

## **EUREKA SLOUGH BRIDGES GEOTECHNICAL INVESTIGATION**

### **Humboldt Bay Harbor, Recreation, and Conservation District Development Permit Application**

#### **ATTACHMENT 2—PROJECT DESCRIPTION**

##### **1. Eureka Slough Bridge Replacement Project**

The Eureka Slough Bridges Replacement Project (01-0F200/0M760) would address seismic, geometric, and functional deficiencies to the U.S. Highway 101 northbound and southbound Eureka Slough Bridges (#04-0022L&R). U.S. Highway 101 passes over the Eureka Slough at approximately Post Mile (PM) 79.9 in Humboldt County. The project proposes replacing the two bridges with new structures that each have two traffic lanes, standard inside and outside shoulders, and a separated bicycle/pedestrian path. Depending on the alternative chosen, maximum required work would include drainage, landscaping, guardrail upgrades, cable barrier connection/continuation, soil disturbances, paving operations, bicycle and pedestrian improvements, traffic handling and impacts, utility relocation, and reconfiguration or relocation of existing northbound U.S. Highway 101 on/off ramps at 6<sup>th</sup> Street near the gas station in Eureka.

##### **2. Geotechnical Investigation Project Description**

The Eureka Slough Bridges Geotechnical Investigation would support the design and construction of two to three bridges to replace the existing northbound and southbound bridges crossing Eureka Slough on U.S. Highway 101 in Humboldt County. The geotechnical investigation would include drilling and performing geophysical surveys. Drilling and surveys would be performed on the proposed bridge alignments at or near the proposed foundation locations. Information from the subsurface data would be used to generate a Log of Test Borings (LOTB). The LOTB would provide the subsurface and geological information for the project site. The investigation would include the following components: 1) geophysical surveys, 2) geotechnical drilling, and 3) P-S (compression and shear wave velocities) suspension logging. Project Layout Plan Sheets show the proposed drilling and survey locations and potential disturbance areas from access paths. The Environmental Study Limits map indicates the area surrounding the project location that was analyzed for environmental impacts.

Potential environmental impacts to plant and animal species, habitat, and jurisdictional waters have been analyzed for the proposed investigative work. Various agency permits would be required for the proposed work including: CDFW 1602 LSAA, NMFS Letter of Concurrence, USACE 404 permit, NCRWQCB 401 certification, CCC CDP, and one Permit to Enter (APN 002-201-008).

Project avoidance measures are listed in Section 3. Work is anticipated to take approximately 20 weeks. A majority of the work locations would be accessed along the highway shoulders and median and through the Eureka Slough Bridges bridge decks within the existing Caltrans right of way. Minimal access would be required at and through the southeastern corner of the Target parcel (Humboldt County Parcel 002-201-08). This project was approved by Caltrans, as the lead agency, as a NEPA Categorical Exclusion, 23 CFR 771.117(c)(24) and a CEQA Categorical Exemption, Common Sense Exemption.

## 2.1 Geophysical Surveys

Up to six geophysical surveys would be conducted. Each of the survey lines (SL) would be between approximately 200 and 500 feet in length. Seismic refraction and electrical resistivity surveys would be performed at the proposed line locations. Seismic refraction and electrical resistivity surveys would help characterize the subsurface conditions, estimate the depth of soft mud, and evaluate geologic variability.

Seismic refraction involves placing of 24 small geophones on the ground in a straight line at equal spacing. The geophones have a one-inch-long prong that is pushed into the ground to hold the geophone firmly. This allows good contact with the ground to the potentiometers inside the geophone. The geophones are connected to a specialized cable that carries the geophone signal created by a seismic source to a seismograph unit.

Electrical resistivity surveys use an Automatic Resistivity System (ARES II manufactured by GF Instruments). At regularly spaced intervals along a survey line, copper stakes are driven into the ground at the proper electrode spacing and connected to multi-electrode cables. The cables are then connected to the ARES II unit in preparation for collecting and recording data. A contrast resistance test is performed for each array before collecting resistivity measurements and adjustments made to the connections as needed. A low current is then applied to the ground across the line and voltage measured at each of the copper stakes. This instrumentation uses low current and has minimal to no potential impact on the environment or persons.

