PROJECT DESCRIPTION REPORT

Project Name:	Humboldt Bay Trail South
Location:	Eureka Waterfront Trail to the southern terminus of the existing Humboldt Bay Trail North
Overview:	A proposed 4.25-mile Class I bikepath (multi-use trail) along the Eureka-Arcata railroad and Highway 101 transportation corridor

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1 INTRODUCTION

1.1 Summary

This report provides the project description for the Humboldt Bay Trail South Project ("Bay Trail South Project," or "Project") which would expand the Humboldt Bay Trail by 4.25 miles and complete the trail connection between Eureka and Arcata (**Figure 1**). The Project is being developed by the Public Works Department of Humboldt County ("County"). This report is associated with the 60% design plans (**Attachment 1**) and will accompany applications for permits and agreements. Photographs of the Project area are provided in **Attachment 2**.

The Humboldt Bay Trail is a network of multi-use trails (also known as shared-use paths) providing non-motorized access for transportation and recreational use throughout the Humboldt Bay region (**Figure 2**). The Humboldt Bay Trail will link communities with multi-modal transportation facilities and connect people to the bay by enabling people of all ages and abilities to access and experience the bay's resources up-close. In addition to serving the region's transportation needs and enhancing coastal access, the Humboldt Bay Trail will achieve a critical link in the California Coastal Trail and advance the mandate of Senate Bill SB 1029 for utilizing the North Coast Railroad Authority ("NCRA") property and right-of-way to create the Great Redwood Trail. The overall Humboldt Bay Trail is being developed as a collaborative effort between the County of Humboldt, Humboldt County Association of Governments ("HCAOG"), City of Arcata, City of Eureka, California Department of Transportation ("Caltrans"), California State Coastal Conservancy, NCRA, Humboldt Trails Council, Redwood Community Action Agency ("RCAA"), Timber Heritage Association ("THA"), and other partners.

In 2018, the City of Arcata completed the Humboldt Bay Trail North segment, which extends south from Arcata along the Highway 101 and railroad corridor to a terminus located near Bayside Cutoff and Bracut Industrial Park. Also in 2018, the City of Eureka completed the Eureka Waterfront Trail, a portion of which extends along the west side of Eureka Slough. The Bay Trail South Project would connect the Eureka Waterfront Trail to the Humboldt Bay Trail North segment, thus providing the interconnecting link between the two previously completed trail projects. The Project is situated primarily along the Highway 101 and railroad corridor, with the exception of a proposed levee trail segment around the Brainard mill site owned by California Redwood Company ("CRC"). The Project is being developed concurrent with the Caltrans Eureka-Arcata Highway 101 Corridor Improvement Project (see Section 2.2).

The Project would result in a continuous, non-motorized trail from central Arcata to the southern end of Eureka, for a total length of nearly 14 miles. Completion of the link between the two largest cities in Humboldt County would provide a major step toward regional trail connectivity around Humboldt Bay. In recent years, the Project has been Humboldt County's top priority for investing in active transportation and represents the greatest opportunity to enable a major mode shift in transportation within the county. The Project is expected to significantly increase the number of non-motorized trips, improve safety, enhance public health, and promote community vitality (Section 1.3).

In 2012, the County and NCRA initiated community dialogue regarding the future use of the railroad corridor around Humboldt Bay through a series of meetings and technical studies, resulting in consensus on a rails-with-trails approach and a commitment from NCRA to support trail projects (see Section 2.1). In 2013, the County initiated a technical study to identify

constraints and evaluate potential alignment options for the Project (GHD, April 2014). The primary constraints influencing the planning and design of the Project include:

- Limited available space
- Proximity to sensitive resources
- Need for compatibility with Highway 101, the NCRA railroad, and private property
- Crossing Eureka Slough
- Mature stand of Eucalyptus trees in physiological decline
- Potential for flooding and erosion along the Humboldt Bay shoreline

In 2015, HCAOG programmed a total of $2 million in regional State Transportation Improvement Program funds for engineering, environmental studies, and design. The County has supplemented this budget with approximately $50,000 of County funds to date. Preliminary engineering and environmental studies are listed on **Table 1.1**.

Caltrans served as the lead agency for compliance with the National Environmental Policy Act ("NEPA") on behalf of the Federal Highway Administration. Based on the results of the environmental studies, Caltrans concluded that the Project would have no significant impacts on the environment as defined by NEPA. Caltrans executed the Categorical Exclusion determination form for the Project on July 16, 2018. The Environmental Commitment Record associated with the Categorical Exclusion is provided in **Attachment 3**.

Humboldt County served as the lead agency for compliance with the California Environmental Quality Act ("CEQA"). The County prepared an Initial Study to identify potentially significant environmental impacts associated with the Project. The Initial Study identified eleven mitigation measures that would collectively reduce environmental impacts to less-than-significant levels (**Attachment 4**). These mitigation measures are discussed further in Section 5. On July 31, 2018, the Humboldt County Board of Supervisors adopted the Initial Study and Mitigated Negative Declaration of environmental impacts for the Project through Resolution 18-79 (**Attachment 5**). The Comment Evaluation Form responding to comments received during the public comment period is provided in **Attachment 6**.

HCAOG initially programmed a total of $2 million in regional transportation funds for the right-of-way phase of the Eureka-Arcata Highway 101 Corridor Improvement Project. HCAOG and Caltrans approved transferring these funds to the County for the Bay Trail South Project in 2018, and the California Transportation Commission (“CTC”) approved this fund transfer in October 2019.

In January 2019, the CTC awarded construction funding ($13.3 million) for the Bay Trail South Project through the Active Transportation Program. Caltrans has committed additional funding of $1.25 million and the State Coastal Conservancy has committed additional funding of $2 million for construction.

The County is currently working through the right-of-way and final design phases of the Project. The target schedule is summarized on **Table 1.2**.

Table 1.1 Engineering and Environmental Studies

Project Study Report (Humboldt County, March 2014)
Initial Engineering Study (GHD, August 2014)
Basis of Design Report for Trail Width (Humboldt County, March 2016)
Preliminary Environmental Study (Humboldt County, July 2017)
Vegetation Mapping/Environmentally Sensitive Habitat Areas Screening (GHD, November 2017a)
Initial Site Assessment (GHD, November 2017b)
Technical Memorandum: Botanical Survey (GHD, December 2017a)
Wetland Delineation (GHD, December 2017b)
Archaeological Survey Report (Roscoe and Associates, February 2018)
Biological Assessment (Caltrans, February 2018)
2018 Bridge Detailed Inspection Report: Eureka Slough Bridge (American Rail Engineers, February 2018)
Natural Environment Study (Caltrans, March 2018a)
Visual Resources Impact Assessment (GHD, March 2018b)
Location Hydraulic Study (GHD, March 2018a)
Summary Floodplain Encroachment Report (GHD, March 2018b)
Eureka Slough North Coast Railroad Authority Railroad Bridge Improvement Alternatives Study (Morrison Structures, April 2018)
Sea Level Rise Vulnerability and Adaptation Report (ESA, July 2018)
Technical Memorandum: HBTS Structural Design Criteria for Final Design (Draft) (Morrison Structures, August 2018)
Historic Property Survey Report (JRP Historical Consulting, April 2018)
Historical Resources Evaluation Report (JRP Historical Consulting, April 2018)
Limited Visual Tree Risk Assessment (Dryad, October 2018)
Geotechnical Report (Crawford and Associates, June 2019)
Bird Use Monitoring Report for Eucalyptus Trees along the Eureka-Arcata Highway 101 Corridor (Sean McAllister, June 2020)
Corridor Sampling Report (GHD, August 2020)

Table 1.2 Target Timeline

Milestone	Date
Complete right-of-way acquisitions	March 2021
Receive all permits approvals	April 2021
Complete final design and bid package	May 2021
Allocation of construction funds by CTC	June 2021
Award construction contract	August 2021
Begin construction	September 2021
Complete construction	October 2022

1.2 Location

The Bay Trail South Project is located along the Highway 101 and railroad transportation corridor between Eureka Slough and Brainard Slough, for a total length of approximately 4.25 miles, with a portion proposed on the perimeter levee between the Brainard mill site property and Humboldt Bay (**Figure 3**). The Project would connect the existing Eureka Waterfront Trail located within the City of Eureka and the southern terminus of the Humboldt Bay Trail North facility located south of the City of Arcata. The proposed trail alignment is generally situated between Highway 101 and the railroad prism, except where the proposed alignment is located on the Brainard levee or where the trail is on the NCRA Eureka Slough Bridge and approaches. Where the Bay Trail South Project is situated between Highway 101 and the railroad, the proposed alignment is on the west-northwest side of Highway 101 and on the east-southeast side of the NCRA railroad corridor. The Bay Trail South Project also includes cable barrier fencing at various locations along Highway 101 from Eureka Slough to Gannon Slough. Geographic coordinates for the southern and northern extent of the Project are provided in **Table 1.3**.

Table 1.3 Project Extent

Location	Latitude	Longitude
Southern-most point of the trail	40.806793°N	-124.14850°W
Northern most point of the trail	40.831808°N	-124.082584°W
Southern-most point of cable barrier fence	40.805923°N	-124.136041°W
Northern-most point of cable barrier fence	40.846125°N	-124.082180°W

1.3 Purpose and Need

A dedicated bicycle and pedestrian trail between Eureka and Arcata has been a regional priority for nearly 20 years and is identified as a priority project in the Regional Transportation Plan (HCAOG, 2017). The Bay Trail South Project will close the existing 4.25-mile gap in the Humboldt Bay Trail between Eureka and Arcata. The primary purpose of the Project is to improve safety and connectivity for non-motorized and motorized travelers between Eureka and Arcata and enhance public access to Humboldt Bay. A separated non-motorized path is needed because Highway 101 between Eureka and Arcata is an incomplete transportation facility that was designed primarily to support motorized vehicles and does not provide safe mobility for all users. Under existing conditions, people seeking to walk or bike between Eureka and Arcata must travel in the shoulder along a four-lane expressway. The lack of bicycle and pedestrian facilities is a deterrent for pedestrian and bicycle use and severely limits the number of non-motorized trips along the highway corridor due to safety concerns. The Project would reduce the potential for conflicts between bicyclists, pedestrians, and vehicles within the Highway 101 corridor and increase mobility options between the communities of Arcata and Eureka. Trail users would range in ages, experience levels, and abilities. Trip purposes would include commuting (to work, school, social events, commerce) and recreation (exercise, enjoyment, nature study). Modes of mobility would include travel by foot and use of bicycles (upright, recumbent, three-wheeled), roller skates, skateboards, scooters, strollers, wheelchairs, and other mobility devices.

Completion of the Project would have multiple benefits, including:

- **Improved safety** – The Project would improve public safety by separating motorized and non-motorized travelers.
- **Coastal access and opportunities for nature study** – The Project would provide access to areas of Humboldt Bay that currently have no facilities for public access.
- **Economic development** – The Project would enhance transportation mobility for workers and provide a major destination for regional tourism.
- **Congestion relief** – The Project would help alleviate vehicular traffic on Highway 101 by providing a non-motorized travel option.
- **Enhanced quality of life** – The Project would provide a new, major facility for active transportation and outdoor recreation in the Humboldt Bay region.
- **Improved public health** – The Project would create opportunities for increased physical activity.
- **Community connectivity** – The Project would enhance the link between the two largest cities in Humboldt County which are currently separated by highways designed exclusively for vehicles.
- **Environmental benefits** – The Project would result in a reduction in vehicle miles traveled, fuel consumption, and emissions of greenhouse gases and other combustion byproducts.
- **Railroad damage repair and flood risk reduction** – The Project would make urgent repairs of portions of the railroad prism that have been damaged by erosion and which, if left unrepaired, pose a significant vulnerability to future flood damage and interruption of Highway 101.

Filling the gap in the Humboldt Bay Trail between Eureka and Arcata will transform the transportation corridor by separating pedestrians and cyclists from motorists on Highway 101 and eliminating a major barrier to active transportation between the two largest population centers in Humboldt County. The Project would enable a major mode shift toward active transportation for regular travelers between Eureka and Arcata and create an opportunity for an outstanding recreational experience along the coast. The completed Humboldt Bay Trail will be a major destination for residents and visitors seeking to be physically active along a 14-mile continuous trail while enjoying the scenic beauty of Humboldt Bay. Currently there are no public access facilities along the Humboldt Bay shoreline between the southern terminus of Arcata's Humboldt Bay Trail North and the Eureka Waterfront Trail near Eureka Slough.

1.4 Existing Facilities and Land Use within the Project Area

The Project area and vicinity include Highway 101, railroad lines, and private property. Right-of-way for the Project is discussed in Section 3.2.

Highway 101

U.S. Highway 101 is the only U.S. highway in Humboldt County and spans the county in the north-south direction. Highway 101 is classified as a Principal Arterial within Humboldt County and an Interregional Road System route. Highway 101 provides one of three routes around northern Humboldt Bay, along with State Route 255 through Manila to the west and Myrtle Avenue/Old Arcata Road to the east. The segment of Highway 101 between Eureka and Arcata has the highest highway traffic volume within Humboldt County with an average annual daily traffic of 36,300 (2011 data). In 2002, this highway segment was designated the Eureka-Arcata Route 101 Safety Corridor as part of a program to reduce collision rates at the at-grade intersections, and HCAOG and Caltrans initiated efforts for road improvements to improve safety and highway operations (Section 2.2). Within the Project area, Highway 101 is a four-lane expressway with two travel lanes in each direction (south-bound and north-bound) separated by a vegetated drainage ditch. The roadway includes 11- to 12-foot wide travel lanes and ten-foot wide shoulders. The posted speed limit is 65 miles per hour north of Bayside Cutoff, and 50 miles per hour south of Bayside Cutoff. Highway 101 crosses Eureka Slough with two parallel bridges.

Railroad

The railroad around Humboldt Bay is part of the Northwest Pacific Railroad ("NWP") line which has been owned and managed by the NCRA since 1992. The track embankment was constructed starting in 1900 along the margin of the bay. In 1998, commercial railroad operations ceased under order of the Federal Railroad Administration following severe storm damage on the line within the Eel River canyon. Track and infrastructure damage on portions of the line in northern Mendocino and southern Humboldt counties has isolated the northern portion of the line from the rest of the NCRA track system. Funds have not been available for maintenance on the northern portion of the NWP line since railroad operations were discontinued. Portions of the line have deteriorated with embankment erosion, culvert failures, tie deterioration, and vegetation growth (Willdan/HNTB, 2002; AndersonPenna Partners, 2012).

Within the Project Area, NCRA's right-of-way is a mix of fee title ownership and easements for railroad purposes (Section 3.2).

The railroad crosses Eureka Slough with an approximately 17-foot wide, 725-foot long bridge composed of concrete box girder spans and a steel hydraulic lift section, supported on concrete pilings (AndersonPenna Partners, October 2012; American Railroad Engineers, February 2018).

The bridge is currently unused for rail service. If rail service were to resume, significant maintenance and/or improvements would be required because the condition of portions of the rail corridor approaching the bridge do not meet current standards for rail traffic. The Eureka Slough railroad bridge is currently used by the THA for speeder rides.

