36.0	41551	32.0	17.1
#3. Inboard ditch, south bank	40.755780 -124.194030	0918 hrs.	2.77	34.6	39622	30.2	17.3
#4. Main-stem Elk River, south bank	40.756039 -124.193903	0925 hrs.	7.33	86.4	27716	20.3	17.4
#5. Residual pool inside tidegate, north bank	40.756389 -124.193036	1015 hrs.	5.5	66.0	31475	23.4	17.3

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Located in the Historic Jacoby Storehouse on the Arcata Plaza, 4th floor, Suite H
tgaec.com

Methods

Mr. Voight used a Yellow Springs Instruments Pro 2030 handheld meter to assess the following ambient water quality parameters at each of the five sites visited: water temperature, salinity, conductivity and dissolved oxygen (DO) (Table 1). Depths and channel widths in the inboard ditch were measured with a stadia rod (demarcated in meters). Depth at the upstream side of the tidegate (site #5) was also measured with the stadia rod. GPS coordinates for each sampling site were identified by taking photographs using an android smartphone equipped with a GPS camera application.

Results & Discussion

Weather conditions for the duration of sampling on 26-June-2017: foggy and overcast with air temperature of 20.4 °C at 0815 hrs. WQ Site #1 was located near the upstream end of the inboard ditch parallel with the south bank of the Elk River, downstream of Highway 101 (Figures 1, 2, 3). Channel width and depth at Site #1 were 2.9 meters and 0.25 meter, respectively. Just upstream of this sampling site, the ditch channel becomes much narrower, less defined, and is mostly obscured by overhanging terrestrial vegetation. Salinity at this site was observed to be 31.6 parts per thousand (ppt) which is considered full strength seawater (Table 1).

While taking WQ measurements, Mr. Voight observed a school of very small fish swim upstream into the cover provided by vegetation. No positive species identification was made, but based on the size and swimming behavior, these fish were possibly three-spine stickleback (*Gasterosteus aculeatus*). Dissolved oxygen (DO) readings were marginally acceptable for salmonids with 3.78 mg/liter observed. "The incipient lethal level of dissolved oxygen for adult and juvenile *Oncorhynchus mykiss* is approximately 3 mg/l or less, depending on environmental conditions, especially temperature" (Raleigh et al. 1984). Adult and juvenile salmonids will begin to experience stress at DO levels lower than 5.0 mg/liter in water temperatures exceeding 15 °C (Raleigh et al. 1984)

WQ Site #2 was located approximately 450 feet downstream of WQ site #1, in the same inboard ditch channel (Figures 1, 4, 5). Channel widths and depths were 3.2 meters and 0.49 meter, respectively. DO was lower, while temperature and salinity higher than at WQ site 1 (Table 1). WQ site # 3 was located approximately 400 feet downstream of WQ site #2 in the same inboard ditch system (Figures 1, 6, 7). Channel width and depths were 2.9 meters and 0.29 m, respectively. DO and salinity decreased slightly from observed values at site #2 while temperature slightly increased, remaining unsuitable for rearing salmonids. Salinity readings remained above the threshold for full strength seawater (> 30 ppt) throughout the ditch system. Surface flows in the ditch system at minus ebb tide conditions were neglible.

WQ site #4 was located in the mainstem of the Elk River just upstream of the railroad track bridge, on the south side of the river (Figures 1, 8, 9). WQ conditions in the mainstem Elk River showed a marked improvement versus observed conditions in the inboard ditch system from increased flows and inherent mixing of freshwater outflows with tidal waters (Table 1). Salinity in the mainstem was in the "brackish range," (0.5-30 ppt) at 20.3 ppt, considerably lower than observed in the ditch system, and DO readings were in the suitable range for rearing salmonids (7.33 mg/l).

WQ site #5 was located in a tidal slough across the river and slightly upstream of WQ site #4, inside the tide gate structure on the north bank of the Elk River (Figures , 10, 11). Depths in the residual pool behind the tidegate were measured off the top of the concrete structure as accessing the pool was

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tenuous due to steep muddy banks exposed at the minus ebb tide. A concrete sill or other hardened surface was detected on the upstream side of the tidegate and extended out an unknown distance from the structure into the residual pool; no areas of scour was detected from extending the stadia rod out to maximum dimensions. The observed depth was 0.55 meter in this area, and the estimated width of the residual pool was 65 feet. No inflows were occurring at the time of sampling, and the tidegate was closed due to the very low tide.

WQ readings were intermediate to the values observed in the inboard ditch system (WQ sites #1-3) versus the mainstem Elk River (WQ site #4) (Table 1). Salinity was observed to be within the brackish range (23.4 ppt), and DO was observed to be 5.5 mg/l while temperature was relatively unchanged.

The stagnant, high salinity, low DO conditions that characterized the inboard ditch system appeared to be intolerable for salmonids. DO readings in the mainstem Elk River were favorable for juvenile rearing salmonids utilizing brackish habitats. WQ conditions in the residual pool behind the tidegate were marginal for salmonids with DO levels/temperature edging into stress causing range.

Longfin smelt (LFS) (*Spirinchus thaleichthys*) will utilize areas of high salinity, but are rarely observed when water temperatures exceed 20.5°C (Rosenfield 2010). Rosenfield and Baxter (2007) noted aspects of LFS distribution patterns were consistent with temperature-limitation, including the apparent summer emigration from the estuary. Since water temperatures are already approaching 20 degrees in the Lower Elk River at the end of June, it seems unlikely that LFS would select either the inboard ditch system (south bank), the lower mainstem Elk River, or the tidal slough habitats upstream of the tidegate (north bank) during later summer through early fall months. More research is needed to describe the preferred dissolved oxygen levels for LFS.

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Figure 1. Location of water quality sampling sites,

Thomas Gast & Associates Environmental Consultants; PO Box 1137, Arcata, California 95518; Office (707) 822-8544
Located in the Historic Jacoby Storehouse on the Arcata Plaza, 4th floor, Suite H
tgaec.com

Figure 2. Water quality site #1 looking upstream, inboard ditch, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 3. Water quality site #1 looking downstream, inboard ditch, south bank of Lower Elk River, Eureka, California, 26-June-2017.

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Located in the Historic Jacoby Storehouse on the Arcata Plaza, 4th floor, Suite H
tgaec.com

Figure 4. Water quality site #2 looking upstream, inboard ditch, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 5. Water quality site #2 looking downstream, inboard ditch, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 6. Water quality site #3 looking upstream, inboard ditch, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 7. Water quality site #3 looking downstream, inboard ditch, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 8. Water quality site #4 looking upstream, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 9. Water quality site #4 looking downstream, south bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 10. Water quality site #5, looking upstream from tidegate structure, north bank of Lower Elk River, Eureka, California, 26-June-2017.

Figure 11. Water quality site #5, residual pool inside tidegate at low tide, north bank of Lower Elk River, Eureka, California, 26-June-2017.

Appendix I

Conceptual Design Modeling Support Technical Memorandum

Northern Hydrology & Engineering

P.O. Box 2515 McKinleyville, California 95519
Telephone: (707) 839-2195; email: nhe@northernhydrology.com

Engineering – Hydrology – Stream Restoration – Water Resources

TECHNICAL MEMORANDUM

Date: 18 October 2016

To: Steve Salzman, P.E.
Greenway Partners
1385 8th Street, Suite 201
Arcata, CA 95521

From: J. Rose Patenaude, P.E. and Jeffrey K. Anderson, P.E.