The geophysical survey of each seismic line would take approximately two days to complete. The total geophysical exploration time is estimated to take approximately 12 working days. Traffic control would not be required. Minor ground brushing may be required for lines SL-4 and SL-5, sufficient to provide unobstructed access to the ground to lay out the cables connecting the geophones and copper probes. This would likely consist of an approximately 3-foot-wide strip cut back to a height of 6-inches above the ground to promote regrowth. No earthwork would be required to perform the proposed geophysical surveys.

#### Equipment:

- Geophones
- Specialized cable
- Battery powered seismograph unit
- Seismic source: hammer and striker plate, downhole shotgun, or explosives (seismic refraction surveys only)

The hammer and striker plate consists of a 12- to 16-lb sledgehammer struck against a small metal or high density polyethylene (HDPE) plate placed on the ground. This seismic source creates the greatest noise of the three available sources. The “ping” from the hammer striking the metal plate may exceed 110 dB within 3.3 feet (1 meter) of the source, with sound pressure decreasing significantly within 120-140 feet of the source. Ground disturbance resulting from this method is a slight dent or divot in the ground in the shape of the plate.

The downhole shotgun uses an industrial shell fired in a minimum 1.5-foot-deep water-filled hole created using a hand auger. The industrial shell is an 8-gauge, 350- to 500-grain blank shotgun cartridge, typically triggered approximately 20 minutes apart. The highest anticipated noise generated consists of a muffled “thump” of approximately 80 dB. This method may leave an area of disturbed earth up to 2 feet in diameter which is tamped down to return to its original condition.

Explosive charges may also be used in locations where deep imaging is required and high seismic impedance is anticipated. All work related to explosives is conducted by a licensed blaster following state and federal safety mandates. When used, the charges are placed below the ground surface in a 1.5- to 3-foot-deep hole excavated by hand auger or manually driving a 2.5-inch diameter gad bar. The charge is placed, the hole backfilled, and the charge detonated using an electric cap. The highest anticipated noise generated is approximately 80 dB. Ground disturbance is limited to an area of raised ground around the detonation site. Any holes are filled after completion of work and the ground surface returned to its original condition to the extent possible.

#### 2.2.1 Geotechnical Drilling

To characterize the geotechnical subsurface conditions in the vicinity of project structures, up to twenty-two (22) borings are proposed. Mud-rotary drilling methods would be utilized for the geotechnical borings to support geotechnical sampling and the installation of instrumentation. The estimated maximum depth for the 4.75-inch diameter, vertical borings would be approximately 200 feet below ground surface. Solid PVC casings would be installed in two of the borings to support the P-S suspension logging.

The advancement, sampling, and geophysical casing installations for each of the borings would take an average of approximately 4 days to complete. The total drilling time for this phase of the exploration is estimated to take approximately 88 working days. Depending on location, the proposed borings would be advanced through the existing bridge deck, highway pavement surface, median strip, or vegetated area adjacent to the approach embankments. Most borings would require traffic control, either continuously or to support entrance and exit from the drill locations. Locations requiring drilling through the bridge deck require lane closures and would be limited to performing work between the hours of 8 pm and 6 am.

The mud-rotary system requires the use of drilling fluid to keep the borehole open, bring cuttings to the surface, and lubricate and cool the drill bit. Drilling fluid is made up of either water alone or water mixed with a thickening agent, such as bentonite clay and/or an organic liquid polymer. The drilling fluid is fully contained and recirculated through a closed system using an 8-inch outer steel casing, 94-mm drill rod, and mud tank. The mud tank would be positioned on the ground surface adjacent to the drill rig and would serve as a settlement tank for soil cuttings. The cuttings are periodically removed and placed in 55-gallon steel drums. The steel drums would be removed from the job site and transferred to an appropriate fenced staging area. From the staging area, the drums would be tested and taken to an appropriate landfill site.

Holes designated to receive geophysical casings for P-S suspension logging would have a solid, 4-inch diameter PVC pipe installed and the annular space filled with bentonite/cement grout. Traffic-proof well covers would be installed at the top of boreholes in which geophysical casing would be installed with quick setting Portland cement to allow access. Borings not designated to receive a geophysical casing would be backfilled with cement grout. To prevent contamination of sensitive areas with cement, boring holes in the slough channel would have the top 20 feet backfilled with a non-toxic bentonite clay mixture and boring holes on land or in wetlands would have the top five feet backfilled with native soils retained from the holes.