The approximately 1.25-mile length of railroad prism between Brainard and Bracut has been severely damaged by erosion. In some areas, the existing rock-slope protection is intact and stable. However, in many areas the rock-slope protection is absent or composed of disarrayed revetment, including locations with broken concrete rubble and debris and locations with a poor mixture of rock sizes that do not provide an interlocking matrix. The ballast under the rails has washed out in several locations, leaving rails unsupported and suspended in the air.

North of Bracut, two metal culverts passing through the railroad prism failed and the railroad prism collapsed, leaving rails suspended in the air. The rail prism adjacent to the failed culverts is unstable and actively eroding into the bay.

In 2019, the fundamental purpose of the railroad property and right-of-way was transformed through Senate Bill SB 1029 to focus on development of the Great Redwood Trail (Section 2.3).

Private Property

The Project area includes two properties (Brainard mill site and Bracut Industrial Park) situated along the Humboldt Bay shoreline west of the highway and railroad transportation corridor. Each of these properties has driveway connections to Highway 101 crossing the rail line (Brainard has two driveway connections, while Bracut has one).

Brainard is a former active mill site owned by CRC. Brainard includes two parcels (APN 017-081-001 and APN 404-141-004) occupying approximately 100 acres surrounded by a levee. The property is zoned General Industrial. Mill operations discontinued in 2014. This site contains multiple structures and significant open paved areas that are currently leased for industrial and commercial purposes. The property was annexed into the City of Eureka in 2018. The property is within the jurisdiction of the Coastal Commission for coastal development permitting.

The Bracut Industrial Park is owned by Bracut Lumber Company. The Bracut Industrial Park includes three parcels. The main developed parcel (APN 501-241-033) occupies approximately 24 acres and is surrounded by a levee. This parcel contains multiple buildings which are leased for industrial and commercial purposes. In 1986, Bracut Lumber Company acquired ownership of the railroad parcel (501-241-031) along the frontage of the Bracut Industrial Park. Bracut Lumber Company also owns a parcel (501-241-030) situated on the bay side of the railroard parcel. Parcel APN 501-241-030 was formerly used for billboard display. Bracut Marsh is a restored intertidal marsh owned by the Coastal Conservancy adjacent to the Bracut Industrial Park. The Coastal Conservancy does not have deeded access rights for access to Bracut Marsh through Bracut Industrial Park.

Between Brainard and the Brainard Industrial Park, the railroad is situated on two privately owned parcels (APN 404-141-002 and APN 501-241-005). These parcels are used for billboard display. Currently three billboards are situated on these two parcels. The billboards are owned by Outfront Media and operated under a lease agreement with the property owners. NCRA holds an easement across the two parcels for railroad purposes.

Eureka Waterfront Trail

The Eureka Waterfront Trail extends from the south end of Eureka near the Elk River estuary along the shoreline of Humboldt Bay to the Myrtletown community near Eureka Slough. The Eureka Waterfront Trail was built in phases starting with the Hikshari Trail and now encompasses a continuous length of approximately six miles. The trail connects industrial, commercial, residential, public facility, and open space areas for transportation and recreational use. Near Eureka Slough, the Eureka Waterfront Trail is composed of a Class I, multi-use trail with two five-foot-wide, asphalt-paved travel lanes and two-foot-wide unpaved shoulders. The most recent phases of the Eureka Waterfront Trail were developed under Coastal Development Permit 1-15-2054. Portions of the trail are integrated with the railroad and were developed under a September 2015 license agreement with NCRA. The City of Eureka is currently developing the Elk River Estuary and Trail Enhancement Project which includes a one-mile extension of the Eureka Waterfront Trail southward, under CDP 1-17-0926.

Humboldt Bay Trail North

The City of Arcata's Humboldt Bay Trail North trail facility was constructed in two phases and currently encompasses a continuous length of approximately four miles. Arcata's trail extends from central Arcata near Larson Park and Arcata High School southward through commercial and residential areas to the Arcata Marsh & Wildlife Sanctuary, and continues southward along the Humboldt Bay shoreline parallel to the NCRA railroad within the Eureka-Arcata transportation corridor. The southern terminus of the trail is located north of Brainard Slough and Bracut Industrial Park. At the southern terminus, there is a connection to the shoulder of Highway 101 for southbound travel. Where the trail parallels the railroad within the Eureka-Arcata transportation corridor, the trail was established by widening the rail prism and constructing separate non-motorized bridges. Here, the trail is composed of a Class I, multi-use trail with two five-foot-wide, asphalt-paved travel lanes and two-foot-wide unpaved shoulders, as specified in Humboldt County (2016). The most recent phase of Humboldt Bay Trail North was developed under Coastal Development Permit 1-16-0122. Portions of the trail are integrated with the railroad and were developed under a March 2016 license agreement with NCRA. The City of Arcata is currently developing a project to develop the Arcata Annie & Mary Trail Connectivity Project, which would create a trail extending northward from Larson Park through the northeast portion of the city to the Humboldt Bay Municipal Water District's Mad River Park #1 facility.

1.5 Eucalyptus Trees

The Project area includes a row of mature eucalyptus trees rooted in the embankment of the southbound lanes of Highway 101. These trees are maintained by Caltrans to reduce potential hazards to travelers on Highway 101. Smaller trees and saplings are growing in the adjacent railroad prism. The mature eucalyptus trees occur in two groups separated by the northern driveway into the Brainard mill site. The southern group extends over a linear distance of approximately 3,400 feet (58% of the entire row of trees). The northern group extends over a distance of approximately 2,500 feet (42% of the entire row of trees). In a survey conducted in 2017, the northern group contained approximately 219 individual trunks larger than eight inches in diameter. Many trees have multiple trunks growing out of a common root mass, making it difficult to differentiate individual trees. A subsequent assessment (Dryad, 2018) estimated approximately 129 separate trees within the northern group. The number of trees may have changed slightly based on maintenance work performed by Caltrans in 2019.

The Project proposes to avoid the southern group of trees by situating the trail on the levee around the Brainard mill site; this group of trees would not be affected by the Project. The northern group of trees is situated directly adjacent to a segment of the proposed trail and would

present a significant safety hazard to trail users. The trail would be situated between Highway 101 and the railroad, approximately 10 to 15 feet west of the trees. Many of the trees lean toward the railroad and/or have overhanging limbs. The County evaluated the safety hazards to future trail users and concluded that removal of the northern group of eucalyptus trees is necessary to protect the safety of trail users. Feasible measures to mitigate the safety hazards were not identified. The primary purpose of removing the northern group of eucalyptus trees is public safety. In addition, removal would create fewer constraints for future sea level rise adaptation measures (Section 1.7), remove a non-native species, and open up views looking westward towards the bay.

The CEQA Comment Evaluation Memo (**Attachment 6**) provides detailed information on the trees. Eucalyptus trees were originally planted in 1921 to serve as a wind-break for a ranch near Fay Slough. The state highway connecting Eureka and Arcata was initially constructed as an unpaved road in 1918 and then improved to become a paved, two-lane highway in 1925. Most or all of the original trees were cut down after a damaging frost in 1933 and subsequently replanted. The replanted trees received major pruning and topping on multiple occasions. The trees are not eligible for listing on the National Register of Historic Places or the California Register of Historic Resources (JRP, 2003; JRP, 2018). Native to Australia and introduced in the United States, eucalyptus trees are allelopathic (i.e., they create chemicals that are harmful to native species and deter their growth and propagation), and thus are often removed as part of habitat restoration projects because they can exclude more desirable native vegetation. The understory beneath the trees lacks diversity and structure and provides little native wildlife habitat value. The trees do not have special rarity or special ecological value and do not meet the criteria for being considered an Environmentally Sensitive Habitat Area as defined in the California Coastal Act (GHD, November 2017a). Some people value the aesthetic qualities of the trees and their connection to historical ranching activities, while other people value more expansive views along the shoreline of Humboldt Bay (Caltrans, 2018b).

The CEQA Comment Evaluation Memo (**Attachment 6**) documents the County's assessment of the safety risks associated with the eucalyptus trees. Based on the proximity of the mature eucalyptus trees to the proposed trail, and the fact that several trees are leaning toward the trail, there is a high likelihood that falling limbs or a toppled tree could strike the trail, and a high likelihood that such an incident would result in severe consequences if a trail user is present at the point of impact. The memo describes eucalyptus trees growth patterns which increase the risk of unexpected dropping of limbs and branches, along with their susceptibility to toppling due to their shallow root system and exposure to strong winds. The memo documents cases of unexpected structure failures leading to death, serious injury, and near-miss incidents involving eucalyptus trees in California and examples of public entities taking proactive measures to mitigate the safety risks where eucalyptus trees are situated in close proximity to roads, trails, paths, and parks.

The County retained Dryad, LLC, a certified arborist, to provide an independent professional opinion of the safety risks associated with locating a trail adjacent to the northern group of eucalyptus trees. Dryad's work was conducted in accordance with protocols and practices established by the American National Standards Institute Standard for tree risk assessment. Dryad's report is provided in **Attachment 7**. Dryad determined that the trees as a whole are in an advanced state of physiological decline, likely due to multiple factors including repeated and severe pruning and topping, limited rooting space, partially impervious soil cover, saline water and soil, low soil fertility, lack of organic soil cover, and desiccation from regular significant winds. The trees were observed to exhibit a number of structural weaknesses that can result in failures, including decay at the base of the trunks, columns of decay on trunk interiors, decay at

pruning wound sites, large dead limbs, and weak attachments of limbs, tops, and codominant stems. Falling dead limbs were identified as the most common first failure risk within a timeframe of 1-3 years. Many of the trees are near death with a tiny fraction of the necessary foliage to survive. Dryad stated that the opinion that the trees are more prone to failure due to the tree structure and architecture resulting from severe pruning and topping. Dryad concluded that there is a high potential for both significant property damage and serious personal injury or death should whole trees or tree parts fail. Dryad concluded there is no reasonable method for mitigating the risks through pruning, cabling and bracing, or moving of targets. Further, Dryad projected that the risk of failures would increase over time if allowed to remain because their growing environment is inherently inhospitable, further pruning is inevitable, and climate change will likely further exacerbate and increase the rate of decline.

The County retained S.E. McAllister & Associates (McAllister), a wildlife biologist, to gather technical data and information regarding avian activity within both the northern and southern groups of eucalyptus trees and assess the habitat quality of the trees. McAllister's report is provided in **Attachment 8**. McAllister initiated monitoring on October 28, 2019, and concluded on April 2, 2020. This monitoring period captured the late fall migration period when many raptors pass through the region, winter roosting, and early spring nesting. A total of 72 visits were made over 37 survey days. Species composition, abundance, and frequency of occurrence are documented in the report. The most frequently observed species were Common Raven, European Starling, Red-tailed Hawk, Peregrine Falcon. Most birds were observed either foraging or roosting. One nest for a pair of Common Ravens was observed in the southern group of trees. Herons, night-herons, egrets, and double-crested cormorants were not observed during the study period. McAllister noted that the row of trees is narrow and foliage is generally sparse and concentrated near the crowns, offering limited dense cover. Pruning and topping have prevented the trees from attaining complex branch structures that are favorable for supporting nests. Potential nesting sites are highly exposed to wind, rain, and potential predators. Based on these observed physical attributes and the avian monitoring data, McAllister concluded that the trees are used periodically by some species for perching and foraging but that site quality limits roosting and nesting activity. McAllister noted that the eucalyptus trees represent poor quality habitat and are surrounded by superior forest habitat and less disturbed areas.

1.6 Flooding Hazards and Sea Level Rise

Overview

The trail for the Bay Trail South Project would be situated along the shoreline of Humboldt Bay. This alignment is essential for providing connectivity with the existing trails to the north and south and avoiding highway crossings. In addition, the alignment must be on the west side of Highway 101 to be considered a coastal trail with access to Humboldt Bay. Where the railroad serves as the hardened shoreline of Humboldt Bay (and de facto levee), the trail would be situated on the inland side of the railroad. Near the Brainard mill site, the trail would be situated on top of the levee surrounding the property.

The Project has been carefully planned to account for flooding hazards and sea level rise. As discussed in Section 3.5, the planning life of the Project is 75 years (through 2100). The County commissioned the Humboldt Bay Trail South Sea-Level Rise Vulnerability and Adaptation Report (ESA, 2018) to refine the technical understanding of vulnerability of the Project, inform the incorporation of resilience measures into the project design, and introduce concepts for future adaptation measures. ESA (2018) provided estimates of wave heights and wave runup within the Project area and developed engineering criteria for evaluating the impacts of stillwater flooding and wave overtopping, which were used as the basis for design of the trail elevations.

The Eureka-Arcata transportation corridor within the Project area is vulnerable to flooding hazards under existing conditions, and flood risks will increase with sea level rise. The railroad and Highway 101 are linear landforms that were built on former tidelands in the early 20th century (Trinity Associates, 2013; Rohde, 2020). Land inland of the railroad and Highway 101 would receive tidal inundation in the absence of these landforms. The 1.25-mile section along the shoreline between Brainard and Bracut is especially vulnerable to flooding, for multiple reasons. This section of railroad and Highway 101 has the lowest elevations along the Eureka-Arcata transportation corridor, with the railroad elevation as low as 9.6 feet NAVD88. In addition, wind wave energy within the bay is high during storm events and wave-attenuating salt marsh adjacent to the railroad is largely absent. The railroad between Brainard and Bracut sustained significant flooding damage in December 2005 when storm surge combined with high tides resulted in the highest recorded water level in Humboldt Bay, concurrent with heavy winds and wind waves, resulting in overwashing of the railroad and closure of Highway 101 for several hours due to flooding. Portions of the rock-slope protection were damaged and sections of railbed were lost to erosion (**Attachment 2**). As described in Section 3.5, the Project would include urgent repairs to the railroad prism and improvements to increase the overall resilience to flood hazards.

Humboldt Bay/Eureka Slough Area Sea Level Rise Adaptation Plan

In 2018, the County received funding from the Caltrans Adaptation Planning Grant program to prepare a sea level rise adaptation plan for the Eureka Slough hydrologic sub-unit of Humboldt Bay. The planning area for this study (**Figure 4**) encompasses the project area for the Bay Trail South Project. The study area contains a concentration of transportation infrastructure, utilities, businesses, low-income residential areas, and wildlife areas. One of the County's primary reasons for initiating the study was to further assess the sea level rise vulnerabilities of the Bay Trail South Project over its entire planning life and to develop a framework for advancing collaborative efforts at a regional scale with an integrated strategy of short-term and long-term actions. The working draft report (GHD, July 2020a) includes a vision statement, key assumptions, guiding principles, sea level rise projections, conceptual model of dynamic landscape evolution and flood risk increases, and a scenario-based planning approach. The study developed specific hazard scenarios to further enhance the technical understanding of flood vulnerability. Two scenarios were developed to assess the flood protection benefits of the Bay Trail South Project (see Section 3.5). The next iteration of the report will include conceptual design alternatives for adaptation projects, benefit-cost analysis, and an adaptation strategy. The project is scheduled for completion in December 2020.

Natural Shoreline Infrastructure in Humboldt Bay for Intertidal Coastal Marsh Restoration and Transportation Corridor Protection

In 2019, the County was awarded funding from the National Fish and Wildlife Federation and Ocean Protection Council to plan and design a project that would integrate the natural flood risk reduction properties of salt marsh into a shoreline management strategy to help protect the segment of the transportation corridor between Brainard and Bracut from flood hazards. The planning project will perform site characterization and prepare preliminary design for a project utilizing tidal benches or similar natural infrastructure techniques. The project is intended to lay the groundwork for implementation of an innovative approach to restore and perpetuate intertidal coastal marsh, increase community resilience to flooding, and demonstrate the use of natural ecological systems for sea level rise adaptation. This project was initiated in July 2020 and is expected to be completed in September 2021.