Re: Elk River Estuary 30% Tidal Marsh Restoration Designs

DRAFT

Introduction

In a natural setting, slough channels typically initiate in an unvegetated mudflat. Mud flats are inundated with water over a significant portion of the tidal cycle with adequate depths and erosive force to carve channels. Vegetation tends to colonize when the elevation of the mudflat is between Mean Tide Level (MTL) and Mean High Water (MHW). Vegetation grows around the established channel network and reinforces channel location by increasing bank stability, allowing for deeper incision and concentrating flow in the channels. The elevation of the mature marsh plain is generally near Mean Higher High Water (MHHW) and may keep pace with sea level rise if an adequate sediment load is available.

When tidal action is cutoff by a tide gate or levee, channels may in-fill with sediment resulting in a relatively flat, undissected plain. In many cases, the elevation of the marsh plain subsides due to management activities that compact the soils and/or sediment supply deficits that halts the natural marsh plain accretion that is required to keep pace with sea level rise.

Slough channel networks may re-develop naturally if an adequate tidal prism is delivered to the site when tidal action is restored. The tidal prism required to cut channels typically requires the marsh plain surface to be close to the mudflat colonization elevation. However, if the substrate is compacted or fill material has been imported, channel development may be limited due to increased resistance to erosion. Channels will not re-establish on marsh plain surfaces near MHHW because the tidal prism does produce high enough erosive forces to cut channels.

Existing Project Site Drainage Conditions

The project sites consist of two tidal marsh restoration areas, referred to as Area 1 and Area 2 (Figure 1). Area 1 has an existing channel network that drains a tidal marsh area of 11.7 acres below MHHW. The marsh area is bound to the south and west by constructed levees, to the east by Highway 101 grade and fill, and to the north by Pound Road fill. A borrow ditch remains, lee side of the southern levee. A historical railway grade bisects the northeastern corner of the site. The highway and Pound Road has cut off tidal exchange to the east and north, respectively, creating freshwater wetlands that act as storm detention basins that drain back to the site. Discharge to Elk River and thence Humboldt Bay is through a tide gate located in the south levee.

Area 2 consists of reclaimed tidal wetlands with a potential salt marsh area of 58.5 acres below MHHW. The marsh restoration area is bound to the west by a levee along Humboldt Bay with boulder revetment

(rock slope protection) lining the western, bay side. Highway 101 forms a boundary to the east, and a natural divide is located beyond a county road to the south. A sandy foredune was naturally established on the northern portion of the site, along Elk River and a levee is located between the sandy upland and the river. Historical channel alignments can be seen in aerial photographs, generally within the southern portion of the site, and remain as shallow swales. These historical channels likely drained directly east to Elk River or west to Humboldt Bay. Tide gates to the east drain the adjacent highway. Linear ditches are located throughout the reclaimed tidal marsh area that drain to a primary drainage ditch, running south to north, to drain through a culvert into Elk River. A borrow ditch remains lee side of the northern levee.

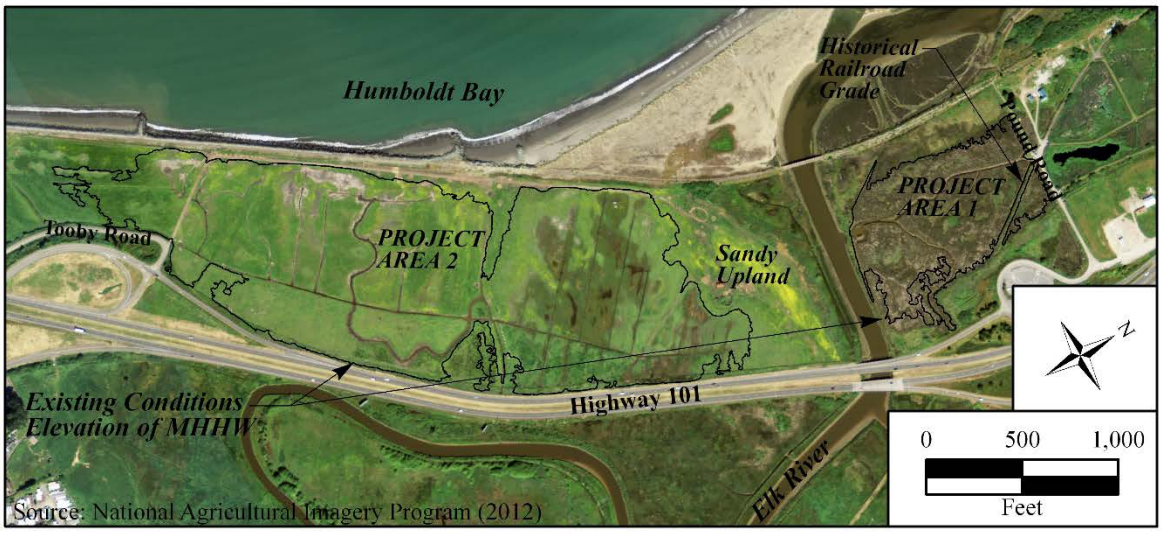

Figure 1. Areas 1 and 2 Project Site Map

Restoration Approach

Tidal marsh restoration of Area 1 includes removing the riverfront levee and tide gate infrastructure, filling the levee borrow ditches, removing the railroad grade, and excavating slough channels to drain the site through a more natural, dendritic channel system. The tidal marsh restoration method for Area 2 is to excavate a mature channel network through the marsh plain and sandy upland north to Elk River, filling existing linear ditches.

The goal of the slough channel designs is to provide an adequate tidal prism to the site and a base channel network that will promote the evolution of a complex drainage system to support an ecological rich and diverse tidal marsh communities. The proposed marsh designs generally follow planform and geometric design guidelines developed by Philip Williams & Associates (PWA 1995 & 2004; Williams et al. 2002) from tidal wetlands in California, predominately in San Francisco Bay. The guidelines are empirical hydraulic geometry relations between physical attributes of salt marshes (tidal prism, marsh area, channel width, channel depth, and channel cross-sectional area). Williams et al. (2002) illustrate that mature salt marshes exhibit equilibrium relations between these physical attributes, while young or evolving salt marshes tend toward an equilibrium state over time.

PWA (1995) compiled a database of measurable channel-defining parameters (channel width, channel depth below MHHW, and channel cross sectional area below MHHW) to analyze their trends as a function of potential diurnal tidal prism. Potential diurnal tidal prism is used as a surrogate for channel-forming discharge. Design guidelines proposed by PWA (2004) include only mature salt marshes, limited to channels with marsh areas larger than 2 hectares (4.9 acres), corresponding to approximately third order channels and larger. Tidal channel geometry to drain small marsh areas (10 acres or less) were estimated from a similar database compiled in a pilot study in Mad River Slough in Humboldt Bay (NHE,

2009). Unless otherwise stated, elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

30% Slough Channel Designs

Planform Layout

The slough channel plans were based primarily on reoccupying existing and historical channel alignments, digitized from aerial photographs dating back to 1939 (Figure 2). Designs considered guidelines developed by PWA (1995) from a database of tidal marsh planform characteristics (Table 1). Planimetric design guidelines include the highest order channel that can be supported in a given marsh area, drainage density, bifurcation ratio, length ratio for a particular drainage system, and channel sinuosity. Based on the contributing marsh areas, Area 1 was designed to accommodate a 3rd order drainage network and Area 2 was designed for a 4th order channel network.