Eleven of the proposed borings would be drilled into vegetated areas in the median, shoulder, or at the base of the existing approach embankments. Access of equipment to and drilling at these locations is expected to generate some level of ground and vegetation disturbance. The proposed access paths and drilling work area have been included in the Layout Plan Sheets. It is anticipated that access to and establishment of a work area at boring locations B-3, B-5, B-21, and B-22 would require some level of brushing of coastal scrub and minor limbing. Vegetation would be cleared outside the bird breeding season or after August 15 with a bird survey conducted one week prior to removal. To avoid rare plants, areas of known rare plant occurrences would be surveyed and flagged prior to beginning work. Protective ground mats would be utilized in wetlands areas to avoid impacts.

Ten of the proposed borings would be drilled through the existing northbound and southbound Eureka Slough Bridge decks. The same type of equipment and equipment set-up utilized for the onshore drilling section of this plan would be utilized for the bridge deck drilling. Drilling through the bridge deck within the slough channel would be done using the self-casing wire line rotary wash system. To facilitate drilling, first the bridge deck would be core drilled utilizing a 5-inch diameter drill bit, taking care to first identify and avoid all critical bridge structures and reinforcing. Second, a 5-inch outer casing would be installed through the deck and extended to below the ground surface within the estuary channel sufficiently (approximately 10–15 feet) to ensure containment and recirculation of the drilling fluids. Once the casing is in place, drill pipe would be installed inside the outer casing and the drilling would proceed to the planned boring depth.

Precautions during drilling would be employed using Best Management Practices (BMP) to avoid excessive noise, equipment leaks, or drilling fluid spillage. These may include plastic tarps, absorption mats, and jute waddles. When drilling within the slough channel, potential leakage at the casing mud-line contact would be monitored. If leakage is detected, the wet drilling would be stopped and the casing advanced by dry drilling to a depth at which leakage has stopped (adequately sealed off).

Upon completion of each geotechnical boring, soil cuttings and drilling fluid generated by the operation would be pumped and/or shoveled into 55-gallon drums for appropriate disposal. Any cuttings and/or drilling fluid inadvertently spilled onto the ground during drilling operations would similarly be shoveled or sponged up and disposed of in 55-gallon drums. Any areas of ground disturbance created during off-road drilling activities would be treated with appropriate BMPs to prevent erosion and stormwater pollution.

Borings not designated to receive a geophysical casing would be backfilled using neat cement grout placed at the base of the excavation by tremie method in accordance with Local Enforcement Agency (LEA) requirements. Any holes in the road surface would be patched with fast setting cement. Any holes in the bridge deck would have a steel plate placed under the bridge deck to cover the drilled hole. Wire and rebar would be attached to the steel plate with a concrete mix placed in the drilled hole to bring the level of the concrete to the elevation of the bridge deck.

**Equipment:**

- Track or truck-mounted drill rig equipped with a Standard Penetration Test hammer
- Water truck
- Crew cab
- Geologist/engineer's vehicle
- As needed ground protection: portable ground protection mats, Visqueen, and straw wattle to construct BMP structures

**2.2.2 P-S Suspension Logging**

Downhole P-S suspension logging would be potentially conducted on two borings, B-2 and B-4. This would allow direct measurement of the compression wave (P) and shear wave (S) velocities of the surrounding rock and soils units in the subsurface to support a site-specific dynamic ground response analysis, as well as refinement of seismic refraction surveys and liquefaction analysis.

**Equipment:**

- 19-foot-long probe
- aluminum tripod with pulley
- winch
- armored conductor cable
- logger/recorder

The probe is lowered to the bottom of the fluid-filled casing using the tripod, pulley and winch system and returned to the surface, stopping at set intervals to collect data. The data would be recorded on the data logger and returned to the office for further processing and analysis.

The probe can be disassembled into sections and all equipment can be transported to and from the site by conventional vehicles and around the site by foot. No disturbance to ground or vegetation is anticipated as part of the downhole P-S suspension logging. When analysis of the collected data confirms that no additional downhole geophysics are required, the geophysical casing and borehole would be backfilled with grout.

### 3. Technical Reports

#### 3.1 Natural Environment Study/ Natural Environment Study Addendum

The Natural Environment Study (NES) (Attachment 7) was prepared to identify existing biological resources, assess potential impacts, and identify permitting requirements for the geotechnical investigation. The NES provides information about the existing environment within the project area, including special status botanical and wildlife species and their associated habitats and other sensitive habitats present in the vicinity of the project that could potentially be affected by the geotechnical investigations.