Additional information regarding the Humboldt Bay/Eureka Slough sea level rise adaptation plan and the natural shoreline infrastructure design project is available at https://humboldtgov.org/2487/Sea-Level-Rise.

Caltrans Eureka-Arcata Highway 101 Corridor Phased Adaptation Plan

In accordance with Special Condition 2 of CDP 1-18-1078, Caltrans will develop a Phased Adaptation Plan for the Eureka-Arcata Highway 101 corridor in coordination with local agencies and interest groups by December 31, 2025, or sooner if flooding closes any portion of Highway 101 four times over any 12-month period. The plan will identify a suite of strategies for protecting, relocating, or otherwise adapting the improvements authorized by CDP 1-18-1078 to maintain safety from flooding and other coastal hazards in order to minimize risk and assure stability and structural integrity in the long-term (at least through 2100). Alternatives to be considered include accommodation strategies (viaducts, overpasses, etc.), protection measures (dikes, living shorelines, or other natural or engineered features), and relocation of the facilities to an area safe from flooding and other coastal hazards. The plan will describe specific design elements and adaptation measures and will address how different strategies may be used in combination and over time to ensure the integrity and functionality of the highway system. The plan will include a timetable for implementation, which may include defined triggers and time horizons. The plan will be reviewed by the Coastal Commission to evaluate the feasibility and Coastal Act consistency of each alternative, including whether the alternatives:

1. Minimize risks to life and property of flood and geologic hazards, assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area;

2. Ensure the resiliency of the transportation infrastructure;

3. Avoid impermissible impacts to wetlands and only involve the feasible least environmentally damaging alternative for any diking, dredging, of filling of wetlands;

4. Protect other coastal resources as sea level rise and other natural processes occur;

5. Maximize and protect public access and recreation to and along the shoreline in a full multi-modal transportation network; and

6. Avoid reliance on hard shoreline armoring.

2 BACKGROUND AND PROJECT HISTORY

2.1 Regional and Local Planning

Humboldt Bay Trails Feasibility Study (RCAA, 2001)
The Humboldt Bay Trails Feasibility Study evaluated opportunities to improve non-motorized access to and around Humboldt Bay by expanding or creating trails. The study identified the Humboldt Bay segment of the California Coastal Trail as the backbone of a regional trail system that provides coastal access to the bay. The concept of a trail project between Arcata and Eureka separate from the Highway 101 corridor was identified as the highest priority project in the region because it would connect the two largest cities in the county, provide recreational access to the bay, and enable the safe use of bicycles for transportation on a heavily traveled highway segment.

Humboldt Bay Trail Feasibility Study: Eureka to Arcata (Alta et al, 2007)
In 2006, local agencies and stakeholders initiated a cooperative planning process to analyze the feasibility of developing a Class I bikeway/multi-use trail between Arcata and Eureka. The project area extended from X Street in Eureka north to Samoa Boulevard in Arcata along the railroad and highway corridor. The corridor was divided into twelve segments based on topography and other features, and five options (four trail options and a no-project option) were developed and evaluated. The assessment report presented information regarding design concepts, opportunities and constraints, environmental impacts, magnitude of costs, projected benefits, and implementation recommendations. The rail with trail option was identified as having the broadest public support.

Humboldt Bay Management Plan (Harbor District, 2007)
The Humboldt Bay Management Plan is the primary planning document for the Humboldt Bay Harbor, Recreation and Conservation District ("Harbor District"). The plan contains Policy RFA-1 which states that the Harbor District shall endeavor to support the development of new access points that propose safe and appropriate public recreational access to Humboldt Bay. Following the adoption of this plan, the Harbor District's economic development committee convened a series of meetings in 2009 to discuss prioritization of potential policies and actions. The committee identified the need to improve recreational infrastructure and opportunities that promote community health and boost economic development related to tourism as a priority. The committee report supported the aim of "preserving the publicly owned [railroad] right-of-way to be managed in the most feasible, best and highest use with an eye to the future that includes trails and railroad options" (Harbor District, 2010).

Humboldt County Regional Pedestrian Plan (HCAOG, 2008)
The Humboldt County Regional Pedestrian Plan provides a guide for development of infrastructure for pedestrian use. The goals of the plan include creating a pedestrian-safe environment and improving pedestrian access to important destinations. The Humboldt Bay Trail is identified as a regional trail project that would fulfill the goals of the 2008 Pedestrian Plan.

Humboldt County Regional Trails Master Plan (HCAOG, 2010)
The Humboldt County Regional Trails Master Plan provides a framework for promoting the development of a regional active transportation system that ensures safe and equitable access for non-motorized users. The plan was developed to address the limited options for active travel between north coast communities. The Humboldt Bay Trail is identified as a priority project that would connect local residential, commercial, and recreational destinations; link to concurrent trail projects in Arcata and Eureka; and add a significant segment to the California Coastal Trail ("CCT").

Humboldt County Corridor Preservation Report (HCAOG, 2010)
The Humboldt County Corridor Preservation Report is a source document for HCAOG and its members with information and potential strategies for preserving, acquiring, and utilizing public transportation corridors for multi-modal uses. The document defines a corridor as a geographic alignment that accommodates travel or potential travel, encompassing a single or multiple transportation routes and facilities, the adjacent land uses, and the connecting network of streets. The NCRA railroad and Highway 101 are identified as key corridors within Humboldt County. The City of Arcata's rail-with-trail project and the City of Eureka waterfront trail are identified in the report.

Humboldt County Coastal Trail Implementation Strategy (RCAA, 2011)
The CCT is intended to be a continuous network of public trails along the coastline that provides non-motorized recreation and transportation opportunities for the widest possible range of potential users. RCAA initiated a coordinated planning effort in 2009 with funding from the California State Coastal Conservancy to develop an implementation strategy for completing the CCT within Humboldt County. Fifty partner organizations participated in and contributed to the planning effort. Public involvement was achieved through surveys, workshops, and comments on the draft report. The Humboldt CCT Implementation Strategy report (RCAA, 2011) includes alignment evaluation and prioritization and trail demand projections for the approximately 158-mile-long segment within Humboldt County. Trail alignments were evaluated based on the goals of providing a scenic experience; maximum access for a variety of non-motorized uses; connectivity to destinations and amenities along the coast and local communities; separation from motorized traffic; minimum impacts to natural habitats and cultural and archeological resources; and respect for private property. For the segment between Arcata and Eureka, the report recommends a bike path with soft surface shoulders along the rail corridor around Humboldt Bay.

NCRA Humboldt Rail Corridor Committee (NCRA, 2012)
In 2012, the NCRA commissioned the Humboldt Rail Corridor Committee to assess the condition of the railroad corridor around Humboldt Bay and opportunities for restoration; opportunities for the return of freight service; and opportunities for development of trails consistent with NCRA's trail policy. Focused technical studies were commissioned to assess the condition of the railroad corridor (AndersonPenna, 2012) and prepare budgetary cost estimates for rail-with-trail projects (GHD, 2012). Three public meetings were conducted in September and October 2012 for presentations and discussions regarding corridor condition, rail-with-trail projects, and prospects for train use of the corridor.

The NCRA committee developed a report which was adopted by the NCRA Board along with Resolution 2012-13. NCRA Resolution 2012-13 declares the following policies:

- NCRA states its support for a broad-based community coalition to advocate for the investment of public and private funds to restore the Humboldt Bay rail corridor, in whole or in part, clearly incorporating rail and trail development into such restoration, generally consistent with NCRA trail policy;
- NCRA will work with the Northwestern Pacific Railroad Co., THA and others to build interest in, and support for the restoration of local freight and passenger excursion service;
- NCRA will consider clearly defined and strictly limited exceptions to its current trail policy to enable development of a trail in the Humboldt Bay corridor without compromising the prospects of rail service restoration;

- NCRA will prioritize rail infrastructure restoration and trail development in the Eureka to Arcata corridor to more clearly align its timing and objectives with those of the HCAOG/Caltrans U.S. 101 Corridor Improvement Project;
- NCRA will also prioritize rail restoration in the Arcata to Samoa corridor in order to facilitate the restoration of passenger excursion service.

2014 Humboldt County Community Health Improvement Plan (Humboldt County Department of Health and Human Services, January 2015)

The 2014 Humboldt County Community Health Improvement Plan identified safe neighborhoods for residents, pedestrians and bicyclists as a community priority area to improve the health and well-being of Humboldt County residents. This priority area was identified as an important contributing factor related to several of the most concerning health outcomes in the county. The absence of safe, walkable communities is a leading cause of physical inactivity. Walking and cycling provide physical health benefits and are linked to improved mental health. The specific objective in the Community Health Improvement Plan for increasing options for active modes of transportation was to secure funding to complete the Humboldt Bay Trail by 2019.

Humboldt Regional Transportation Plan – Variety in Rural Options of Mobility (HCAOG, 2017)

The Regional Transportation Plan ("RTP") is a long-range planning document (planning horizon of 20 years, updated every five years) for future transportation investment in the region. The RTP presents overall goals, objectives, policies, and performance criteria and includes a list of identified priority projects. The six main objectives of the RTP are:

- Balanced mode share/complete streets
- Economic vitality
- Efficient and viable transportation system
- Environmental stewardship
- Equitable and sustainable use of resources
- Safety

The RTP is composed of several elements focusing on specific topics, including Complete Streets and Commuter Trails. The goal of the Complete Streets element is for the streets, roads, and highway system throughout Humboldt County to meet the transportation and safety needs of all users, including pedestrians, transit users, bicyclists, motorists, the elderly, youth, and the disabled. The goal of the Commuter Trails element is for the county to have a network of connected regional and local trails which gives people options for safe, active transportation. In addition, the Commuter Trails element contains a goal for the California Coastal Trail within Humboldt County to be a continuous public right-of-way along the coastline and a contiguous trail for non-motorized travel, fostering appreciation and stewardship of the scenic and natural resources of the North Coast.

The RTP includes the following policies relevant to the Humboldt Bay Trail:

> Policy CS-2: HCAOG recognizes the planned Humboldt Bay Trail as a regional priority multi-use trail, and supports multi-jurisdictional, public, and private efforts to develop it.
>
> Policy CS-4: HCAOG shall include Complete Streets improvements in regionally-funded transportation system projects to the extent feasible, as consistent with California Complete Streets Act of 2008 (AB 1358) and Caltrans Deputy Directive 64-R1.

Policy CS-5: HCAOG shall encourage and promote regional "complete street" projects for the demonstrated economic benefits they bring to local businesses, markets, and property values.

Policy CS-11: Carry out policies and program funding for projects that will help achieve the goals of the Global Warming Solutions Act. This shall include supporting efforts to reduce non-renewable consumption and air pollution, such as projects that increase access to alternative transportation and renewable fuels, reduce congestion, reduce single-occupancy (motorized) vehicle trips, and shorten vehicle trip length, and reduce greenhouse gas emissions.

Policy CS-12: HCAOG shall promote equity, cost effectiveness, and modal balance in programming and allocating funds to regionally significant roadway and trail projects.

Policy CS-15: HCAOG supports roadway design standards that increase bicyclist and pedestrian safety and will work with jurisdictions to help implement innovative designs and engineering projects that have been shown to improve bicyclist and pedestrian safety.

Policy Trails-1: HCAOG shall coordinate and support local jurisdictions in developing a regional trails network. HCAOG shall support lead agencies in completing a contiguous California Coastal Trail ("CCT") in Humboldt County. HCAOG supports implementing "Complete Streets" projects and policies for the CCT along the shoreline of Humboldt's coastal communities.

Policy Trails-2: HCAOG shall pursue, and help member entities pursue, active transportation system funding to implement priority trail projects identified in the Humboldt County Regional Trails Master Plan.

Policy Trails-3: HCOAG shall pursue and support using existing public right-of-way for trails to the maximum extent feasible in order to preserve land, assets, and financial resources.

Public Trails-4: HCAOG shall support entities to design and locate trails to minimize impacts to environmentally sensitive habitat areas and prime agricultural lands to the maximum extent feasible.

Policy Trails-6: HCAOG supports and encourages the design principles, as applicable, that the Coastal Conservancy outlines in "Completing the California Coastal Trail" (2003), which are: proximity to the sea, connectivity, integrity, respect, and feasibility.

Policy Trails-8: HCAOG will prioritize planning, design, construction, adequate maintenance, and other actions to improve the safety of the regional trails system.

Humboldt Regional Bicycle Plan Update 2018 (HCAOG, 2018)

The Humboldt Regional Bicycle Plan supports the development of convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities. The plan is intended to facilitate projects that link adjoining jurisdictions' bicycle routes and serve to build a regional bicycle network. The goal of the plan is to create the safest conditions for bicyclists by providing bikeways and improving roadways to eliminate barriers to bicycle travel. The Humboldt Bay Trail is identified as one of the five priority regional programs/projects to support and enhance bicyclist safety and encourage more people to utilize bicycles for transportation.

Humboldt County Regional Climate Action Plan (in progress)
Humboldt County is coordinating with local agencies to develop a regional Climate Action Plan to reduce greenhouse gas emissions. The plan will identify locally-oriented strategies to reduce emissions from various sources including vehicle travel. In a 2015 inventory developed by the Redwood Coast Energy Authority, mobile combustion (transportation) contributed 54% of county-wide emissions. One of the goals in the Climate Action Plan is low-carbon transportation alternatives, and one of the strategies is creating new trails.

2.2 Eureka-Arcata Route 101 Corridor Improvement Project

The Eureka-Arcata Route 101 Corridor Improvement Project was initiated in 2002 to improve safety and operations along Highway 101 between Eureka and Arcata. The primary purpose of the Corridor Improvement Project is to eliminate traffic conflicts at six uncontrolled intersections to reduce the number and severity of collisions along the Eureka-Arcata Corridor. The proposed project includes a half-signal at Airport Road; compact diamond interchange at Indianola Cutoff; and median closures at Mid-City Motors, CRC, Bracut, and Bayside Cutoff. Additional work includes replacement of the southbound Jacoby Creek bridge, bridge rail replacement, tide gate replacement, center median barriers, and extension of acceleration and deceleration lanes.

In September 2013, the California Coastal Commission issued conditional concurrence with the proposed consistency determination submitted by Caltrans and HCAOG (Consistency Certification No. CC-016-13). The consistency determination included the following condition:

> Condition 1 (Coastal Trail Planning): Construction of the Route 101 Corridor Improvements will not commence until adequate commitments are in place to assure that a separate Class 1 bike and pedestrian trail, parallel to Route 101 from Arcata to the northern end of downtown Eureka, will be constructed and operational by the time the major project components are completed. Such commitments will include, but may not be limited to, assurances that adequate funding for construction of the trail exists, as well as a demonstration that the necessary assurances are in place to secure ownership interests or permissions to enable the trail construction to proceed in a timely manner, prior to or concurrent with construction of the corridor improvements.