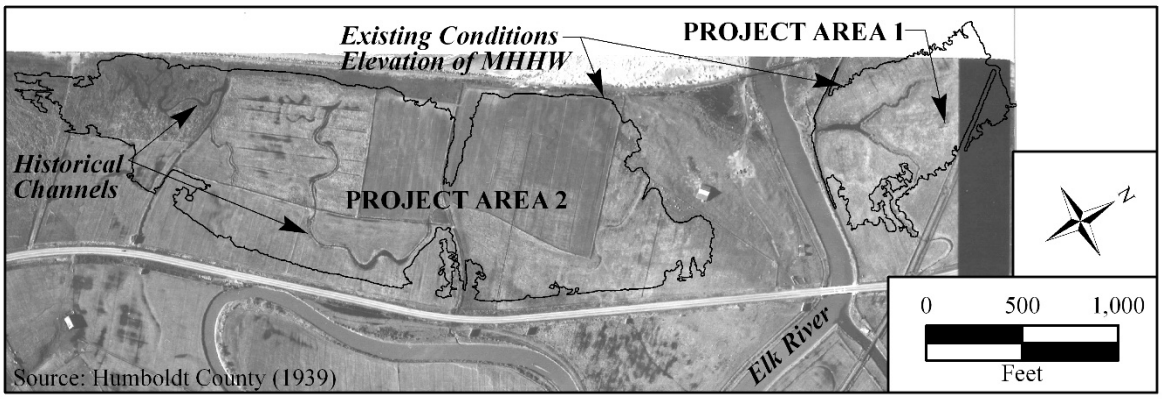

Figure 2. Aerial photograph of project areas 1 and 2 (Humboldt County Archive, 1939)

Table 1. Planimetric Design Guidelines for Slough Channels (PWA, 1995)

Planform Design Element	Channel Order	Specifications
Channel Order	3rd 4th	5-10 acre marsh 10-100 acre marsh
Drainage Density		0.01-0.02 ft/ft^2 = 435-870 ft channel/acre marsh
Bifurcation Ratio		3.5
Length Ratio (3rd Order System)	1st 2nd 3rd	20% to 60% 60% to 20% 20%
Length Ratio (4th Order System)	1st 2nd 3rd 4th	0.43 38% to 24% 16% 5% to 17%
Sinuosity	1st 2nd 3rd 4th	Straight channels No guidelines provided 1.1 – 2.0 1.0

Slough Channel Geometry

Tidal channels with contributing marsh areas greater than 10 acres were designed using the hydraulic geometry relations developed from the PWA (2004) database. Tidal channels with contributing marsh areas less than 10 acres were designed using the empirical relations that were developed from Mad River Slough marshes (NHE 2009). Figure 3 illustrates the 30% channels plans with the channel segment locations where geometries were calculated. Smaller, first order channels were not designed in this phase; these numerous, dense channels can be left to redevelop naturally from the designed channel network and tidal prism.

Table 2 summarizes the 30% design slough channel dimensions. Changes to these estimates will likely occur before designs are complete to account for tidal prism changes as marsh plain grading and elevations are finalized.

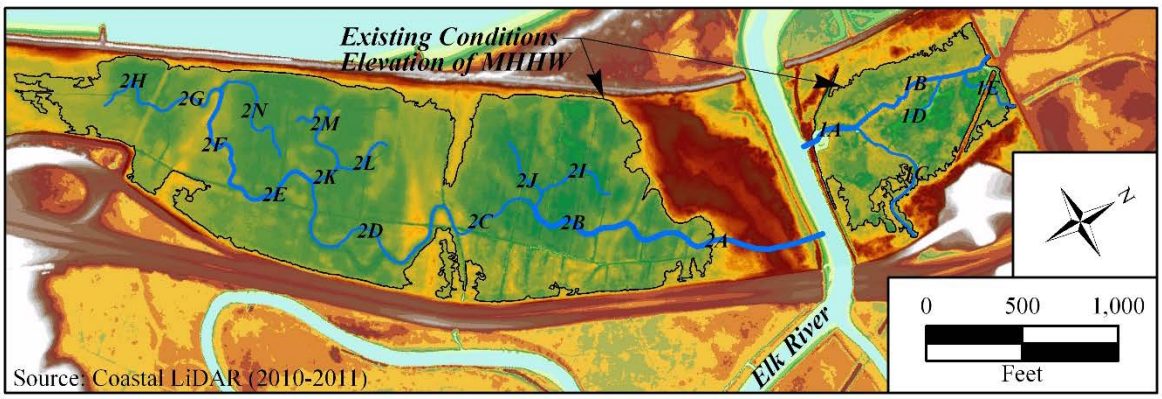

Figure 3. 30% Channel Design Plan

Table 2. 30% Design Slough Channel Dimensions

Project Area	Channel Segment	Contributing Marsh Area (acre)	Top Width (feet)	Bottom Width (feet)	Bottom Elevation (feet)
Area 1	1A	11.67	49.9	38	-0.8
	1B	7.51	43.6	32	-0.5
	1C	4.16	31.7	22	0.7
	1D	2.25	27.5	20	1.1
	1E	1.78	23.2	15	1.6
Area 2	2A	58.47	109.9	95	-3.6
	2B	54.40	104.1	89	-3.4
	2C	38.16	87.4	73	-2.7
	2D	34.38	80.3	66	-2.4
	2E	16.42	54.5	42	-1.1
	2F	13.26	47.5	35	-0.7
	2G	8.10	35.5	25	0.3
	2H	4.34	26.1	17	1.3
	2I	6.43	37.7	28	0.1
	2J	10.42	47.7	37	-0.7
	2K	11.10	41.6	31	-0.3
	2L	3.41	27.4	18	1.1
	2M	7.19	35.8	26	0.3
	2N	3.27	30.7	22	0.8

Drainage Design Considerations

Design elements that need further consideration as the designs are finalized include:

- Drainage features that will remain, including all existing culverts that drain to the project sites that may need to be replaced or retrofitted with tide control structures;
- Microtopography, such as tidal hummocks and sedimentation areas; and
- In-channel features, such as deep bays or islands.

References

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DRAFT

DRAFT

TECH MEMO From Rose Patenaude of Northern Hydrology & Engineering 7/14/16

The following is a summary describing how the channel geometry was developed for the conceptual designs. Note that since I got a chance to pull the longitudinal profile through this reach, I have revised the channel cross-sections (attached); specifically, the thalweg elevations of the slough channels. The LiDAR data gave me a false sense of vertical limitation at -0.5 feet elevation in Elk River that was not accurate.

Design guidelines for tidal wetland creation or restoration were developed by Philip Williams & Associates (PWA 1995 & 2004; Williams et al. 2002) from tidal wetlands in California, predominately in San Francisco Bay. The guidelines are empirical hydraulic geometry relations between physical attributes of salt marshes (tidal prism, marsh area, channel width and channel depth). Williams et al. (2002) illustrate that mature salt marshes exhibit equilibrium relations between the physical attributes, while young or evolving salt marshes tend toward an equilibrium state over time. Design guidelines proposed by PWA (2004) include only mature salt marshes, limited to channels with marsh areas larger than 2 hectares (4.9 acres), corresponding to approximately third order channels and larger.

A pilot study in Mad River Slough, Humboldt Bay was implemented for US Fish and Wildlife Services to test the San Francisco Bay empirical relations and to develop a similar database of smaller marsh systems (less than 5 acres) that could be applied within Humboldt Bay for tidal wetland restoration projects (NHE 2009).

For the Elk River estuary project, three approaches were used to develop the concept designs for tidal channels. Tidal channels with contributing marsh areas less than 4.9 acres were designed using the empirical hydraulic geometry relations that were developed in Mad River Slough (NHE 2009). For tidal channels with contributing marsh areas between 4 and 20 acres, both PWA (2004) and Mad River Slough (NHE 2009) empirical relations were used. Tidal channels with contributing marsh areas greater than 20 acres were designed using the PWA (2004) database. Unless otherwise stated, elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

References:

Northern Hydrology & Engineering. 2009. Tidal wetland geometric relations in Humboldt Bay: Mad River Slough pilot study. For United States Fish and Wildlife Service, Arcata, CA.

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Appendix J

Greenhouse Gas Modeling Methods

Elk River Estuary Restoration

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	90.00	Acre	90.00	3,920,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - No park or other buildings are planned as part of this project.