Temporary impacts to Sensitive Natural Communities (SNC), wetlands, and aquatic habitats considered to be ESHAs may occur during the geotechnical drilling. Potential temporary impacts to the SNC pickleweed mats and wetlands include minor compaction or disturbance of the vegetation and soils from the operation of the track-mounted drill rig at each of the four boring holes that are within or adjacent to these habitats. It is anticipated minor impacts to this sensitive natural community and wetland vegetation and soils would not be visible by the following year. Impacts on eelgrass or eelgrass habitat are not anticipated. Eelgrass would not be directly impacted by any geotechnical drilling because eelgrass does not extend under the bridge where geotechnical drilling would occur. Impacts on Humboldt Bay owl's clover and Point Reyes bird's-beak are not anticipated. A Caltrans biologist will flag occurrences of these rare plants prior to beginning of work. Geophysical surveys, consisting of foot traffic to lay cables, geophones, and strike plates, would occur in some areas where the plants are known to occur. However, no drilling or heavy equipment would occur within these areas.

Impacts on wetlands and Waters of the U.S. and State from the geotechnical exploration are discussed in the Addendum to Eureka Slough Bridges Geotechnical Exploration Natural Environment Study (Attachment 7). Utilizing Caltrans standard measures and BMPs, there would be no permanent impact to wetlands or waters. Temporary impacts of up to approximately 0.158 acre of wetlands would occur during the geotechnical drilling.

Potential hydroacoustic impacts from the geotechnical investigation were evaluated. Underwater noise can result in injury or behavioral effects to fish if thresholds are exceeded, which are 206 dB (decibels) peak and 187 dB accumulated sound exposure level (SEL) for fish for injury (for fish over 2 grams), and 150 dB for behavioral effects. Based on the NMFS calculator's estimates for cSEL exposure, the injury threshold for fish over 2 grams would not be exceeded for the proposed work. Therefore, exposure of Chinook salmon, coho salmon, steelhead, and green sturgeon to the cSEL injury threshold is extremely unlikely and discountable. Although the 150 dB threshold for behavioral effects may be exceeded up to 177.2 feet (54 meters) from the seismic survey locations and up to 111.6 feet (34 meters) from the geotechnical boring locations,

the potential exposure to the behavioral threshold by individual Chinook salmon, coho salmon, steelhead, and green sturgeon would be insignificant.

Caltrans' Standard Measures and Best Management Practices would be implemented to avoid or minimize impacts to sensitive terrestrial and aquatic animal species, rare plant species, migratory birds, natural communities, and jurisdictional waters potentially impacted by the project. Additional measures to protect rare plant species and aquatic resources are also included as part of the project.

### **3.2 Cultural Screening Memo**

A Cultural Resources Screening Memo (Attachment 7 ) was prepared, and it is determined that no cultural resources or historical built-environment elements are in the geotechnical investigation project area. If proposed investigation plans change to include new areas or additional test holes, new cultural studies would be conducted.

### **3.3 Initial Site Assessment – Hazardous Waste**

The Initial Site Assessment (ISA) (Attachment 7) found that the project has minor hazardous waste issues. Aerially Deposited Lead (ADL) was identified in shoulder soils and in the soils below the bridge foundation elements. Worker safety related to lead contaminated soils would be addressed in the project Health and Safety Plan. The ISA found project work is on or adjacent to sites listed on the Hazardous Waste and Substances Site List (Cortese List). However, proposed geotechnical explorations are not within an area of contaminate or cleanup activities and it is unlikely that petroleum hydrocarbons would be encountered during drilling operations. No special handling of soil and/or groundwater encountered in the exploratory borings, with respect to petroleum hydrocarbons, is anticipated during the geotechnical exploration activities. After the completion of each geotechnical boring, soil cuttings and drilling fluid generated by the operation would be stored in 55-gallon drums for hazardous waste characterization and disposal, as specified through the Mud Disposal Contract managed by the Caltrans Office of Drilling Services.