In November 2013, the HCAOG board formed the 101 Corridor and Bay Trail Ad Hoc Committee with representatives from City of Arcata, City of Eureka, County of Humboldt, and Caltrans to ensure coordination and collaboration on the linked highway and trail projects. In 2017, the CTC adopted the Environmental Impact Report for the Corridor Improvement Project for compliance with CEQA. Also in 2017, the Record of Decision for the final Environmental Impact Statement was issued for compliance with NEPA.

Caltrans has assisted with development of the Humboldt Bay Trail in multiple ways including the following:

1. Contributed $1 million of Caltrans discretionary funds to the City of Arcata to support construction of the Humboldt Bay Trail North project.
2. Supported re-programming of $2 million of HCAOG discretionary funds to the County of Humboldt for right-of-way acquisition for the Humboldt Bay Trail South project. These funds had originally been allocated to Caltrans for billboard removal along the corridor. However, Caltrans was able to remove the majority of billboards through alternative means.

3. Developed a large-scale wetland mitigation project that includes mitigation credit for a portion of the City of Arcata's wetland mitigation obligations for the Humboldt Bay Trail North project and the total amount of the County of Humboldt's wetland mitigation obligations for the Bay Trail South Project. The wetland mitigation strategy includes removal of *Spartina densiflora* and creation of wetlands on a developed parcel.
4. Committed to contribute $1.25 million of Caltrans discretionary funds to the County of Humboldt to support construction of the Humboldt Bay Trail South project.

In August 2019, the Corridor Improvement Project received Coastal Development Permit CDP 1-18-1078, which includes Condition 4 (Coastal Trail Planning). This condition requires that prior to commencement of the construction of the Indianola Interchange, Caltrans shall submit plans showing a separated bike and pedestrian connection (at least six feet in width) from Indianola Cutoff to the Humboldt Bay Trail.

2.3 Great Redwood Trail

In September 2018, Governor Brown signed Senate Bill SB 1029, known as the North Coast Railroad Authority Closure and Transition to Trails Act, to dissolve the NCRA and transfer the rights-of-way and other properties to a successor agency that would create a Great Redwood Trail for hiking, biking, and riding. This transition is currently being administered by a task force composed of California State Transportation Agency, Caltrans, Department of Finance, and Department of General Services. The task force commissioned an assessment of NCRA finances, right-of-way, and the condition of the railroad infrastructure. Issuance of an assessment report is expected by the end of 2020. Establishment of a successor agency is expected by the end of 2021. NCRA is expected to continue to function until the successor agency is established but has limited capacity to engage with trail planning and design efforts.

3 PROJECT DESCRIPTION

3.1 Overview

The Bay Trail South Project would construct approximately 4.25 miles of Class I multi-use trail to provide non-motorized transportation and recreational access along the Eureka-Arcata Highway 101 transportation corridor and connect the City of Eureka's Waterfront Trail with the southern terminus of the City of Arcata's Humboldt Bay Trail North. The trail would be paved to accommodate pedestrians, bicyclists, wheelchairs, strollers, and mobility devices. The majority of the trail would be ten feet wide (two five-foot bi-directional lanes) with two-foot gravel shoulders.

For a total length of approximately three miles, the Project would be constructed by widening the railroad prism and constructing the trail parallel to, and offset from, the rails, similar to the southern portion of the City of Arcata's Humboldt Bay Trail North project. For the segments of railroad that have been damaged by flooding and erosion, the Project would repair and maintain the shoreline revetment, remove the rails, and raise the elevation of the rail prism to provide resiliency to flood hazards and sea level rise. The Project includes cooperative use of NCRA's 725-foot-long bridge over Eureka Slough, where flangeway fillers would be installed adjacent to the rails to allow passage by railroad and speeder cars while maintaining a flat trail surface. Approximately one mile of trail is proposed to be located on the perimeter levee around the Brainard mill site, with two new bridges providing connectivity between the railroad and levee trail sections. Other major project elements include a new bridge over Brainard Slough and removal of the northern segment of mature Eucalyptus trees adjacent to Highway 101 and the railroad.

The trail will include drainage facilities and measures for erosion control. The Project would install a cable barrier fence at specified locations between Highway 101 and the new trail and also at locations along the existing Humboldt Bay Trail North segment. Fencing would be incorporated to separate the trail from private property. The trail would include a center stripe delineating the opposite directions of travel and associated regulatory, warning, and directional signs. Trail amenities would include viewing platforms, benches, and interpretive signs.

The Project is primarily situated within the interior of the Arcata-Eureka transportation corridor and is fundamentally designed to connect existing trail segments located within the two cities. Immediate opportunities for new trailheads were not identified. The Project does not propose new trailheads and envisions that users will access the new trail segment from the interconnecting trail segments in Eureka or Arcata.

The approximately 4.25-mile-long trail alignment was divided into nine (9) functional study segments (**Figure 3** and **Table 3.1**). Detailed descriptions of the project design by segment are provided in Section 3.3.

Table 3.1 Trail Segments

Segment	Location	Approximate Length (ft)	Alignment Description
1	Connection to Eureka Waterfront Trail	100	Westerly approach to Eureka Slough Bridge (trail on railroad prism) and connection to the existing Eureka Waterfront Trail (200 feet of the Eureka Waterfront Trail will be reconstructed)
2	Eureka Slough Crossing	725	Cooperative use of NCRA's existing Eureka Slough Bridge
3	East Eureka Slough	1,850	Easterly approach to Eureka Slough Bridge; trail adjacent to railroad prism
4	Eureka Slough to Brainard mill site	4,875	Trail between railroad and highway and bridge trail connection over bay
5	Brainard mill site	5,375	Trail on perimeter levee
6	Northern bridge crossing from mill site to railroad	200	Bridge trail connection over bay
7	North eucalyptus area	2,550	Trail between railroad and highway
8	South of Bracut	4,050	Trail between railroad and highway
9	Bracut to Brainard Slough	2,630	Trail between railroad and highway and bridge over Brainard Slough
	Total:	22,455	
Bay Trail North	Brainard Slough to Gannon Slough	5,230	Cable barrier fence between existing trail and highway

3.2 Property and Right-of-Way

Right-of-way for the Bay Trail South Project would include a lease agreement with NCRA, a use agreement and permanent easement with CRC, two property acquisitions, and authorizations from the U.S. Fish & Wildlife Service and City of Eureka as summarized on **Table 3.2** and described below.

NCRA

NCRA's railroad right-of-way within the Project area is comprised of a combination of fee title ownership and easement. For property owned by NCRA, the County will apply for a lease agreement similar to the agreement that was approved in 2019 between NCRA and the City of Blue Lake for the Annie & Mary Trail Phase 1 Project. While previous agreements for trail projects between NCRA and the Cities of Eureka and Arcata were license agreements, the more recent agreement with the City of Blue Lake was a lease agreement. The lease agreement will need to be approved by the CTC.

U.S. Fish & Wildlife Service

Widening of the railroad prism east of Eureka Slough bridge would result in a small encroachment onto the Humboldt Bay National Wildlife Refuge. The instrument for authorizing this encroach remains to be determined.

City of Eureka
The City of Eureka owns a tideland parcel (APN 405-061-006) south of the Brainard mill site. A bridge would cross a corner of this parcel. The County expects to receive an encroachment permit or use agreement from the City of Eureka to allow this crossing.

California Redwood Company
Humboldt County proposes to develop a Use Agreement with CRC and acquire a permanent easement for construction and operation of the trail on the levee around the Brainard mill site. The Use Agreement will specify the terms and commitments for shared use of the levee. The agreement and easement are expected to be completed in early 2021.

McMurray/Allpoints Outdoor
Humboldt County proposes to acquire two parcels owned by McMurray and Allpoints Outdoor. The parcels encompass portions of the railroad prism along with adjacent intertidal areas. Escrow is expected to close in October 2020. The sign structures on the property are owned by Outdoor Media and operated under two lease agreements. The term of the lease agreements ends on August 1, 2043. Humboldt County would become the lessor for these lease agreements.

Bracut Lumber Company
Humboldt County proposes to acquire two parcels owned by Bracut Lumber Company. Escrow is expected to close by the end of 2020. A lot line adjustment would be administered to ensure that the developed portion of the Bracut Industrial Park remains part of the main industrial parcel.

Table 3.2 Right-of-Way Summary

Segment	Design Concept	Current Property Owner	Assessor Parcel No.'s (APN's)	Right-of-Way Instrument for the Project
1-4	Rail-with-Trail	NCRA (see Note)	• 014-031-002 • 014-041-002 • 014-051-003 • 014-061-002 • 014-101-002 • 014-111-003 • 014-121-002	Lease Agreement
3	Rail-with-Trail	U.S. Fish & Wildlife Service	• 014-031-004 • 014-071-005	To Be Determined
4	Bridge	City of Eureka	• 405-061-006	Encroachment Permit
5-6	Trail-on-Levee	CRC	• 017-081-001 • 404-141-004	Use Agreement and Permanent Easement
7-9	Rail-with-Trail	McMurray/Allpoints Outdoor	• 501-241-005 • 404-141-002	Humboldt County to acquire property
		Bracut Lumber Co.	• 501-241-030 • 501-241-031	Humboldt County to acquire property

Note: The following APN's within the Project area are associated with easements held by NCRA for railroad use: 017-081-002; 017-102-008; 404-141-003; 404-141-005; 501-091-006; 501-241-027.

3.3 Design Approach

The Bay Trail South Project is designed to achieve the standards of a Class I Bikeway in accordance with the Caltrans Highway Design Manual (2020). Chapter 1000 of the Highway Design Manual provides guidelines for planning and design of bikeways, which are defined as facilities provided primarily for bicycle travel (Streets and Highway Code Section 890.4). A Class I bikeway (also called a bike path) provides a completely separated right of way for the exclusive use of bicycles and pedestrians with minimal crossflow by motorists. Chapter 1000 provides design criteria for geometrics, separations between bike paths and highways, drainage, and signing and delineation.

Other standards and guidelines applicable to the Project include:

- American Association of State Highway and Transportation Officials (AASHTO) – Guide for Development of Bicycle Facilities (AASHTO, 2012).
- AASHTO LRFD Bridge Design Specifications with California Amendments (2017).
- AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges (AASHTO, 2009).
- California Manual on Uniform Traffic Control Devices (CAMUTCD) (Caltrans, 2014).
- Americans with Disabilities Act (ADA) Standards for Accessibility Design (2010).
- Chapter 11B of the 2018 California Building Code.
- General Order No. 26-D from the California Public Utilities Commission.
- California Coastal Trail – Definition & Siting and Design Standards (California Coastal Conservancy, undated).
- NCRA Trail Guidelines (2009).
- American Railway Engineering and Maintenance-of-Way Association's Manual for Railway Engineering.

Integration with the Railroad

Design Principles

The NCRA Trail Guidelines (NCRA, 2009) provide policies and procedures for trail projects within the NCRA right-of-way to ensure compatibility with safe operation of the railroad right-of-way and with current rail capacity needs and future rail capacity expansions. The Trail Guidelines include planning and consultation requirements, design standards, and maintenance requirements. The Trail Guidelines specify design standards for clearances, grade crossings, surfacing, utilities ingress and egress, landscaping, fencing, lighting, drainage, and access. Within the context of Humboldt Bay, Resolution 2012-13 specified that NCRA will consider clearly defined and strictly limited exceptions to its trail policy to enable development of a trail in the Humboldt Bay corridor without compromising the prospects of rail service restoration.

The passage of California Senate Bill SB 1029 in 2018 fundamentally changed the legislative mandate of the NCRA from focusing on railroads to focusing on trails. A task force of state agencies is currently working with NCRA and California Senator McGuire's office to develop a transition plan to a successor agency that would implement this new mandate to develop the Great Redwood Trail. The NCRA transition is still in the early stages and is likely to take several

years before the successor agency is fully functional. In the meantime, the County plans to work with NCRA to develop a lease agreement for completion of the Bay Trail South Project.

In May 2019, the Humboldt County Board of Supervisors submitted a letter to NCRA expressing support for the introduction of rail bicycling on NCRA right-of-way within Humboldt County. The Board's letter noted that in some areas, rail bike proposals will need to be evaluated for compatibility with the Humboldt Bay Trail and Great Redwood Trail. The Board expressed support for rail bicycling on segments of the rails where there is no conflict with the Humboldt Bay Trail, conditioned upon no additional expenditure of public funds for development of Humboldt Bay Trail projects.

The design of the Bay Trail South Project is based on the following principles:

- The Project will be compatible with continued use of the railroad corridor by THA for speeder cars where the railroad is currently intact and suitable for this use.
- The Project will be compatible with the introduction of rail bicycling if design measures do not require additional expenditure of public funds.
- The Project will repair damaged areas of shoreline armoring to protect the railroad prism, Highway 101, and future trail from flooding and erosion.
- The spacing and geometry of the trail will be compatible with restoration of historic use of the railroad corridor, where that restoration is feasible. Future railroad use would require significant infrastructure upgrades and improvements. In the event that future railroad use does not materialize, there would be additional space available to implement sea level rise adaptation measures, such as raising the elevation of the railroad prism and trail.
- The Project incorporates the minimum setback distance of 8.5 feet between the railroad centerline and edge of trail where feasible. Exceptions to this minimum setback distance are incorporated to reduce environmental impacts in sensitive areas and avoid localized obstructions.
- The alternative of full occupation of the railroad corridor for the trail was not selected due to public safety concerns about flood hazards. In areas where the railroad is situated along the shoreline, the railroad would be maintained as the first line of defense and the trail would be aligned on the inland side of the railroad to provide a minimum separation between the trail and breaking waves/floodwaters that could result from extreme events. This separation provides a necessary safety buffer for trail users.

These design principles are intended to be consistent with the NCRA Trail Guidelines, the allowance for exceptions under NCRA Resolution 2012-13, the legislative intent of SB 1029, and the Humboldt County Board of Supervisors' May 2019 support letter for rail bicycling.

Specific exceptions to the NCRA Trail Guidelines are listed here and discussed further in Section 3.4:

1. Segment 1: The trail would be situated directly on the rail prism with the incorporation of flangeway fillers.
2. Segment 2: The trail would be situated directly on the Eureka Slough bridge with the incorporation of flangeway fillers to allow cooperative use with speeders and heavy rail vehicles.

3. Segment 3: The trail would be situated adjacent to the rails with a reduced setback.
4. Segments 7 and 8: The rails and ties would be removed, the rail prism would be raised 1.5 to 2 feet, and space would be left for future re-establishment of the railroad. A short segment of trail would have a reduced setback distance from the rails to avoid a billboard.
5. Segment 9: The rails and ties near the failed culvert crossing at Brainard slough would be removed and the eroded rail prism would be stabilized. A short segment of trail would have a reduced setback distance to avoid a utility pole.

Flangeway Fillers

A flangeway filler is a strip of rubber that provides a semi-compressible surface adjacent to the interior side of a railroad rail. Flangeway fillers are designed to compress under the weight of heavy rail vehicles so that the flange wheel of the vehicle can by guided and kept in position by the rails, but to remain incompressible under the weight of pedestrians, bicycles, wheelchairs, and light vehicles. The trail surface (timber decking or asphalt concrete) would be constructed up to the flangeway filler.

Flangeway fillers are typically used for crossings where a road or driveway crosses perpendicular to the railroad. For the Bay Trail South Project, flangeway fillers are proposed in two segments (Segments 1 and 2) where the direction of travel of the trail is parallel to the rails, to eliminate potential safety hazards caused by vertical discontinuities (drop-offs) or horizontal gaps (openings) adjacent to the trail surface. As discussed later, the suitability of flangeway fillers depends on the context of the trail.