Construction Phase - No Architectural coating or building construction phases.

Off-road Equipment - No architectural coasting phase will take place.

Off-road Equipment - Demolition consists of removing the existing tidegate in Area 1 and will take one crane and one excavator approximately 20 hrs to complete.

Off-road Equipment - No graders or scrapers will be used, just excavators and a dozer. Dozer will be used for approximately 29 days of the project, or 2/3 of the time. DUmp trucks will be used approximately 7 hrs per day or total of 125 truck days. Dewatering pump will be used for duration of phase- approximately 47 days.

Off-road Equipment - Paving will require the use of two dump trucks (20 yard), as well as a roller and a paver.

Off-road Equipment - Minial site prep will be required, consisting mainly of preparing the access road and removing any old infrastructure, such as fences.

Grading - Cut and fill will be balanced on site with no material exported or imported.

Trips and VMT - No architectural coating or building construction phases

Water And Wastewater - No landscaping. Park will be a restored tidal marsh.

Solid Waste - No solid waste generation- tidal marsh restoration

Land Use Change -

Sequestration -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	5
tblConstructionPhase	NumDays	100.00	3.00
tblConstructionPhase	NumDays	155.00	54.00
tblConstructionPhase	NumDays	110.00	5.00
tblConstructionPhase	NumDays	60.00	5.00
tblConstructionPhase	PhaseEndDate	5/31/2018	8/20/2018
tblConstructionPhase	PhaseEndDate	5/31/2018	8/15/2018
tblConstructionPhase	PhaseEndDate	5/31/2018	8/21/2018
tblConstructionPhase	PhaseEndDate	5/31/2018	5/25/2018

tblConstructionPhase	PhaseStartDate	6/1/2018	8/16/2018
tblConstructionPhase	PhaseStartDate	6/1/2018	8/15/2018
tblConstructionPhase	PhaseStartDate	6/1/2018	5/20/2018
tblGrading	AcresOfGrading	0.00	90.00
tblOffRoadEquipment	HorsePower	231.00	81.00
tblOffRoadEquipment	HorsePower	402.00	97.00
tblOffRoadEquipment	LoadFactor	0.29	0.73
tblOffRoadEquipment	LoadFactor	0.38	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Cranes
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	5.40
tblProjectCharacteristics	OperationalYear	2018	2020
tblSequestration	NumberOfNewTrees	0.00	6,090.00
tblSolidWaste	SolidWasteGenerationRate	7.74	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	5.00
tblWater	OutdoorWaterUseRate	107,233,321.47	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0941	0.8882	0.6609	1.1200e-003	0.1779	0.0475	0.2254	0.0752	0.0443	0.1195	0.0000	101.3084	101.3084	0.0266	0.0000	101.9725
Maximum	**0.0941**	**0.8882**	**0.6609**	**1.1200e-003**	**0.1779**	**0.0475**	**0.2254**	**0.0752**	**0.0443**	**0.1195**	**0.0000**	**101.3084**	**101.3084**	**0.0266**	**0.0000**	**101.9725**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0941	0.8882	0.6609	1.1200e-003	0.0830	0.0475	0.1305	0.0346	0.0443	0.0790	0.0000	101.3083	101.3083	0.0266	0.0000	101.9724
Maximum	**0.0941**	**0.8882**	**0.6609**	**1.1200e-003**	**0.0830**	**0.0475**	**0.1305**	**0.0346**	**0.0443**	**0.0790**	**0.0000**	**101.3083**	**101.3083**	**0.0266**	**0.0000**	**101.9724**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**53.34**	**0.00**	**42.10**	**53.94**	**0.00**	**33.94**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**6-1-2018**	**8-31-2018**	0.9561	0.9561
		Highest	0.9561	0.9561

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0369	1.0000e-005	8.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6100e-003	1.6100e-003	0.0000	0.0000	1.7200e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.3478	1.7890	3.7813	7.2300e-003	0.4913	0.0117	0.5030	0.1325	0.0111	0.1436	0.0000	661.1111	661.1111	0.0434	0.0000	662.1960
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.3848**	**1.7890**	**3.7822**	**7.2300e-003**	**0.4913**	**0.0117**	**0.5030**	**0.1325**	**0.0111**	**0.1436**	**0.0000**	**661.1127**	**661.1127**	**0.0434**	**0.0000**	**662.1977**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0369	1.0000e-005	8.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6100e-003	1.6100e-003	0.0000	0.0000	1.7200e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.3478	1.7890	3.7813	7.2300e-003	0.4913	0.0117	0.5030	0.1325	0.0111	0.1436	0.0000	661.1111	661.1111	0.0434	0.0000	662.1960
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.3848**	**1.7890**	**3.7822**	**7.2300e-003**	**0.4913**	**0.0117**	**0.5030**	**0.1325**	**0.0111**	**0.1436**	**0.0000**	**661.1127**	**661.1127**	**0.0434**	**0.0000**	**662.1977**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
New Trees	4,311.7200
Vegetation Land Change	-123.0500
Total	**4,188.6700**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	5/20/2018	5/25/2018	5	5	
2	Grading	Grading	6/1/2018	8/15/2018	5	54	Marsh and channel restoration
3	Paving	Paving	8/15/2018	8/21/2018	5	5	Pave trail
4	Demolition	Demolition	8/16/2018	8/20/2018	5	3	Remove tidegate

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 90

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	1	8.00	158	0.38
Demolition	Cranes	1	8.00	81	0.73
Grading	Excavators	2	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Paving	Pavers	1	8.00	130	0.42
Paving	Rollers	1	8.00	80	0.38
Grading	Rubber Tired Dozers	1	5.40	247	0.40
Grading	Graders	0	8.00	187	0.41
Grading	Off-Highway Trucks	3	7.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	0	8.00	367	0.48
Grading	Pumps	1	8.00	84	0.74
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Off-Highway Trucks	5	8.00	402	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0151	0.0000	0.0151	8.2800e-003	0.0000	8.2800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.5800e-003	0.0380	0.0168	3.0000e-005		1.9900e-003	1.9900e-003		1.8300e-003	1.8300e-003	0.0000	2.6602	2.6602	8.3000e-004	0.0000	2.6809
Total	**3.5800e-003**	**0.0380**	**0.0168**	**3.0000e-005**	**0.0151**	**1.9900e-003**	**0.0171**	**8.2800e-003**	**1.8300e-003**	**0.0101**	**0.0000**	**2.6602**	**2.6602**	**8.3000e-004**	**0.0000**	**2.6809**

3.2 Site Preparation - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1000e-004	1.1000e-004	9.0000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0937	0.0937	1.0000e-005	0.0000	0.0939
Total	**1.1000e-004**	**1.1000e-004**	**9.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0937**	**0.0937**	**1.0000e-005**	**0.0000**	**0.0939**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7700e-003	0.0000	6.7700e-003	3.7200e-003	0.0000	3.7200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.5800e-003	0.0380	0.0168	3.0000e-005		1.9900e-003	1.9900e-003		1.8300e-003	1.8300e-003	0.0000	2.6602	2.6602	8.3000e-004	0.0000	2.6809
Total	**3.5800e-003**	**0.0380**	**0.0168**	**3.0000e-005**	**6.7700e-003**	**1.9900e-003**	**8.7600e-003**	**3.7200e-003**	**1.8300e-003**	**5.5500e-003**	**0.0000**	**2.6602**	**2.6602**	**8.3000e-004**	**0.0000**	**2.6809**