The primary design criteria for the flangeway fillers include the following:

- Performance – The product must remain firm for the wheels and tires of bicycles, wheelchairs, strollers, and similar wheeled devices, while yielding to the flange wheels of trains and speeder cars and returning to the original form after these heavy vehicles pass.
- Geometric tolerance – The design standard for surfaces associated with a multi-use trail is to maintain vertical discontinuities and horizontal gaps to a length of less than 0.5 inches. Vertical discontinuities between 0.25 and 0.5 inches must be beveled. The intent of this standard is to avoid potential safety hazards that could be created if a vertical discontinuity blocks the forward momentum of a wheel or if a wheel becomes caught in a horizontal opening. This standard also reduces vibration effects.
- Durability and resilience – The product must remain robust to wear, resist vandalism, and accommodate thermal expansion and vibration.
- Constructability – The product must be reasonably constructed.
- Net life-cycle cost – The goal is to reduce the overall life-cycle cost which includes materials, construction, maintenance, and repair.

Two types of flangeway filler systems (clamped system and strip system) are available. The clamped system uses a full-height compressible rubber strip on the interior side of the rail and a corresponding non-compressible rubber strip on the exterior side of the rail. A metal clamping system is used to hold the two sides against the rail. The clamped system is more common for new construction. The strip system employs a smaller compressible rubber material to fill the active interior flangeway area only. The product is wedged into the web of the rail and supported by an underlying flat surface, typically a timber support header. The strip system is more commonly used as a modification to an existing facility. The clamped system has the advantage

of being more robust but would be more difficult to replace because replacement would require removal and restoration of the adjacent trail surface. The strip system appears to be less resilient to vandalism and wear and may require more maintenance. The durability and maintenance needs of the strip system need to be evaluated further.

In September 2019, the County tested two clamped systems with products supplied by PPI and Polycorp. A test section with the two products was temporarily installed near Eureka Slough bridge. THA provided a speeder car for the test. The speeder car test indicated that both products would compress under speeder wheel loading. However, the products would not compress under the loading of rail bikes, which are substantially lighter. The County has not identified a design for the Eureka Slough bridge that would be compatible with rail bikes, meet applicable trail design standards, and require no additional expenditure of public funds.

The two clamped system products tested in September 2019 have minor variations and both appear to be viable options. The County intends to test a strip system product to allow a direct comparison before selecting the final design based on the design criteria.

Trail Width and Surface

Trail width was specified in accordance with the Basis of Design for Trail Width – Humboldt Bay Trail: Eureka-to-Arcata Segment (Humboldt County, 2016). Trail width is a key design parameter for user safety and the quality of the user experience. The Project is designed to accommodate the expected volume and diversity of users, which includes a range of ages, experience levels, speeds, trip purposes, and mobility modes. The 2016 report documents how design standards were applied to develop the appropriate trail width using a context-based approach. The standard width for the majority of the trail is ten feet with two-foot gravel shoulders. A narrower trail width would be utilized in Segment 5 due to the narrowness of the levee crown and because the levee contains several curves which will reduce travel speeds.

The trail would have a typical pavement structural section comprised of approximately six inches of aggregate base and approximately three inches of asphalt concrete. In areas of poor soils, the structural section may be increased or other soil stabilization measures may be utilized, such as the use of geotextiles. In accordance with Class I and accessibility standards, the trail would be designed with a two percent or less cross slope and a five percent or less running slope. Steeper slopes may be used in isolated area where design standards allow. The trail surface would include a centerline stripe to delineate the two bi-directional lanes.

Standard trail-related traffic-control signage would be installed in order to comply with Class I standards and CAMUTCD requirements. At locations where the trail intersects a vehicular roadway, bollards or similar control features would be installed to prevent motorized vehicles from entering the trail. Authorized personnel (e.g. police, emergency-responders, County/City maintenance crews, etc.) would be able to remove the bollards and temporarily access some portions of the trail with motorized vehicles.

Cable Barrier Fence

Cable barrier fencing would be utilized between Highway 101 and the trail to enhance safety. The cable barrier would protect trail users from errant vehicles and help delineate the boundary between the two transportation facilities. The cable barrier would be installed within Caltrans right-of-way along portions of the Bay Trail South Project as well as the existing Humboldt Bay Trail North project. The cable barrier consists of steel wire ropes (typically four strands) mounted on steel posts secured in concrete foundations. With round posts spaced 10.5 feet on center, the maximum deflection zone is nine feet. An approximately four-foot wide concrete

weed mat would be constructed along the length of the barrier to control vegetation. The barrier would be installed at least eight feet from the edge of pavement on Highway 101, with the exception of Segment 7, where the barrier would be installed two feet from the edge of pavement on Highway 101 to avoid conflicting with eucalyptus tree stumps and roots. The barrier would be installed at least nine feet from the edge of the trail shoulder. Within these parameters, the barrier would be installed as close to the edge of the Caltrans right-of-way as possible.

Shoreline Armoring Repair and Maintenance
In Segments 3, 4, 7, and 8 (and a small portion of Segment 9), the trail would be constructed by widening the railroad prism where the prism serves as the shoreline of Humboldt Bay. The current physical integrity of the railroad prism is correlated with the landform type in the adjacent intertidal area. Where salt marsh is abundant (Segment 3, the majority of Segment 4), the condition of the railroad is relatively good. The vegetation and higher bed elevations associated with salt marsh combine to attenuate wave energy and reduce erosion. Where salt marsh is absent or only present in remnant patches (Segments 7 and 8), the railroad has been significantly damaged due to erosion. As described in Section 3.4, the Project proposes to perform localized repair and maintenance of the shoreline armoring in Segment 4 and substantial repair and maintenance in Segments 7 and 8. The shoreline armoring improvements would serve to protect existing structures (the railroad and Highway 101) and the new Bay Trail South Project, which is a coastal-dependent use.

As discussed in Section 3.4, the Project proposes to repair and maintain shoreline armoring at specified locations in Segment 3 (approximately 143 feet), Segments 7 and 8 (approximately 6,400 feet), and Segment 9 (approximately 66 feet), for a total shoreline length of approximately 6,609 feet. The total length of Humboldt Bay shoreline composed of railroad prism and levee from the Eureka Slough bridge to the northern extent of the Bay Trail South Project near Brainard Slough is approximately 22,200 feet. The total length of shoreline from Eureka Slough bridge to the City of Arcata's corporation yard at 600 South G Street is approximately 31,400 feet.

Drainage
The trail would typically have a cross slope of two percent or less to allow surface water to flow off the trail surface. When the trail is directly adjacent to the railroad or highway, the cross slope of the trail would be away from the railroad/highway in order to convey runoff towards existing or new drainage facilities. A total of six existing cross-culverts that pass through the railroad prism in Segments 4, 7, and 8 would be repaired or replaced. The drainage ditch situated between the railroad prism and Highway 101 would continue to provide capacity for a 25-year rain event (GHD, July 2020b).

3.4 Design Discussion by Section

Segment 1
Segment 1 is a 100-foot connection between the existing Eureka Waterfront Trail and the Eureka Slough Bridge. The design for Segment 1 is shown on Sheets C-101 and C-401. Segment 1 extends from Station 0+84 to Station 1+80.

The trail would be situated on the rail prism. The railroad rails and ties would remain. Flangeway fillers would be installed adjacent to the rails to allow cooperative use with speeders and trains. In order to provide a smooth transition with the Eureka Waterfront Trail and maintain slopes less than 5%, approximately 200 feet of the existing Eureka Waterfront Trail would be raised and re-paved. Directional and wayfinding signage would be installed to inform trail users of connections to surface streets and nearby destinations.

Segment 2
Segment 2 comprises the Eureka Slough railroad bridge. The railroad bridge is approximately 725-feet long bridge and 17-feet wide. The bridge is composed of two concrete, box girder, approach spans and one steel, plate girder, hydraulic lift section. The bridge was constructed in approximately 1975. The lift section is approximately 90 feet long and currently inoperable. No utilities are carried on the bridge. The design for Segment 2 is shown on Sheets C-101, C-102, S-101, and S-501. Segment 2 extends from Station 1+80 to Station 9+05.

The Project would modify the bridge structure to accommodate both railroad and trail uses. The design life is expected to be a minimum of 25 years (Morrison Structures, 2018). For the concrete approach spans, the existing cross ties would be removed and replaced. The ballast along the approach spans would be regraded. Geotextile fabric and aggregate base would be placed on the existing ballast to support an asphalt concrete trail surface. A flangeway filler (either clamped or strip system) would be installed around the rails. The asphalt concrete surface would extend to timber headers installed at the outside edges of the bridge surface. For the steel lift span, the walkway gratings would be removed and salvaged, and a new deck system composed of treated laminated timbers would be installed in conjunction with flangeway fillers (either clamped or strip system). Travel lanes for the trail would be established on the outer portions of the deck, between the rails and bridge railings. The area between the rails would be paved to prevent drop-offs.

The Project would provide certain structure repairs of the bridge but would not fundamentally modify any structural elements of the bridge structure. Structural repairs would be made to the precast girder joints and deteriorated precast girder tie-down anchors on the supporting pile bent caps. Localized areas of unsound concrete near the tie-down holes would be repaired and corroded components of the tie-down anchors would be removed and replaced. The existing bridge railings would be removed and replaced with new railings composed of treated glue-laminated timber. During construction, protection measures would be implemented to prevent construction debris and other materials from falling from the bridge and entering the slough.

Segment 3
Segment 3 is situated along the railroad prism east of the Eureka Slough Bridge for a length of approximately 1,500 feet. Segment 3 is separated from Highway 101 by an intertidal area. The design for Segment 3 is shown on Sheets C-102 through C-105 and Sheet G-003. Segment 3 extends from Station 9+06 to Station 27+50.

The trail would be constructed by widening the railroad prism and placing the trail parallel to the railroad. The rails and ties would remain to allow continued use of the rails by the THA for speeders. The trail would have two five-foot paved lanes and two two-foot gravel shoulders. To minimize environmental impacts, the setback distance between the railroad centerline and edge of trail shoulder would be reduced from the standard minimum 8.5 feet to approximately 2.5 feet. The shoulder for the trail would be directly adjacent to the nearest rail. To minimize environmental impacts, the slope for the new embankment would be steepened from the typical 3:1 to 2:1. The channel adjacent to the railroad prism would be re-established.

Segment 4
Segment 4 is situated where the railroad and Highway 101 are parallel for a length of approximately 5,200 feet. Segment 4 includes a bridge connecting the railroad prism to the levee at the south side of the CRC property. The design for Segment 4 is shown on Sheets C-105 through C-113, Sheet G-004, and Sheet S-102. Segment 4 extends from Station 27+50 to Station 76+27.

The trail would be constructed by widening the railroad prism and placing the trail parallel to the railroad. The rails and ties would remain to allow continued use of the rails by speeders and trains. The trail would have two five-foot paved lanes and two two-foot gravel shoulders. The setback distance between the railroad centerline and edge of trail shoulder would be 10 feet. This setback distance is slightly longer than the standard minimum 8.5 feet to allow for future raising of the rail prism to accommodate sea level rise. The slope for the new embankment would be 3:1. Cable barrier fencing would be installed between the trail and Highway 101.

The extensive salt marsh plain adjacent to the railroad in Segment 4 has generally limited erosion by reducing wave energy. However, an approximately 143-foot section of shoreline revetment (Station 34+70 to 36+13) where salt marsh is absent has been damaged by erosion. To protect the railroad, Highway 101, and new trail, the damaged revetment would be repaired and maintained, as shown on Sheet G-005 (Type 4). Type 4 maintenance and repair involves full reconstruction of the revetment using Class VIII rock-slope protection (30-inch diameter, 1 ton) at the toe and lower portion of the slope and Class V rock-slope protection (18-inch diameter, ¼ ton) near the top. The rock-slope protection would be placed on geotextile fabric. The Class VIII rock-slope protection would be at least three feet thick and keyed at least one foot below ground surface. The rock would be placed at a slope of 1.5:1 (H:V), or flatter. This work would be limited to the revetment's historical footprint. No additional encroachment beyond the toe of the historical footprint is proposed.

The drainage swale situated between the railroad and Highway 101 would be re-established in areas where fill is placed to widen the railroad prism. Three existing culverts composed of corrugated metal pipe convey stormwater runoff from the existing drainage swale through the railroad prism and discharge into Humboldt Bay. The culverts are in poor condition. These culverts would either be replaced in their current location, or slip-lined, to extend their useful life. Slip-lining involves inserting a plastic liner and securing it to the interior surface of the culvert with grout. If slip-lined, the culverts would be extended to convey flow through the new trail embankment as well as the existing railroad prism. New flap gates would be provided.

An approximately 48-foot long bridge would be installed near the southern end of the Brainard mill site to connect the railroad prism to the Brainard levee. The bridge would be a single-span precast concrete slab with an asphalt trail surface (Sheet S-102). The bridge would be at least 10-feet wide between railings. The bridge would be supported on each end with abutments and wingwalls and up to seven 14-inch diameter Cast-in-Steel Shell (CISS) piles approximately 50 feet deep. The bottom of the bridge deck (soffit) would be at a minimum of 10.5 feet NAVD88. Where the trail crosses the rails to connect to the bridge, a flangeway filler would be installed adjacent to the rails. Asphalt would be placed between the rails and on either side of the rails to provide a continuous trail surface (Sheet C-501).

Segments 5 and 6

Segment 5 is situated on the levee surrounding the Brainard mill site for a length of approximately 5,200 feet. Segment 6 is a new bridge that would connect the levee to the railroad prism on the north side of the Brainard site. The design for Segments 5 and 6 is shown on Sheets C-113 through C-122, G-004, and S-103. Segments 5 and 6 extend from Station 76+27 to Station 132+43.

The trail design for Segment 5 (Sheet G-004) varies from other segments of the Project to account for the geometry of the levee and applicable design standards. The levee top width varies from 12 feet to more than 30 feet, and the levee side-slopes vary from 3:1 to 1:1. For slopes steeper than 3:1, the AASHTO bicycle facility standard (2012) specifies either a widened shoulder or

drop-off protection. The AASHTO standard recommends applying engineering judgment to incorporate either a minimum five-foot separation from the edge of the path pavement to the top of the slope, or a physical barrier such as a rail or fence. Based on these guidelines, the trail on the levee in Segment 5 would be composed of two four-foot-wide lanes with the trail centerline shifted toward the interior side of the levee. The bay-side of the trail would have a five-foot-wide shoulder (one foot paved and four feet unpaved). With this shoulder width, drop-off protection is not required. On the interior side of the levee, the trail would have a one-foot-wide paved shoulder, with a flush concrete curb and 3.5-foot-high chain link fence installed at the edge of the trail for drop-off protection. The fence would have a dual purpose by also providing site security for the Brainard mill site. At the five access ramps onto the levee, six-foot-high chain link vehicle gates would be installed. The fence and gates would be continuous around the mill site to separate the trail from the privately-owned developed area. The fence and gates are shown on Sheet C-501.

The top elevation of the levee varies around the perimeter of the property, from 10.2 feet NAVD88 at the southwest corner to over 17 feet NAVD88 where there are localized mounds of fill material. To the extent possible, the elevation profile of the trail would follow the existing levee elevations. At some locations, the ground surface would be raised to a minimum elevation (see Section 3.5). At other locations, the ground surface would be lowered (typically 0.5 to 1.25 feet) to achieve a minimum top width. The localized mounds would be lowered to provide a gradually sloped surface within the applicable standards. Some locations which are narrow or low in elevation may need additional embankment construction to widen and/or raise the elevation of the trail. Sections may also require reinforced steepened slopes or short retaining systems (e.g. gabion walls) to reduce necessary embankment fill.

An approximately 170-foot long bridge would be installed near the northern end of the Brainard mill site to connect the trail on the levee with the railroad prism in Segment 7. The bridge would be at least 10-feet wide between railings and would be a precast concrete structure. The bridge would be a three-span bridge supported with two abutments (one on each end) and two bents to support the mid-spans located within the bay. Each abutment is anticipated to be comprised of up to seven 14-inch diameter CISS piles, while each bent would be supported by four 24-inch diameter CISS piles. The steel shells would be advanced to a depth of approximately 60 to 70 feet bgs and installed using the vibratory pile driver method followed by impact hammer proofing. The bottom of the bridge deck (soffit) would be at a minimum of 11.0 feet NAVD88.

The Project intends to create viewing platforms and interpretive sign areas along Segment 5. Specific locations for viewing platforms and interpretive signage will be determined in the next design iteration. These features may consist of either low-profile landscaped areas or raised deck platforms comprised of either steel, asphalt concrete, concrete, wood or crushed rock. Each platform/sign area may include interpretive signs, benches, trash receptacles, railings and/or landscaping. These areas would encourage an appreciation of the environment and the socio-cultural history of the area by providing opportunities for nature and cultural study. The opportunities include providing up-close views of local vegetation/habitats, mid-range views of Eureka Slough/Humboldt Bay, long-range views of the surrounding ridge lines, and interpretive signs that include information regarding local habitats and cultural/historical sites.

Segments 7-8

Segments 7 and 8 are situated between Brainard and Bracut. The trail within these segments would be constructed between the railroad and Highway 101 by widening the railroad prism, for a total length of approximately 6,600 feet. The design for Segments 7 and 8 is shown on Sheets C-

122 through C-122 and G-005. Segment 7 extends from Station 132+43 to Station 157+50. Segment 8 extends from Station 157+50 to Station 198+00.

The railroad within Segments 7 and 8 is situated along the Humboldt Bay shoreline where the adjacent intertidal habitat is primarily mudflat with only remnant patches of salt marsh. The revetment on the bay side of the railroad prism serves as the shoreline. Direct exposure to wind waves has resulted in severe erosion damage to the shoreline revetment and rail prism. Some shoreline areas have little or no rock protection remaining, while other areas have isolated, over-sized rock boulders or concrete rubble. Large areas of ballast are absent with rails and ties hanging in the air. Segments 7 and 8 are impassable for any rail vehicles. The cumulative erosion (likely accelerated during the New Year's storm of 2005-2006) has severely diminished the integrity of the railroad prism and created significant flood hazard risks for further damage to the railroad and flood damage to Highway 101. The flood risk is amplified by the relatively low elevation of the rail prism, which is as low as 9.6 feet NAVD 88.

To protect the railroad, Highway 101, and new trail, the rails and ties within Segments 7 and 8 would be removed and the rail prism would be raised 1.5 to 2 feet to a minimum elevation of 11.5 feet NAVD88 (see Section 3.5 for further discussion). The trail would be placed parallel to, and offset from, the former rail location at a minimum elevation of 10.5 feet NAVD88. The trail would have two five-foot paved lanes and two two-foot gravel shoulders. The rail prism would be widened to provide a 10-foot setback distance between the centerline of the former rail location and the edge of the nearest trail shoulder. The primary purpose of this setback distance is to provide a factor of safety between the trail and trail users and floodwaters and wave overwash that are expected during extreme flood events, with the railroad continuing to serve as the first line of defense for flood hazards. This setback distance would also allow for future re-establishment of the railroad or future sea level rise adaptation measures. The existing drainage ditch between the railroad and Highway 101 would be graded and partially filled to provide stable side-slopes for the trail and Highway 101 while maintaining drainage capacity. High-tension cable barrier fence would be installed between the trail and Highway 101.

The Project would remove the group of eucalyptus trees north of the driveway into the Brainard mill site. The tree removal method is described in Section 4.7. The existing metal beam guardrail would be removed and replaced with cable barrier fencing.

To protect the railroad, Highway 101, and new trail, the shoreline revetment within Segments 7 and 8 would be repaired and maintained. Maintenance and repair work on the shoreline revetment would be limited to the revetment's historical footprint. No additional encroachment beyond the toe of the historical footprint is proposed. Three types of actions are planned within Segments 7 and 8 to address the varied condition of the existing revetment (Sheet G-005). Type 1 and Type 2 maintenance and repair involve placing rock-slope protection directly adjacent to the top of the railroad prism to supplement the existing rock lower on the prism. Type 1 maintenance and repair involves placing Class V rock-slope protection (18-inch diameter, ¼ ton) on geotextile fabric. Type 2 maintenance and repair involves placing Class VIII rock-slope protection (30-inch diameter, 1 ton) near the upper portion of the railroad prism in combination with the Class V rock-slope protection near the top. Approximately 5,825 linear feet of existing shoreline would receive Type 1 or Type 2 maintenance and repair. Type 3 maintenance and repair involves full reconstruction of the revetment using Class VIII rock-slope protection at the toe and lower portion of the slope and Class V rock-slope protection near the top. The Class VIII rock-slope protection would be at least three feet thick and keyed at least one foot below ground surface. The rock would be placed at a slope of 1.5:1 (H:V), or flatter. Approximately 575 linear feet of existing shoreline would receive Type 3 maintenance and repair.

Currently three cross-culverts through the railroad prism connect the drainage ditch to the bay. These culverts (18-inch diameter) are in poor condition and not optimally located. In some cases the flap gate on the bay side does not seal properly. Based on the results of the Drainage Study (GHD, July 2020b), the three existing culverts (Stations 169+50, 180+50, 191+60) would be removed and replaced with new culverts at more optimal locations based on the slope of the drainage ditch (Stations 142+77, 171+16, 186+34). The replacement culverts would have the same diameter (18-inches) and would be longer to extend through the widened railroad and trail prism.

Three billboards owned and operated by Outdoor Media under a lease with the property owners are situated in the vicinity of the Project area. One of the billboards is located within the Project area, constructed in the embankment of the railroad. Two of the billboards are located outside the Project area on the bay side of the railroad prism. The County is currently in the process of acquiring ownership of the two parcels on which the billboards are located. The lease agreement does not contain an early termination provision. Because the County does not have a contract right or other entitlement to have the billboard removed or relocated, the trail is designed to bypass the billboard. A short segment of trail would be constructed closer to the rail prism (with a reduced setback distance from the rails) to avoid this billboard (C-126 and C-127).

A trail connection would be made with the new Indianola Interchange that will be constructed by Caltrans (Sheet C-129). A new approximately 18-inch diameter culvert would be utilized to cross over the roadside drainage swale between the railroad prism and Highway 101. Caltrans will be responsible for constructing the improvements on Indianola Cutoff.

Segment 9

Segment 9 is situated adjacent to the Bracut Industrial Park for a length of approximately 2,630 feet. Segment 9 includes a new bridge crossing Brainard Slough. The design for Segment 9 is shown on Sheets C-133 through C-138, Sheet G-006, and Sheet S-102. Segment 9 extends from Station 198+00 to Station 224+27.

The trail would be constructed by widening the railroad prism and placing the trail parallel to the railroad. The trail would have two five-foot paved lanes and two two-foot gravel shoulders. The rails and ties would remain. The setback distance between the railroad centerline and edge of trail shoulder would be 10 feet. Cable barrier fencing would be installed between the trail and Highway 101.

At the intersection of the trail with the driveway entrance into Bracut, the trail crossing would have ladder style crosswalk striping with detectable warning surfaces at each end. Stop signs would be placed at each end of the intersection to convey that trail users must stop for vehicles. Pavement markings on the driveway will be established as shown on Sheet C-135. Removable bollards will prevent unauthorized vehicles from driving on the trail. One new light standard would be constructed to enhance visibility at the intersection. The lighting would be designed to avoid impacting wildlife and nighttime views, including views of the night sky. This design goal would be achieved using a variety of means as applicable, including fixture types, cut off angles, shields, lamp arm extensions, and pole heights. Specific design preferences include directing light downward, avoiding brightly illuminated vertical surfaces where feasible, and directing lighting away from natural areas. The specific lighting design will be developed in the next iteration of the design plans.

New fencing would be constructed along the Bracut property line to deter trail users from diverging onto private property. The fencing would be six-feet high and would be composed of

welded-wire panels secured on steel posts. At the north and south ends of the property, small areas of vegetation would be planted to enhance the existing vegetation barriers.

An approximately 80-foot long, single-span bridge would be installed across Brainard Slough. The bridge structure would be a pre-manufactured, precast, concrete slab with an asphalt trail surface (Sheet S-102). The bridge would be at least 10-feet wide between railings. The bridge would be supported on each end with abutments and wingwalls and seven 14-inch diameter CISS piles approximately 50 feet deep. To reduce the thickness of the bridge structure, this bridge was reduced in length from earlier designs which projected a 120-foot long bridge.

The railroad crossing over Brainard Slough failed several years ago and continues to deteriorate. Two 48-inch diameter corrugated metal culverts collapsed and a significant amount of fill material slumped into the bay. The steel rails are hanging in air. The railroad prism is unstable and continues to erode and release fill material into the slough and bay. As part of the Project (Sheets C-402 and C-403), the failed culvert pieces and debris (timber ties, supports, and rock) would be removed from the primary slough channel. The remaining railroad embankment would be regraded to provide a stable slope and rock-slope protection would be installed to stabilize the shoreline and reduce the potential for ongoing erosion. The embankment stabilization would extend approximately 33 feet on each side of the slough channel.

The north end of the new trail would be connected with the southern terminus of the existing trail constructed by the City of Arcata (Sheet C-138, Station 224+27). The temporary trail connection between Arcata's trail and the Highway 101 shoulder at Station 225+00 would be removed. The existing culvert and rock within the drainage swale would be removed and the swale would be regraded and seeded.

Cable Barrier Fencing along Portions of Humboldt Bay Trail North

Cable barrier fencing would be installed along portions of the existing trail situated adjacent to Highway 101. Areas of new cable barrier along the existing trail are shown on Sheets C-138 through C-143.

3.5 Minimum Trail and Railroad Elevations

Section 1.6 provides an overview of flooding hazards and sea level rise adaptation planning efforts within the Project area. Section 3.4 describes the areas where the shoreline revetment along the railroad would be maintained and repaired. This section describes the basis of design for the minimum trail and railroad elevations.

Design Elevations

A technical memorandum summarizing how the design criteria identified in ESA (2018) were applied to develop design elevations for the Project is currently in preparation (GHD, September 2020). The general goal is to establish trail elevations that minimize exposure to stillwater flooding and wave overtopping over the 75-year planning period while maintaining drainage conveyance within the interior drainage ditch, minimizing filling of wetlands, and maintaining financial feasibility. The design criteria developed in ESA (2018) were based on a review of technical literature, which reflect generalized engineering values that must be applied based on site conditions using professional judgment. The analysis assumed two feet of sea level rise by the year 2070 and three feet of sea level rise by the year 2100. For reference, the current estimate for the 1% annual chance stillwater level (100-year recurrence interval) near the Project area is 10.6 feet NAVD88 (GHD, July 2020a). The 1% annual chance stillwater level for Humboldt Bay on the FEMA Flood Insurance Rate Map is 10.2 feet NAVD88.

One design criterion is to avoid or minimize conditions when trail usability is impacted by 0.5 feet or more of stillwater flooding. The analysis indicated that a minimum trail elevation of 9.5 feet NAVD88 would result in 20 hours of impacted trail usability with two feet of sea level rise and 200 hours of impacted trail usability with three feet of sea level rise. With a minimum trail elevation of 10.0 feet NAVD88, trail usability would be impacted for 3 hours with two feet of sea level rise and 70 hours with three feet of sea level rise. With a minimum trail elevation of 10.5 feet NAVD88, trail usability would not be impacted with 2 feet of sea level rise and would be impacted for 20 hours with three feet of sea level rise. With a minimum trail elevation of 11.0 feet NAVD88, trail usability would be impacted for three hours with three feet of sea level rise.

An additional design criterion is to avoid or minimize conditions when trail usability is impacted by wave overtopping, using a threshold of 0.22 cubic feet per second (cfs) per linear foot (lf). The analysis assumed a scenario with a stillwater elevation of 6.5 feet (NAVD88) with one foot of wind setup and 50-year wind waves, resulting in total water levels within the Project area ranging from 7.5 to 12 feet NAVD88. This wind event reflects conditions that would have a 2% annual chance recurrence. The 0.22 cfs/lf threshold would not be exceeded within the Project area under existing conditions or with one foot of sea level rise. With two feet of sea level rise, the threshold would be significantly exceeded with minimum trail elevations of 9.5 feet and 10.0 feet NAVD88, but only slightly exceeded with minimum trail elevations of 10.5 feet NAVD88, and not exceeded with minimum trail elevations of 11.0 feet NAVD88. With three feet of sea level rise, the threshold would be significantly exceeded for minimum trail elevations less than 11.5 feet NAVD88.

A final design criterion is to avoid or minimize conditions when the trail would be damaged by wave overtopping, using a threshold of 0.54 cfs/lf for damage to lightly-protected surfaces and a threshold of 2.2 cfs/lf for damage to trail pavement. The analysis assumed a scenario for an extreme event with a stillwater elevation of 9.34 feet NAVD88 with one foot of wind setup and 50-year wind waves, resulting in total water levels within the Project area ranging from 12 to 15 feet NAVD 88. The Project area would not exceed the higher pavement-damaging threshold under existing conditions or up to three feet of sea level rise. The threshold for damage to lightly-protected surfaces would be exceeded under existing conditions with minimum trail elevations less than 11.0 to 11.5 feet NAVD88. Overtopping rates would increase with sea level rise.

An important design consideration is the tradeoff between raising the elevation of a fill prism and the associated enlargement of the footprint, which may encroach into adjacent wetlands. In some cases, the side-slopes of a fill prism can be steepened or an engineering structure like a retaining wall can be considered. However, design standards provide limits on the steepness of side-slopes, and engineering structures are expensive and may not be appropriate for the context. Similarly, raising the elevation of a bridge typically results in enlarging the footprint of the bridge abutments and approach.

Based on the analysis described above, the Project proposes the following minimum elevations:

<u>Segment 3</u>
The minimum trail elevation would be 10.5 feet NAVD88.

<u>Segment 4</u>
The minimum trail elevation would be 10.5 feet NAVD88. Space would be left to accommodate future raising of the railroad grade or other sea level rise adaptation measures. The new trail bridge connecting to the south side of the Brainard mill site would have a minimum deck elevation of 12.0 feet NAVD 88.

Segments 5 and 6
Where the levee faces south and southwest (and is more protected from wind waves), the minimum trail elevation would be 10.5 feet NAVD88. Where the levee faces west, northwest, and north, the minimum levee/trail elevation would be 12.0 feet NAVD88. The new trail bridge connecting to the north side of the Brainard mill site would have a minimum deck elevation of 13.0 feet NAVD 88.