3.2 Site Preparation - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1000e-004	1.1000e-004	9.0000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0937	0.0937	1.0000e-005	0.0000	0.0939
Total	**1.1000e-004**	**1.1000e-004**	**9.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0937**	**0.0937**	**1.0000e-005**	**0.0000**	**0.0939**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1575	0.0000	0.1575	0.0655	0.0000	0.0655	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0656	0.6508	0.4856	7.8000e-004		0.0368	0.0368		0.0344	0.0344	0.0000	70.2579	70.2579	0.0183	0.0000	70.7148
Total	**0.0656**	**0.6508**	**0.4856**	**7.8000e-004**	**0.1575**	**0.0368**	**0.1942**	**0.0655**	**0.0344**	**0.0999**	**0.0000**	**70.2579**	**70.2579**	**0.0183**	**0.0000**	**70.7148**

3.3 Grading - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6800e-003	5.5300e-003	0.0450	5.0000e-005	4.7900e-003	5.0000e-005	4.8400e-003	1.2800e-003	5.0000e-005	1.3300e-003	0.0000	4.6534	4.6534	3.9000e-004	0.0000	4.6632
Total	**5.6800e-003**	**5.5300e-003**	**0.0450**	**5.0000e-005**	**4.7900e-003**	**5.0000e-005**	**4.8400e-003**	**1.2800e-003**	**5.0000e-005**	**1.3300e-003**	**0.0000**	**4.6534**	**4.6534**	**3.9000e-004**	**0.0000**	**4.6632**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0709	0.0000	0.0709	0.0295	0.0000	0.0295	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0656	0.6508	0.4856	7.8000e-004		0.0368	0.0368		0.0344	0.0344	0.0000	70.2578	70.2578	0.0183	0.0000	70.7147
Total	**0.0656**	**0.6508**	**0.4856**	**7.8000e-004**	**0.0709**	**0.0368**	**0.1076**	**0.0295**	**0.0344**	**0.0639**	**0.0000**	**70.2578**	**70.2578**	**0.0183**	**0.0000**	**70.7147**

3.3 Grading - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6800e-003	5.5300e-003	0.0450	5.0000e-005	4.7900e-003	5.0000e-005	4.8400e-003	1.2800e-003	5.0000e-005	1.3300e-003	0.0000	4.6534	4.6534	3.9000e-004	0.0000	4.6632
Total	**5.6800e-003**	**5.5300e-003**	**0.0450**	**5.0000e-005**	**4.7900e-003**	**5.0000e-005**	**4.8400e-003**	**1.2800e-003**	**5.0000e-005**	**1.3300e-003**	**0.0000**	**4.6534**	**4.6534**	**3.9000e-004**	**0.0000**	**4.6632**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0123	0.1326	0.0774	2.0000e-004		5.3200e-003	5.3200e-003		4.8900e-003	4.8900e-003	0.0000	18.6089	18.6089	5.7900e-003	0.0000	18.7538
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0123**	**0.1326**	**0.0774**	**2.0000e-004**		**5.3200e-003**	**5.3200e-003**		**4.8900e-003**	**4.8900e-003**	**0.0000**	**18.6089**	**18.6089**	**5.7900e-003**	**0.0000**	**18.7538**

3.4 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.3000e-004	5.1000e-004	4.1600e-003	0.0000	4.4000e-004	1.0000e-005	4.5000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.4309	0.4309	4.0000e-005	0.0000	0.4318
Total	**5.3000e-004**	**5.1000e-004**	**4.1600e-003**	**0.0000**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.4309**	**0.4309**	**4.0000e-005**	**0.0000**	**0.4318**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0123	0.1326	0.0774	2.0000e-004		5.3200e-003	5.3200e-003		4.8900e-003	4.8900e-003	0.0000	18.6089	18.6089	5.7900e-003	0.0000	18.7537
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0123**	**0.1326**	**0.0774**	**2.0000e-004**		**5.3200e-003**	**5.3200e-003**		**4.8900e-003**	**4.8900e-003**	**0.0000**	**18.6089**	**18.6089**	**5.7900e-003**	**0.0000**	**18.7537**

3.4 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.3000e-004	5.1000e-004	4.1600e-003	0.0000	4.4000e-004	1.0000e-005	4.5000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.4309	0.4309	4.0000e-005	0.0000	0.4318
Total	**5.3000e-004**	**5.1000e-004**	**4.1600e-003**	**0.0000**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.4309**	**0.4309**	**4.0000e-005**	**0.0000**	**0.4318**

3.5 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.1700e-003	0.0606	0.0306	5.0000e-005		3.3700e-003	3.3700e-003		3.1300e-003	3.1300e-003	0.0000	4.5472	4.5472	1.2300e-003	0.0000	4.5779
Total	**6.1700e-003**	**0.0606**	**0.0306**	**5.0000e-005**		**3.3700e-003**	**3.3700e-003**		**3.1300e-003**	**3.1300e-003**	**0.0000**	**4.5472**	**4.5472**	**1.2300e-003**	**0.0000**	**4.5779**

3.5 Demolition - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	7.0000e-005	5.4000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0562	0.0562	0.0000	0.0000	0.0563
Total	**7.0000e-005**	**7.0000e-005**	**5.4000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0562**	**0.0562**	**0.0000**	**0.0000**	**0.0563**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.1700e-003	0.0606	0.0306	5.0000e-005		3.3700e-003	3.3700e-003		3.1300e-003	3.1300e-003	0.0000	4.5472	4.5472	1.2300e-003	0.0000	4.5779
Total	**6.1700e-003**	**0.0606**	**0.0306**	**5.0000e-005**		**3.3700e-003**	**3.3700e-003**		**3.1300e-003**	**3.1300e-003**	**0.0000**	**4.5472**	**4.5472**	**1.2300e-003**	**0.0000**	**4.5779**

3.5 Demolition - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	7.0000e-005	5.4000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0562	0.0562	0.0000	0.0000	0.0563
Total	**7.0000e-005**	**7.0000e-005**	**5.4000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0562**	**0.0562**	**0.0000**	**0.0000**	**0.0563**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3478	1.7890	3.7813	7.2300e-003	0.4913	0.0117	0.5030	0.1325	0.0111	0.1436	0.0000	661.1111	661.1111	0.0434	0.0000	662.1960
Unmitigated	0.3478	1.7890	3.7813	7.2300e-003	0.4913	0.0117	0.5030	0.1325	0.0111	0.1436	0.0000	661.1111	661.1111	0.0434	0.0000	662.1960

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	170.10	2,047.50	1506.60	1,343,310	1,343,310
Total	170.10	2,047.50	1,506.60	1,343,310	1,343,310

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.469869	0.051968	0.208218	0.140414	0.048762	0.007865	0.014833	0.044690	0.003169	0.001708	0.005951	0.001528	0.001026

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0369	1.0000e-005	8.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6100e-003	1.6100e-003	0.0000	0.0000	1.7200e-003
Unmitigated	0.0369	1.0000e-005	8.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6100e-003	1.6100e-003	0.0000	0.0000	1.7200e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0369					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	8.0000e-005	1.0000e-005	8.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6100e-003	1.6100e-003	0.0000	0.0000	1.7200e-003
Total	**0.0369**	**1.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.6100e-003**	**1.6100e-003**	**0.0000**	**0.0000**	**1.7200e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0369					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	8.0000e-005	1.0000e-005	8.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6100e-003	1.6100e-003	0.0000	0.0000	1.7200e-003
Total	**0.0369**	**1.0000e-005**	**8.3000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.6100e-003**	**1.6100e-003**	**0.0000**	**0.0000**	**1.7200e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	4,188.6700	0.0000	0.0000	4,188.6700

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Grassland	75 / 0	-323.2500	0.0000	0.0000	-323.2500
Scrub	0 / 14	200.2000	0.0000	0.0000	200.2000
Wetlands	23 / 84	0.0000	0.0000	0.0000	0.0000
Total		**-123.0500**	**0.0000**	**0.0000**	**-123.0500**

11.2 Net New Trees

Species Class

	Number of Trees	Total CO2	CH4	N2O	CO2e
		MT			
Miscellaneous	6090	4,311.7200	0.0000	0.0000	4,311.7200
Total		**4,311.7200**	**0.0000**	**0.0000**	**4,311.7200**

Attachment 3

Mitigation Monitoring and Reporting Program

CEQA
Mitigation Monitoring / Reporting Program
(MMRP)

CITY OF EUREKA

This Mitigation Monitoring/Reporting Program (MMRP) has been prepared for the project described below in conformance with Section 21081.6 of the California Environmental Quality Act (CEQA) and Section 15097 of the CEQA Guidelines.

SCH #: 2017082048

PROJECT TITLE: Elk River Estuary/Inter-Tidal Wetlands Enhancement and Coastal Access Project Use Permit

PROJECT APPLICANT: City of Eureka **CASE NO**: C-17-0009/ED-17-0011

PROJECT LOCATION: APN 302-181-031, 302-181-002, 302-181-040, and 305-181-005, 302-181-039

ZONING & GENERAL PLAN DESIGNATION: Area 1: Land use and zoning are Natural Resources; Area 2: land use is Agricultural and zoning is Coastal Agriculture.

PROJECT DESCRIPTION: The City of Eureka proposes to restore and enhance estuary and inter-tidal wetland habitats on approximately 114 acres adjacent to Elk River. The project would enhance and restore approximately: 78 acres of salt marsh, 13 acres of riparian habitat, and 13 acres of inter-tidal channels, which may provide nearly ten acres of valuable Eelgrass (Zostera marina) habiat.

The City also proposes to enhance public access to Elk River and Humboldt Bay with an approximately 1 mile extension of its Class 1 ADA Waterfront Trail, and the construction of a non-motorized boat launch, several causeways and viewing platforms, and a trail head parking area off Tooby Road. The project may also create approximately 2.8 miles of navigable channels connected to Elk River Slough.

LEAD AGENCY: City of Eureka**,** 531 "K" Street, Eureka, CA 95501-1165

CONTACT PERSON: Kristen M. Goetz. Senior Planner; *phone*: (707) 441-4160; *fax*: (707) 441-4202; *e-mail*: kgoetz@ci.eureka.ca.gov

INTRODUCTION: On November 13, 2017, the above described project was approved by the Planning Commission of the City of Eureka; mitigation measures were made a condition of project approval. The purpose of this MMRP is to ensure that the mitigation measures adopted in connection with project approval are effectively implemented. This MMRP establishes the framework that the City of Eureka and others will use to implement the adopted migration measures and the monitoring and/or reporting of such implementation.

CEQA provides that the City of Eureka may choose whether the MMRP will monitor mitigation, report on mitigation, or both. "Reporting" generally consists of a written compliance review that is presented to

the decision making body or authorized staff person. A report may be required at various stages during project implementation or upon completion of the mitigation measure. "Monitoring" is generally an ongoing or periodic process of project oversight. There is often no clear distinction between monitoring and reporting and the program best suited to ensuring compliance in any given instance will usually involve elements of both. The choice of program may be guided by the following:

(1) Reporting is suited to projects which have readily measurable or quantitative mitigation measures or which already involve regular review. For example, a report may be required upon issuance of final occupancy to a project whose mitigation measures were confirmed by building inspection.

(2) Monitoring is suited to projects with complex mitigation measures, such as wetlands restoration or archeological protection, which may exceed the expertise of the City of Eureka to oversee; are expected to be implemented over a period of time; or, require careful implementation to assure compliance.

(3) Reporting and monitoring are suited to all but the most simple projects. Monitoring ensures that project compliance is checked on a regular basis during and, if necessary after, implementation. Reporting ensures that the City of Eureka is informed of compliance with mitigation requirements.

ENFORCEMENT: In accordance with CEQA, the primary responsibility for making a determination with respect to potential environmental effects rests with the City of Eureka rather than the monitor or preparer of the CEQA documents. As such, the City of Eureka is identified as the primary enforcement agency for this MMRP.

PROGRAM MODIFICATION: After adoption of this MMRP, minor changes to this MMRP are permitted but can only be made by the City of Eureka. The Director of Development Services, after consultation with affected Departments or Agencies, may make minor modifications to this MMRP. If, for any reason, any mitigation measure specified in this MMRP cannot be implemented due to factors beyond the control of the owner/developer and/or the City of Eureka, at a noticed public hearing before the Planning Commission of the City of Eureka substitution of another mitigation measure may be approved. In no case shall deviations from this MMRP be permitted unless this MMRP continues to satisfy the requirements of Section 21081.6 of CEQA, as determined by the City of Eureka.

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

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
I. Aesthetics		✓		
II. Agricultural Resources		✓		
III. Air Quality			✓	
IV. Biological		✓		
V. Cultural		✓		
VI. Geology and Soils		✓		
VII. Greenhouse Gas Emissions			✓	
VIII. Hazards and Hazardous Materials		✓		
IX. Hydrology and Water Quality		✓		

X.	**Land Use and Planning**				✓
XI.	**Mineral Resources**				✓
XII.	**Noise**		✓		
XIII.	**Population**				✓
XIV.	**Public Services**				✓
XV.	**Recreation**		✓		
XVI.	**Transportation and Traffic**			✓	
XVII.	**Tribal Cultural Resources**				✓
XVI.	**Utilities & Service Systems**				✓
XVII.	**Mandatory Findings of Significance**				✓

MMRP IMPLEMENTATION TABLE: To assure that this MMRP is effectively implemented the table on the following pages establishes the framework that the City of Eureka and others will use to implement the adopted migration measures and the monitoring and/or reporting of such implementation. The following abbreviations will be used in the MMRP table:

ACOE ..... Army Corps of Engineers
AQMD ..... Air Quality Management District
BD ..... City of Eureka Building Division
BMP ..... Best Management Practice(s)
CCC ..... California Coastal Commission
CCR ..... California Code of Regulations
CDFW ..... California Department of Fish and Wildlife
CEQA ..... California Environmental Quality Act
CGC ..... California Government Code
City ..... City of Eureka
DSD ..... Development Services Department
EPD ..... Eureka Police Department
ENG ..... City of Eureka Engineering Division
ESHA ..... Environmentally Sensitive Habitat Area
MND ..... Mitigated Negative Declaration
PARKS ..... City of Eureka Parks and Recreation Department
PRC ..... Public Resources Code
PW ..... City of Eureka Public Works Department
RWQCB ..... Regional Water Quality Control Board