Segments 7 and 8
The rails and ties would be removed and the rail prism would be raised 1.5 to 2 feet to a minimum elevation of 11.5 feet NAVD88, in order to protect the railroad, Highway 101, and the new trail from flooding hazards. The minimum trail elevation would be 10.5 feet NAVD88. Space would be left to accommodate future raising of the railroad grade or other sea level rise adaptation measures. Raising the railroad higher than 11.5 feet NAVD88 would be a much more complex and costly undertaking and does not appear warranted at this time. If a natural shoreline infrastructure project is determined to be feasible (e.g., creation of a tidal bench with salt marsh vegetation), then implementation of such a project could help avoid or delay the need for further raising of the railroad.

Segment 9
The minimum trail elevation would be 10.5 feet NAVD88. The new trail bridge across Brainard Slough would have a minimum deck elevation of 13.25 feet NAVD 88.

Evaluation of Flood Hazard Reduction Benefits
Section 1.6 described the adaptation planning study currently in progress for the Eureka Slough hydrographic area. This study developed a series of hazard scenarios to explore the anticipated range of potential outcomes associated with existing and future tidal water levels, fluvial flows, and modifications to the shoreline. Figures depicting the hazard scenarios for tidal flooding are provided in **Attachment 9**. The objectives and methodology for the hazard scenarios are described in Section 6 of GHD (July 2020a) and narratives for the hazard scenarios are provided in Appendix D of that report.

The hazard scenarios provide an advancement in previous vulnerability assessments by (1) considering cause-and-effect linkages between hydrologic and geomorphic processes and physical changes to the landscape; (2) accounting for the compounding effect of wind set-up and wind waves; (3) identifying the specific locations where flooding is likely to be initiated (inundation pathways); and (4) estimating the total volume of floodwaters that would enter the inland areas during the storm event. For two scenarios, as described below, the study evaluated flooding impacts under current conditions and with the proposed Bay Trail South Project improvements to the shoreline.

Water levels between 10 to 10.5 feet NAVD88 (Scenarios 4 and 5) mark the initiation of overtopping of shoreline structures, such as the railroad, resulting in widespread inland flooding. Water levels above 10.5 feet NAVD88 (Scenarios 6, 7, and 8) mark a significant increase in the extent of overtopping and would create a high potential for a major breach of a shoreline structure. The southbound lane of Highway 101 begins to be inundated with water levels above 10.5 feet NAVD88, and the northbound lane begins to be inundated with water levels above 11.5 feet NAVD88. The volume of flooding from overtopping of the rail prism is an order of magnitude larger than the volume of overtopping from interior levees because the rail prism has a lower elevation than these levees. Under current conditions, a tidal water level of 10.6 feet NAVD88 has a 1% annual chance of occurrence (100-year event). Under future conditions with one foot of sea level rise, 10.6 feet NAVD88 would have a 50% annual chance of occurrence

(two-year event), and with two feet of sea level rise, 10.6 feet NAVD88 would occur approximately six times per year. With one foot of sea level rise, a tidal water level of 11.6 feet NAVD88 would have a 1% annual chance of occurrence. With two feet of sea level rise, a tidal water level of 11.6 feet NAVD88 would have a 50% annual chance of occurrence.

While stillwater levels of 9.3 feet NAVD 88 (Scenario 2) would result in limited, isolated overtopping, the addition of high winds would add approximately one foot of wind set-up, elevating water levels along the bay shoreline to 10.3 feet NAVD88, along with wind waves that run up the shoreline an additional 1 to 4.5 feet (Scenario 3), resulting in widespread flooding and closures of Highway 101. Scenario 3 generally represents the conditions during the New Year's Storm of 2005-2006 which caused damage to the railroad within Segments 7 and 8 of the Project Area. The modeling results for Scenario 3 indicate 460 acre-feet of water would overtop the railroad along the shoreline.

Scenarios 5 and 6 reflect extreme tide levels under existing conditions. These scenario water levels were paired with the proposed shoreline improvements associated with the Project to develop Scenarios 5a and 6a. Under existing conditions, the 100-year tidal flood event (water level of 10.6 feet NAVD88) would cause 940 acre-feet of floodwaters to overtop the railroad, causing temporary closure of the southbound lanes of Highway 101 and water depths of 1.5 to 2.5 feet (Scenario 5). By raising the railroad to 11.5 feet NAVD88, the Bay Trail South Project would eliminate overtopping for this type of flood event (Scenario 5a). With current shoreline conditions and one foot of sea level rise, the 100-year tidal flood event (water level of 11.6 feet NAVD88) would cause 4,700 acre-feet of floodwaters to overtop the railroad, causing full closure of Highway 101, water depths of 6 to 7 feet, and widespread damage to residential and commercial properties and agricultural land. By raising the railroad to 11.5 feet NAVD88, the Bay Trail South Project would reduce the volume of overtopping tidal floodwaters associated with this flood event to 10 acre-feet, almost eliminating the flood hazard at this water level (Scenario 6a).

3.6 Considerations for Future Modifications to Highway 101

Currently, Highway 101 includes two separate bridge structures (northbound and southbound) crossing Eureka Slough. These bridges do not meet current seismic design standards nor current standards for non-motorized users. Caltrans has initiated preliminary engineering and technical studies for a project to replace the Eureka Slough bridges. Caltrans has indicated that the replacement bridges would include bike and pedestrian facilities, and a design goal would be to ensure connectivity with the Eureka Waterfront Trail and Humboldt Bay Trail. Specific alignments have not been developed and the project timeline has not been determined. The project will require substantial State transportation funds which have not yet been programmed.

The trail crossing utilizing the railroad bridge proposed by the Bay Trail South project is designed to have a minimum 25-year design life. The new Highway 101 bridge would provide a long-term non-motorized crossing over Eureka Slough. However, the crossing on the railroad bridge has several advantages, including: optimal connectivity to the Eureka Waterfront Trail, improved views of Humboldt Bay, and reduced noise due to separation from the highway. Therefore, the trail crossing on the railroad bridge would be used as long as possible.

4 CONSTRUCTION ACTIVITIES

4.1 Construction Schedule

Construction of the project is expected to begin in winter and require approximately 18 months to complete. Vegetation clearing would occur during the non-bird nesting season, between August 16 and March 14, or a nesting bird survey would be performed prior to disturbance. Anticipated daytime work hours are 7:00 a.m. to 7:00 p.m., Monday through Friday with occasional work at night and on weekends. Construction on legal and County holidays is not currently anticipated except for emergencies or with prior approval from the County of Humboldt.

4.2 Project Phasing

The project includes elements which are discretionary or which could be implemented separately from the core work of constructing the trail. Certain elements may be implemented before or after the trail construction, based on available funding and/or the readiness of the elements. Elements which may be implemented in phases (prior or after the construction of the trail) include, but are not limited to, the following:

- Eucalyptus tree removal
- Cable barrier fence installation
- Shoreline revetment and embankment repairs and improvements
- Trail heads, viewing platforms, and trail amenities

4.3 Construction Staging, Activities, and Equipment

Construction staging and stockpiling areas would occur primarily at specified locations at the Brainard mill site and Bracut Industrial Park in accordance with temporary construction easements. These areas will be existing paved or graveled surfaces. Construction would primarily include removal of trees and vegetation, excavation and grading, bridge abutment, bent and pile construction, bridge assembly and installation, trail paving, signage, and fencing/railing along various segments of the project alignment. All construction activities would be accompanied by both temporary and permanent erosion and sediment control best management practices (BMPs).

Trail construction would include the following activities:

- Clearing and Grubbing – To clear trees, vegetation, and topsoil from the proposed trail footprint
- Excavation – For trail subgrade preparation and bridge approaches
- Embankment – Fill for trail and railroad prim, and drainage features in highway shoulder areas
- Aggregate Base – For subgrade support, trail shoulders and to support asphalt paving
- Asphaltic Concrete Paving – For trail surface
- Fencing/Railing/Barriers/Bollards
- Trail Striping and Signage
- Rock-Slope Protection – To protect the railroad and trail prisms, bridge abutments, and culvert inlets/outlets from erosion

Bridge assembly and placement would include the following activities:

- Excavation – For the abutment foundations and wingwalls
- Aggregate Base – For structure foundations
- Abutments, Bents and Footings – Cast-in-place concrete to support pre-cast bridge decks
- Piles – Reinforced concrete in steel shell to support pre-manufactured bridges
- Bridge assembly in staging area
- Placement/Installation – Set pre-manufactured bridge on abutments
- Asphalt Concrete – Placing asphalt concrete surface on pre-cast bridge decks
- Railing Installation
- Rock-Slope Protection – To protect bridge abutments and wingwalls

Equipment required for trail construction would include tracked excavators, backhoes, graders, bulldozers, dump trucks, rollers, pavers, feller bunchers, water trucks, drill rigs, and pick-up trucks. Equipment required for bridge construction and assembly would include excavators, drill rigs, pile drivers, cranes, pavers and rollers.

Construction access would be to and from the designated staging areas. Roadways that would be utilized for construction access and the staging areas include Highway 101, the entrance into the Brainard mill site, and the entrance into Bracut Industrial Park. It is not anticipated that any temporary utility extensions, such as electric power or water, would be required for construction.

4.4 Construction Access and Hauling Traffic

The anticipated haul truck routes to the project area include Highway 101 from the north and south. The number of construction-related vehicles traveling to and from project area would vary on a daily basis. It is anticipated that up to 40 haul truck round trips would occur on a peak day. In addition, it is anticipated that construction crew trips would require up to eight round trips per day. Therefore, for the purposes of analysis, on any one day during construction, up to 48 vehicle round trips could occur.

4.5 Traffic Control Plan

In accordance with jurisdictional requirements, the construction contractor would be required to obtain an encroachment permit from Caltrans prior to beginning the work along Highway 101. As part of the encroachment permit process, the construction contractor would be required to prepare a traffic control plan for review and acceptance of planned work within the public right-of-way. The development and implementation of a traffic control plan would include, but not necessarily be limited to: temporary traffic control systems, delineators, lane closures, signs, and flaggers conforming to the current CAMUTCD.

4.6 Groundwater Dewatering

Excavation into groundwater and dewatering is anticipated. Temporary groundwater dewatering would be conducted to provide a dry work area. Dewatering would involve pumping water out of a trench or excavation. Groundwater would be pumped to settling tanks (Baker tanks or similar) or into dewatering bags. Following the settling process provided by a tank or filter, the water

would be used for dust control and compaction. Water from settling tanks or dewatering bags would be to applied to upland areas, away from wetlands and other waterbodies, or legally discharged to nearest sanitary or stormwater system.

4.7 Eucalyptus Tree Removal

The eucalyptus trees in Segment 7 would be felled onto the railroad prism, where they would be limbed, cut into sections, removed, and stockpiled at the Brainard mill site for future use (e.g., firewood). Equipment and workers would access the trees from both the highway and railroad side. The removal operation would likely require temporary closure of the southbound lanes of Highway 101 in accordance with an Encroachment Permit from Caltrans. To limit impacts to motorists, the felling work would likely occur at night or weekends when traffic volumes are lower. Tree stumps would be removed to the extent feasible through excavating, grinding, or other means. Remaining stumps and root systems would be covered with black plastic sheeting and mulched to prevent regrowth. No herbicides would be used.

4.8 Bridge Construction

The Project includes three new bridges which would be constructed on new CISS piles. The steel shells would be installed using a vibratory pile driver (American Pile driving Equipment Model 200 or similar), which would utilize a vegetable based non-toxic hydraulic oil in case of a hydraulic leak in or near Humboldt Bay. Each steel shell would be proofed by driving its final 5 feet by a conventional impact hammer pile driver to achieve design tip elevation and verify load capacity. No pile driving would occur in water, as installation would occur during low tides.

The bridges at the southern end of the Brainard mill site and at Brainard Slough would be single-span bridges with piles at the abutments only. The bridge at the northern end of the Brainard mill site would be a three-span bridge with bents on piles serving as mid-structure supports. For the north Brainard bridge, temporary sheet piles and washed coarse-grained aggregate fill would be used to construct a temporary access road and landings for crane access to install the mid-structure piers. The temporary sheet piles would be installed approximately 30 feet bgs (vibrated in without impact proofing), and the aggregate fill would be encapsulated in geotextile fabric to separate native and fill soils. Water bladders may also be used to construct a coffer dam to isolate the work area from the bay and tidal waters. Isolating the work area with water bladders would allow for work within the bay to be expedited, as work would not be restricted to periods of low tides only. The coffer dam would also reduce the likelihood of construction generated sediment from entering the bay and reduce the possibility of fish entrapment. Following the installation of the bridge, the temporary access road, including the sheet piles, aggregate fill and geotextiles, would be removed, and existing ground surface (bay mud) smoothed out to the extent practical.

4.9 Site Restoration and Demobilization

Following construction, the contractor would demobilize and remove equipment, supplies, and construction wastes. The disturbed areas along the project alignment would be restored to pre-construction conditions or stabilized with a combination of grass seed (broadcast or hydroseed), straw mulch, rolled erosion control fabric, rock, and other plantings/vegetation.

4.10 Air Quality Construction Control Measures

The following air quality emission construction measures would be included in the construction specifications for the project:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas and unpaved access roads) would be watered as necessary during dusty conditions.
- All haul trucks transporting soil, sand, or other loose material on- or off-site would be covered or should maintain at least 6 inches of freeboard (i.e., minimum vertical distance between top of load and the trailer).
- Soil stockpiles would also be surrounded by silt fencing, straw wattles, or other sediment barriers prior any forecasted rain event.
- Equipment or manual watering would be conducted on all stockpiles, dirt/gravel roads, and exposed or disturbed soil surfaces, as necessary, to reduce airborne dust.
- Paved access roads would be swept daily.
- All visible mud or dirt tracked-out onto adjacent public roads would be removed.
- All vehicle speeds on unpaved areas would be limited to 15 miles per hour.

5 MITIGATION MEASURES AND ENVIRONMENTAL COMMITMENT CONDITIONS

Attachment 4 contains the Mitigation Monitoring and Reporting Program which was developed for compliance with CEQA. **Attachment 5** contains the Environmental Commitment Record (ECR) which was developed for compliance with NEPA. The measures and conditions included within these two documents are summarized in **Table 5.1**.

Table 5.1 Mitigation Measures and Environmental Commitment Conditions

NEPA ECR Condition	CEQA Mitigation Measure	Mitigation Measure
Condition 1	BIO-1	Avoidance and protection measures for special-status plants
Condition 2	BIO-2	Avoidance and minimization measures for fish
Condition 3	BIO-3	Tidewater goby avoidance and minimization measures
Condition 4	BIO-4	Northern red-legged frog avoidance and minimization measures
Condition 5	BIO-5	Avoidance and protection measures for nesting birds
Condition 6	--	White-tailed kit/raptor avoidance measures
Condition 7	BIO-6	Avoidance and minimization measures for waters of the United States and waters of the State
Condition 8	BIO-7	Compensatory mitigation for wetland impacts
Condition 9	CR-1	Protect archaeological resources during construction activities
Condition 10	CR-2	Protect human remains if encountered during construction
Condition 11	HAZ-1	Procedures for encountering unknown hazardous materials
Condition 12	HAZ-2	Preliminary site investigation and sampling
Condition 13	--	Visual impact avoidance
Condition 14	--	Erosion and sedimentation control during construction
Condition 15	--	Prevention of spread of invasive species
Condition 16	--	Air quality/dust control
Condition 17	--	Spill prevention

Wetland Impacts and Mitigation

One of the Project's primary design goals is to avoid or minimize wetland impacts to the greatest extent possible (ECR Condition 7 and BIO-6). However, some impacts are unavoidable due topographic constraints and the presence of existing facilities within the Project area. The majority of the impacted wetlands are associated with the existing drainage ditch situated

between Highway 101 and the railroad prism. **Table 5.2** provides a summary of the permanent and temporary impacts and **Table 5.3** provides a summary of habitat conversions.