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Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
MITIGATION MEASURE 1-1. After construction, the City will install signage in the Pound Road and Tooby Road parking areas. Signage will indicate that the hours of public use are to be limited to daylight hours only (sunrise to sunset).	▸ City ▸ Contractor	Language conveying hours of public shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction and maintenance.	PARKS shall ensure Contractor installs signage as designed. CITY shall, on the basis of their observations or complaints regarding use during non-daylight hours, be empowered to direct EPD to cite violators.		
MITIGATION MEASURE 2-1. Once grading is complete, the project will plant 12.8 acres of native riparian forest species.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of the project construction.	PARKS shall conduct photo monitoring to document completion of planting by Contractor.		
Mitigation Measure 4.1. Construction shall only occur between July 1st and October 31st when freshwater discharge of the Elk River is at its lowest and when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of the project construction and maintenance	PARKS shall limit the construction window to the dates specified in the Mitigation Measure in the contract with the Contractor.		
Mitigation Measure 4.2. Prior to dewatering and beginning construction, the Fish Avoidance Plan shall be implemented to passively encourage fish to leave the project area without harming them.	▸ City ▸ Contractor	A qualified biologist will identify, record, and report to CDFW, USFWS, and NMFS as appropriate fish captured and relocated, or the occurrence of any mortality.	Immediately prior to construction.	PARKS shall secure the services of a qualified fish biologist to implement this mitigation measure, in coordination with CDFW, USFWS, and NMFS, to comply with all permitting provisions.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 4.3. If water remains present during low tides and/or after sealing the Area 1 tide gates, aquatic habitat will be impacted by pumping for the shortest time necessary to complete construction or excavation. Pumps used to de-water work areas shall utilize a fish screen on the inlet of sufficiently sized mesh to prevent entrainment.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of the project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 4.4. Surveys of freshwater habitat by a qualified biologist for juvenile red-legged frogs shall occur two weeks prior to disturbance activities in the areas to be de-watered (July through August). Any red-legged frogs found shall be relocated to suitable areas outside of the area of disturbance. Construction activities shall occur only when the area is dry and when adult red-legged frogs are not expected to be present.	▸ City ▸ Contractor	A qualified biologist will identify, record, and report to CDFW as appropriate red-legged frogs captured and relocated, or the occurrence of any mortality.	Immediately prior to construction.	PARKS shall secure the services of a qualified biologist to implement this mitigation measure.		
Mitigation Measure 4.5. Northwestern pond turtle surveys shall be carried out by a qualified biologist along tidal margins two weeks prior to commencement of ground disturbing activities (July and August). Surveys shall be utilized to locate and flag northwestern pond turtle nests with eggs, or to remove hatchlings and adults that may be present in the stream reaches above the existing tidal zone below first diversion. Any active nests located shall be left undisturbed until hatchlings have emerged or have been relocated to suitable areas outside of the area of disturbance; similarly relocation of any adults found will occur. No existing freshwater ponds shall be impacted by the project.	▸ City ▸ Contractor	A qualified biologist will identify, record, and report to CDFW as appropriate northwestern pond turtles captured and relocated, or the occurrence of any mortality.	Immediately prior to construction.	PARKS shall secure the services of a qualified biologist to implement this mitigation measure.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 4.6. Surveys by a qualified biologist for nesting birds 1,000 ft beyond the limits of disturbance shall occur two weeks prior to commencement of ground-disturbing activities. If breeding is confirmed of any special status birds, construction activities that will degrade or remove breeding habitat shall not occur in the immediate vicinity until the end of the breeding period for that species or until the breeding effort has either been determined to have failed or the young have been determined to have fledged.	▸ City ▸ Contractor	A qualified biologist will identify, record, and report to CDFW, and USFWS as appropriate any bird SSC that are actively breeding in or near the area of disturbance.	Immediately prior to construction.	PARKS shall secure the services of a qualified biologist to implement this mitigation measure.		
Mitigation Measure 4.7. If possible, vegetation clearing activities shall take place between August 16 and March 13, outside of the active nesting season for migratory bird species (i.e., March 14 to August 15).	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Immediately prior to construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 4.8. If work must be completed during the nesting season, a qualified biologist shall conduct preconstruction surveys of all ground disturbance areas to verify absence of nesting migratory birds in the project area within two weeks prior to vegetation removal and the start of construction. If nesting migratory birds are found in the project construction area during the preconstruction surveys, they shall be avoided with an appropriate buffer area until the young birds have fledged. Buffers shall be 250 ft for raptors, 100 ft for threatened and endangered species, 50 ft for other special-status bird species; however, buffers may be modified after consultation with, and agreement by CDFW. If state listed California Endangered Species Act (CESA), federally listed Endangered Species Act (ESA), or raptors are found outside of the construction area but near the construction area, appropriate buffers shall be implemented. If non-listed state CESA, non-listed federal ESA, including state species of special concern are found near, but outside of the construction area, no buffers will be implemented.	▸ City ▸ Contractor	A qualified biologist will identify, record, and report to CDFW, and USFWS as appropriate any bird SSC that are actively breeding in or near the area of disturbance.	Immediately prior to construction.	PARKS shall secure the services of a qualified biologist to implement this mitigation measure.		
Mitigation Measure 4.9. Vegetative disturbance shall be contained within the limits of grading and kept to a minimum area.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Immediately prior to construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 5.1 If potential archaeological or paleontological resources are encountered during project subsurface construction activities or geotechnical testing, all work within 50 ft of the find shall be stopped, and a qualified archaeologist funded by the City of Eureka and approved by the City of Eureka shall be contacted to evaluate the find, determine its significance, and identify any required mitigation. The applicant shall be responsible for implementing the mitigation prior to construction activities being re-started at the discovery site.	▸ City ▸ Contractor ▸ THPOs	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project. THPOs will be notified immediately should archaeological resources be encountered.	Throughout the duration of project construction.	If archaeological or paleontological resources are discovered: (1) hiring of a qualified archaeologist acceptable to the City; and (2) implementation of any mitigation identified by the archaeologist prior to further geotechnical testing and/or construction activities at the location.		
Mitigation Measure 5.2. If project related geotechnical excavations become necessary, as a result of final design, and those excavations are to be more than one ft deep, then the THPOs of each local native American tribes, as noted above, will be contacted and given the date and time of excavations so that a cultural monitor may be present to observe for the presence of buried archaeological materials.	▸ City ▸ Contractor ▸ THPOs	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project. THPOs will be notified immediately should archaeological resources be encountered.	Throughout the duration of project construction.	If archaeological or paleontological resources are discovered: (1) hiring of a qualified archaeologist acceptable to the City; and (2) implementation of any mitigation identified by the archaeologist prior to further geotechnical testing and/or construction activities at the location.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 6.1. A California registered Geotechnical Engineer shall conduct a design-level geotechnical study for the project. The geotechnical study shall evaluate seismic hazards and provide recommendations to mitigate the effect of strong ground shaking; any unstable, liquefiable, or expansive soils; or settlement in adherence with current California Building Code (CBC) standards for earthquake resistant construction. The seismic criteria shall consider the active faults in the Eureka area and beyond, and ground motions and shaking related to the faults shall be accounted. The geotechnical study shall include evaluation of unstable land in the project area, including areas susceptible to liquefaction, lateral spreading, or settlement, and areas containing expansive soils. The study shall provide measures to repair, stabilize, or avoid such soils, and include grading, drainage, paving, and foundation design recommendations. The project shall be designed and constructed in conformance with the specific recommendations contained in the design-level geotechnical study, including recommendations for grading, ground improvement, and foundation support. The recommendations made in the geotechnical study shall be incorporated into the final plans and specifications and implemented during construction. Professional inspection of foundation and excavation, earthwork and other geotechnical aspects of site development shall be performed during construction in accordance with the current version of the CBC.	▸ City ▸ Contractor	A qualified geotechnical engineer will conduct the study and prepare a report. Measures recommended by the engineer shall be incorporated into the design and construction of the project. Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to construction and throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 6.2. Construction will only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when Elk River freshwater inputs are at summer baseflow thresholds.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to construction and throughout the duration of project construction.	PARKS shall limit the construction window to the dates specified in the Mitigation Measure in the contract with the Contractor, and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 6.3. Placement of fill in the project area will occur when the area is not inundated by tide water.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 6.4. Dewatering measures will be in place to bypass any discharge from entering the work site.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 8.1. Heavy equipment used in the project shall be in good condition and shall be inspected for leakage of coolant and petroleum products and repaired, if necessary, before work is started.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 8.2. Equipment operators shall be trained in the procedures to be taken should an accidental spill occur.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to project construction.	PARKS shall include contract provisions in construction contract to require employee hazardous spill training (avoidance and response).		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 8.3. Prior to the onset of work the contractor shall prepare a plan for the prompt and effective response to any accidental spills.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to project construction.	PARKS shall include contract provisions in construction contract to require employee hazardous spill training (avoidance and response).		
Mitigation Measure 8.4. Absorbent materials designed for spill containment and cleanup shall be kept at the project site for use in case of an accidental spill.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 8.5. Refueling of equipment shall occur within the staging area. Within the staging area, refueling will occur on a pad to capture any drips or spills.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 8.6. If equipment must be washed, washing shall occur off-site.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 8.7. Stationary equipment shall be positioned over drip pans.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 8.8. Equipment on site during construction shall be required to have emergency spill cleanup kits immediately accessible in the case of any fuel or oil spills.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 8.9. Staging, fueling and maintenance of equipment shall be conducted only in staging areas and no closer than 150 ft from open water or in any location where hazardous material spills could become entrained in flowing water.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site and equipment throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 9.1. Construction and Spartina eradication shall only occur between July 1st and October 31st when the ground surface is dry and to reduce the chance of stormwater runoff occurring during construction and when background Elk River freshwater inputs are at summer baseflow thresholds. Excavated materials shall not be stockpiled overwinter. Sediment control measures shall be in place while materials are being stockpiled to minimize sediment and pollutant transport from the project site.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract to specify dates of allowable construction.		
Mitigation Measure 9.2. Placement of fill in the project area shall occur when the area is not inundated by tide water.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.3. Excavation shall include handling of saturated soils. Saturated soils shall be dewatered and/or transported saturated in a manner that prevents excess discharge or spillage of soils or water within the construction access areas. A silt fence shall be installed around the perimeter of temporary stockpiles of saturated soils to prevent runoff from leaving the site.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.4. During construction, a silt fence shall be deployed to isolate work areas from existing channels, and to trap suspended sediment that might leave the construction site if stormwater runoff were to occur. If the silt fence is not adequately containing sediment, the construction activity shall cease until remedial measures are implemented that prevent sediment from entering the waters below.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to and throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 9.5. No construction materials, debris, or waste, shall be placed or stored where it may be allowed to enter or be washed by rainfall into waters of the U.S./State.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.6. Following completion of excavation, placement of fill, and grading all ground to the limits of disturbance (except newly constructed streambeds, pond beds, and tidally inundated areas) shall be treated for erosion prior to the onset of precipitation capable of generating run-off or the end of the yearly work period, whichever comes first. Treated areas that are not exposed to tidal influence shall be mulched with at least 2 to 4 inches of certified weed-free straw mulch with wheat or other straw for riparian and wetland areas and rice straw for uplands and use of a seed mix with coverage equivalent to 100 lbs/acre of barley seed and appropriate riparian vegetation for immediate erosion control. No annual (Italian) ryegrass (Lolium multiflorum) shall be used. In places such as stream banks, rush mattresses shall be installed for immediate erosion control.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.7. All temporary fill, synthetic mats and silt fences shall be removed from wetlands and waters of the U.S./State immediately on cessation of construction. Biodegradable geotextile fabrics shall be used, where possible.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 9.8. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.9. The following BMPs (California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003) shall be implemented to prevent entry of storm water runoff into the excavation site, the entrainment of excavated contaminated materials leaving the site, and to prevent the entry of polluted storm water runoff into coastal waters during the transportation and storage of excavated contaminated materials: EC-2 Preservation of Existing Vegetation EC-6 Straw Mulch EC-7 Geotextile and Mats EC-9 Earth Dikes and Drainage Swales EC-10 Velocity Dissipation Devices SE-1 Silt Fence NS-2 Dewatering Operations NS-4 Temporary Stream Crossing NS-5 Clear Water Diversion WM-9 Sanitary/Septic Waste Management Stream diversion and dewatering shall conform to the following BMP (California Storm Water Quality Association Storm Water Best Management Practice (BMP) Handbook for Construction, 2003) NS-2 Dewatering Operations NS-5 Clear Water Diversion EC-9 Earth Dikes and Drainage Swales EC-10 Velocity Dissipation Devices	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 9.10. Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper drying time prior to tidal inundation. Herbicides shall be applied by a certified applicator and in accordance with application guidelines and the manufacturer label. The project's site specific water quality control plan shall include and obtain coverage for use of herbicides to treat Spartina from the North Coast Water Quality Control Board. Herbicides shall be applied by or under the direct supervision of trained, certified or licensed applicators. Herbicide mixtures shall be prepared by, or under the direct supervision of trained, certified or licensed applicators. Storage of herbicides and surfactants on or near project sites shall be allowed only in accordance with a spill prevention and containment plan included in the site-specific water pollution prevention plan approved by the NCRWQCD; on-site mixing and filling operations shall be confined to areas appropriately bermed or otherwise protected to minimize spread or dispersion of spilled herbicide or surfactants into surface waters.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.11. The City of Eureka shall coordinate with the contractor to develop and implement a site-specific water pollution control plan, subject to review and approval by the NCRWQCB.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to and throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 9.12. To inform trail users of the potential of tsunami run-up inundating the trail area, each trailhead location shall have signage informing the public of what actions to take in the event of seismic activity. Said signage shall be posted to the satisfaction of the City of Eureka and prior to the trail being open to the general public.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	After construction is complete.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 12.1. Workers shall be required to wear hearing protection when in the vicinity of or while operating equipment producing noise levels equal to or greater than 85 db.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 12.2. Restrict noise from earthmoving and hauling of soils to daytime hours. Hours of construction for outdoor activities exceeding 50 dBA shall be limited to Monday through Friday 7:00 a.m. to 7:00 p.m. and weekends and holidays from 8:00 a.m. to 6:00 p.m. Movement and hauling of material, and associated activities such as re-fueling or maintenance, shall be limited to normal working hours for the area, as specified above. More restrictive operation hours may be specified in the construction documents and may be property-specific.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 12.3. All equipment shall operate with factory-equipped mufflers, and staging areas shall be located as far from residential uses as is practical. These conditions shall be incorporated into project contract specifications.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 12.4. A haul-truck route plan shall be developed. Hauling shall minimize passing any substantial collection of noise-sensitive land uses (i.e. occupied houses, schools, hospitals).	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		

Mitigation Measure	Responsible Agency and/or Party	Action Required	Monitoring Phase/ Reporting Requirements	Enforcement	Compliance Verification	Notes/ Comments
Mitigation Measure 12.5. Larger capacity belly and end-dump trucks as well as double-trailers shall be used whenever feasible to minimize the number of truck trips necessary.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 12.6. Construction personnel shall conduct all work activities in a manner that minimizes noise generation. A variety of contractor actions are available that will reduce construction noise, including: i) turning off engines on all construction equipment not in active use, ii) shielding noisy equipment with less noisy equipment, and iii) avoiding high RPM engine operation whenever possible.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Throughout the duration of project construction.	PARKS shall include contract provisions in construction contract and shall inspect the work site throughout the duration of construction to ensure contract compliance.		
Mitigation Measure 12.7. Notify commercial property neighbors when activity involving heavy construction equipment is scheduled to occur within 250 ft of occupied structures. Construction personnel shall provide written notification to the adjacent property owners prior to using heavy construction equipment. The written notification shall be provided to each potentially affected property at least 72 hours prior to the start of the activity, and shall indicate the approximate duration of time (dates and hours) during which the noise-generating activity is expected to occur.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to project construction.	PARKS shall maintain copies of written notifications.		
Mitigation Measure 12.8. If necessary, limit public access to Pound Road and the Hikshari Trailhead during construction to avoid exposing people to noise levels higher than standards established in the local general plan, or applicable standards of other agencies.	▸ City ▸ Contractor	Language assuring compliance shall be incorporated into design and contract documents prepared by the City for the project	Prior to project construction.	PARKS shall include contract provisions in construction contract to limit access prior to and throughout construction.		