Table 5.2 Estimated Permanent and Temporary Impacts to Waters of the United States and Waters of the State

Feature Type	Wetland Parameters	Wetland Impacts (Ac)	
		Permanent	Temporary
Estuarine Intertidal Emergent Ditch - with *Spartina densiflora*	3	2.42	0.29
Palustrine Emergent Ditch	3	2.12	0.16
Rocky Intertidal Rocky Shore	3	0.00	0.08
Rocky Intertidal Rocky Shore - with Spartina	3	0.00	0.30
Estuarine Intertidal Emergent Wetland - with *Spartina densiflora*	3	0.54	0.00
Estuarine Intertidal Emergent Wetland - Native	3	0.04	0.00
Estuarine Intertidal Unconsolidated Bottom	3	0.04	0.12
Estuarine Subtidal Unconsolidated Bottom	3	0.00	0.00
Palustrine Emergent Wetland	3	0.19	0.00
Palustrine Scrub-Shrub Wetland	3	0.37	0.03
Total Impacts on Waters of the U.S. and State		**5.72**	**0.98**
Willow series, dripline	1	0.04	0.00
Deschampsia Series	1	0.01	0.00
Juncus series	1	0.39	0.00
Total Impacts on Additional Waters of the State		**0.44**	**0.00**
Total Estimated Impacts		**6.16**	**0.98**

Table 5.3 Permanent Conversion to Waters of the United States and Waters of the State

Feature Type Conversion From	Feature Type Conversion To	Area Converted (Ac)
Rocky Intertidal Rocky Shore	Estuarine Intertidal Unconsolidated Bottom	0.01
Estuarine Intertidal Emergent Wetland - *with Spartina densiflora*	Estuarine Intertidal Unconsolidated Bottom	0.14

Design measures to avoid or minimize wetland impacts include the following:

- In Segment 3, the side-slope of the widened railroad prism would be reduced from 3:1 to 2:1 and the setback distance between the railroad centerline and edge-of-trail would be reduced from 8.5 feet to 2.5 feet.

- In Segment 4, a trail bridge would be utilized instead of embankment with culverts to span a portion of the bay.

- In Segment 9, a trail bridge would be utilized instead of embankment with culverts to span a Brainard Slough.

The temporary impacts of 0.98 acres reflect areas where wetlands would be re-established within the Project footprint through grading of the drainage ditch between the railroad and Highway 101.

The estimated permanent impacts of 6.16 acres would be mitigated off site through a cooperative agreement with Caltrans, in accordance with ECR Condition 8, CEQA Mitigation Measure BIO-7, and the forthcoming regulatory permits. The draft Memorandum of Understanding ("MOU") between Caltrans and Humboldt County is provided in **Attachment 10**. This cooperative mitigation work would include removal of *Spartina densiflora* from specified locations within Humboldt Bay and creation of three-parameter wetlands on a property owned by Caltrans in the Arcata Bottoms.

Corridor Sampling Report

The Initial Site Assessment (GHD, 2017) identified that certain chemical constituents of concern could potentially be present in soil or groundwater within the Project area due to historical activities and the use of leaded gasoline in vehicles along Highway 101. ECR Condition 12 and CEQA Mitigation Measure HAZ-2 specified a preliminary site investigation to determine whether specific measures are necessary during construction to ensure protection of human health and the environment and compliance with state and federal regulations. A Sampling and Analysis Plan (GHD, March 2020) was developed to identify the sampling procedures and locations and the constituent list for laboratory analysis. GHD (August 2020) performed soil and groundwater sampling activities in April 2020 for Segments 1, 3, 4, 7, 8, and 9. Sampling is not applicable for Segment 2, which involves work on the deck of the Eureka Slough bridge only. Sampling in Segments 5 and 6 will be considered as a potential second phase of work after the County obtains an easement from the landowner.

Samples were collected in April 2020 at 29 locations. Soil samples were collected from two intervals at each location (0.0 to 0.5 feet below ground surface [bgs] and 1.5 to 2.0 feet bgs), with the exception of one location where groundwater was encountered at 1.5 feet bgs and a grab-groundwater sample was collected in lieu of soil from this interval. A total of 57 soil samples and one grab-groundwater sample were submitted to North Coast Laboratories. The suite of tests for each sample was specified based on the findings of the Initial Site Assessment. Laboratory analyses included total petroleum hydrocarbons ("TPH"), metals, organochlorine pesticides, herbicides, semi-volatile organic compounds ("SVOCs"), and dioxins/furans.

None of the soil samples reported detectable concentrations of organochlorine pesticides, herbicides, or SVOCs.

The soil results for TPH were below applicable worker screening levels. Construction workers

should still use appropriate personal protective equipment to mitigate any unnecessary exposure. If excavated soil is disposed of off site, the spoils would need additional testing/profiling before disposal at an appropriate facility.

At the three locations (Segments 7 and 9) where the Initial Site Assessment identified dioxins and furans as potential contaminants of concern, five soil samples contained detectable concentrations of the compounds; however, the toxicity equivalencies ("TEQ") in soil were below applicable construction worker screening levels and less than the hazardous waste disposal criteria.

With the exception of arsenic and lead, the results from the metals analyses in soil were below applicable commercial/industrial/construction worker screening levels, and below hazardous waste characterization concentrations. The total arsenic and lead concentrations throughout the project site support the need for appropriate construction worker protection during implementation of the project.

Soil impacted with arsenic and lead exceeding California hazardous waste screening levels is confirmed to be present in Segments 4 and 8 and will require stockpiling and profiling to confirm transport and disposal in accordance with applicable State and Federal guidelines. It was observed that the arsenic exceedances occurred only in the samples collected from 1.5-2.0 feet bgs. Soil excavated from Segments 4 and 8 is not appropriate for on- or off-site reuse.

The grab groundwater sample collected from Segment 9 was analyzed for TPH, metals, and dioxins and furans. The results do not indicate the presence of hazardous waste concentrations in groundwater. This shallow groundwater sample is representative of shallow groundwater that may be encountered during excavations. This sample is not representative of the deeper aquifer that may be encountered during bridge pile excavation, which will require additional characterization to determine disposal and/or discharge requirements.

The County will prepare a Soil and Groundwater Management Plan prior to groundbreaking activities to ensure impacted soil and groundwater is handled and disposed of in accordance with current regulations. The selected contractor will prepare and follow an Excavation, Stockpiling, Dewatering, and Transportation Plan and a Lead Compliance Plan.

6 PERMITS AND APPROVALS

The status of consultations, permits, and approvals is summarized on **Table 6-1**:

Table 6.1 Permits and Approvals

Agency	Status
State Historic Preservation Office	On June 19, 2018, the State Historic Preservation Office issued a letter concurring with the conclusion that the Project area does not contain properties or resources that are eligible for listing on the National Register of Historic Places or the California Register of Historic Resources.
National Marine Fisheries Service	On March 22, 2018, the National Marine Fisheries Service issued a letter concurring with the conclusion that the Project is not likely to adversely affect species protected by the federal Endangered Species Act. NMFS requested consideration of a roughened or naturalized exterior surface on the bridge piers and pilings. However, the outer surface of the CISS piers and pilings is steel, not concrete, and the steel will have an epoxy coating for corrosion protection. Therefore, this request is not technical feasible because a roughened surface veneer would not adhere to the coated steel shell.
U.S. Fish & Wildlife Service	For potential effects on tidewater goby, the Project was analyzed under a Programmatic Endangered Species Act Section 7 consultation between Caltrans and U.S. Fish & Wildlife Service established in 2017. In September 2020, the County will submit an application for an Encroachment Permit.
City of Eureka	In September 2020, the County will submit an application for an Encroachment Permit.
Coastal Commission	In September 2020, the County will submit an application to the Coastal Commission for a Coastal Development Permit. The County will request that the permit be considered at a hearing in early 2021.
U.S. Army Corps of Engineers	A Jurisdictional Determination for wetland delineation was issued on May 31, 2018. In September 2020, the County will submit an application for a Section 404 permit.
North Coast Regional Water Quality Control Board	In September 2020, the County will submit an application for a Section 401 permit.

California Department of Fish & Wildlife	In September 2020, the County will submit an application for a Lake and Streambed Alteration Agreement.
Humboldt Bay Harbor, Recreation and Conservation District	In September 2020, the County will submit an application for a Development Permit.
Caltrans	In September 2020, the County will submit an application for an Encroachment Permit.
NCRA	In September 2020, the County will submit an application for a Lease Agreement.

7 ALTERNATIVES

This section provides a summary of alternative alignments and design concepts that were considered as part of the planning and design process but not selected:

West Side of Railroad Corridor
This alternative would develop a trail on the west side (toward the bay) of the railroad prism or within the open water portion of the bay using a boardwalk. This alternative was not selected due to the much higher lifetime costs (construction and maintenance) and higher impacts to sensitive habitat types (salt marsh and mud flat) within Humboldt Bay. In addition, there is high uncertainty whether the required permits could be acquired.

East Side of Highway 101
This alternative would develop a trail on the east side of Highway 101. This alternative would require multiple crossings of Highway 101 and other roads and driveways to provide a continuous trail connected to the regional trail system. Right-of-way needs would be substantial with this alternative and new crossings of creeks and sloughs would be required. The reduced quality of experience due to the increased distance and separation from Humboldt Bay would diminish the value of the trail as a "coastal trail." For these reasons, this alternative was not selected.

Re-align Entire Railroad and Highway Corridors
This alternative would shift the railroad and highway corridors eastward to allow a trail on the existing railroad prism. This alternative is logical from a planning perspective and has the benefit of locating the trail directly adjacent to the bay to enhance the recreational experience. However, this alternative would be a major infrastructure project with a cost on the order of $100-$200 million. Securing funding of this magnitude is not considered possible due to competing transportation needs. Therefore, this alternative was determined to be cost-prohibitive and therefore infeasible.

Full Occupation of Railroad Prism
This alternative would place the trail directly on the existing railroad prism for Segments 3, 4, 7, 8, and 9. This alternative would require removal of the existing railroad tracks and ties and would still require widening portions of the prism to accommodate the required trail width. This alternative was not selected because it would increase the risks of flooding causing damage to the trail or creating safety hazards for trail users. As stated in Section 3.3, the railroad would be maintained as the first line of defense and the trail would be aligned on the inland side of the railroad to provide a minimum separation between the trail and breaking waves/floodwaters that could result from extreme events. This separation provides a necessary safety buffer for trail users. In addition, this alternative would conflict with the previously agreed-upon community consensus for integrating the Humboldt Bay Trail with the railroad (NCRA, 2012) and the existing use of the rail prism by THA for speeder cars.

Cantilevered Structure on the Eureka Slough Bridge (Segment 2)
This alternative would widen the existing bridge structure by cantilevering a separate deck girder frame from the existing supports (pile abutments, bents, and pier). The cantilever frame from each support would be structural steel. The deck girders spanning between the frames and the trail deck itself would be aluminum or another lightweight material. The new deck surface would be separated from the existing railroad bed by railing.

The cantilever alternative has the advantage of avoiding the need for cooperative use on the existing railroad bridge deck. However, this alternative was eliminated from further consideration due to unfavorable weight impacts to the existing bridge supports, unfavorable costs associated with design and construction, and difficulty in removal (Morrison Structures, April 2018). This alternative would concentrate additional deadload on one side of the bridge which was not designed for this distribution of loading. Applying a non-uniform load could necessitate structural improvements to the existing piles. Significant further analysis would be needed to confirm feasibility and design the structural improvements. Fabrication of customized structural components would likely be necessary and construction methods would be more difficult and costly. Morrison Structures estimated that the cantilever option would be significantly more expensive to construct (likely twice as costly) as the proposed cooperative use option. In addition, removal of the cantilevered improvements would be difficult and costly. This alternative was not selected due to the uncertain technical feasibility and because even if feasible, the total lifetime costs would be substantially higher.

Flangeway Fillers in Segment 3

This alternative would place the trail directly on the railroad prism using flangeway fillers similar to Segments 1 and 2. This alternative has the advantage of reducing the width of the widened railroad prism and reducing wetland impacts. However, this alternative was not selected due to safety concerns because the flangeway fillers and steel rails would need to be situated within the travel lanes of the trail. The presence of multiple joints between asphalt, steel, and rubber within the travel lanes for a distance of 1,500 feet would create higher risks of trail users slipping or encountering irregularities in the surface. In Segment 2 (on the Eureka Slough bridge), the flangeway fillers are situated outside the primary travel lanes. In Segment 1, the flangeway fillers would be present within the travel lanes for only a short distance (approximately 80 feet), and in a context where travel speeds are lower due to the intersection between the Bay Trail South Project and the Eureka Waterfront Trail. In contrast, the length of Segment 3 is significantly longer and has a straight orientation, with trail users expected to travel at normal speeds. This alternative was not selected due to these safety concerns.

Alignment in Front of the Brainard Mill Site

This alternative would place the portion of the trail near the Brainard mill site (Segments 5 and 6) parallel with the railroad and highway rather than on the perimeter levee around the mill site. This alternative would have the advantage of providing a more direct route but would have the disadvantage of being closer to Highway 101 and further from the bay. This alternative would require removal of the 0.6- mile-long southern segment of eucalyptus trees to create space for the trail facility and for safety reasons due to overhanging limbs. This alternative would have more environmental impacts (through the filling of wetlands) and be more expensive than the proposed alignment around the perimeter levee. This alternative may need to be re-considered if the County is unable to acquire an easement on the Brainard mill site levee.

Alignment around Bracut Marsh and Bracut Industrial Park

This alternative would place a portion of the trail (Segment 9) on the levees surrounding Bracut Marsh and Bracut Industrial Park. This alternative would have the advantage of being further away from the highway and closer to the bay but would have the disadvantage of being a less direct route with several sharp turns. The Bracut levees are more narrow and less robust than the levees at the Brainard mill site. This alternative would require substantial improvements to the Bracut levees, including widening and revetment repair, and two bridges would be needed to cross the gaps in the levee around Bracut Marsh. Widening the levee would cause unavoidable impacts to adjacent wetlands. This alternative would have more environmental impacts and be more expensive than the proposed alignment parallel to the railroad. This alternative is not the

least environmentally damaging feasible alternative and would be more expensive than the proposed alignment in Segment 9. For these reasons, this alternative was not selected.

Bike Path with Two Six-Foot-Wide Lanes, Adjacent Multipurpose Trail, or Widened Shoulders

These alternatives would construct increase the predominant lane width from five feet to six feet, develop a multipurpose trail with a natural surface adjacent to the paved bike path, or provide widened natural surface shoulders. These alternatives were not selected due to the highly constrained corridor and tradeoffs regarding cost and wetland impacts.

8 REFERENCES

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