#### 4. Avoidance and Minimization Measures

Standard Best Management Practices (BMPs) would be followed to avoid and minimize impacts to waters and biological resources. In addition to general avoidance and minimization measures, the following measures would be included as part of the geotechnical investigation activities:

- Before start of work, as required by permit or consultation conditions, a Caltrans biologist or ECL would meet with the site investigation team to brief them on environmental permit conditions and requirements relative to each stage of the proposed project, including, but not limited to, work windows, drilling site management, and how to identify and report regulated species within the project areas.
- To protect migratory and nongame birds (occupied nests and eggs), if possible, vegetation removal would be limited to the period outside of the bird breeding season (removal would occur between September 16 and January 31). If vegetation removal is required during the bird breeding season, a nesting bird survey would be conducted by a qualified biologist within one week prior to vegetation removal. If an active nest is located, the biologist would coordinate with CDFW to establish appropriate species-specific buffer(s) and any monitoring requirements. The buffer(s) would be delineated around each active nest and construction activities would be excluded from these areas until birds have fledged, or the nest is determined to be unoccupied.
- Artificial night lighting may be required. To reduce potential disturbance to sensitive resources, lighting would be temporary, and directed specifically on the portion of the work area actively under construction. Use of artificial lighting would be limited to Cal/OSHA work area lighting requirements.
- A Limited Operating Period would be observed, whereby all in-stream work below ordinary high water (OHW) would be restricted to the period between June 15 and October 15 to protect water quality and vulnerable life stages of sensitive fish species. Geotechnical drilling restricted to this period includes drilling through the bridge deck into the slough channel
- All equipment would be thoroughly cleaned of all dirt and vegetation prior to entering the job site to prevent importing invasive non-native species. Project personnel would adhere to the latest version of the *California Department of Fish and Wildlife Aquatic Invasive Species Cleaning/Decontamination Protocol (Northern Region)* for all field gear and equipment in contact with water.

- Prior to the start of work, flagging would be installed around Humboldt Bay owl's clover and Point Reyes bird's-beak occurrences that are within the ESL and no drilling or heavy equipment would occur in these areas. Geophysical surveys consisting of foot traffic to lay cables, geophones, and strike plates would be allowed in or adjacent to occurrences.
- Before geotechnical activities begin, the project environmental coordinator or biologist would discuss the implementation of the required BMPs with the site investigation team and identify and document environmentally sensitive areas and potential occurrence of listed species.
- When geotechnical drilling takes place, drilling fluid would be made up of water or water mixed with bentonite clay without additives. Drilling would be conducted inside a casing so that all spoils are recoverable in a collection structure. All drilling fluids and materials would be self-contained and removed from the site after use, in accordance with *Caltrans Drilling Services Quality Management Plan* (Caltrans 2019).
- The boring holes would be backfilled with cement. For those boring holes in the slough channel, to prevent contamination of sensitive areas with cement, the top 20 feet would be filled with a non-toxic bentonite clay mixture. For those boring holes on land or in wetlands, the top 5 feet would be filled with native soils retained from the holes.
- The only equipment that would be parked or driven in wetlands would be a track-mounted drill rig. Temporary wetland protection mats would be used to prevent permanent damage and minimize temporary damage to wetlands from the track-mounted drill rig. With the exception of the track-mounted drill rig, no equipment parking or storage would occur within wetlands or special status plant communities.
- BMPs would be implemented as appropriate to control on-site and offsite releases from geotechnical drilling operations. In the event of a fluid spill, drilling will cease immediately to allow for containment and clean-up. The District 1 Spill Communication Plan will be followed, which outlines the process of spill response and notification of appropriate agencies and entities.
- Precautions during drilling will be employed to mitigate any possible equipment leaks or drilling fluid spillage. These may include plastic tarps, absorption mats, and straw wattles where appropriate. Where risk exists of drilling fluid being sprayed or otherwise ejected beyond the controlled work zone into an adjacent wetland area, removable barriers (such as plastic sheeting) would be deployed.

- When drilling within the slough channel, potential leakage at the casing mud-line contact will be monitored. If leakage is detected, wet drilling will be stopped and the casing will be advanced by dry drilling to a depth at which leakage has stopped (adequately sealed off).
- Equipment would be inspected on a daily basis for leaks and completely cleaned of any external petroleum products, hydraulic fluid, coolants, and other deleterious materials prior to operating equipment.
- Maintenance and fueling of equipment and vehicles would occur at least 49.2 feet (15 meters) from the Ordinary High Water Line (OHWL) or the edge of sensitive habitats (e.g., wetlands). Vegetation would be mowed or trimmed to a height greater than 4 inches. Existing vegetated areas would be maintained to the maximum extent practicable.
- A project Health and Safety Plan would address worker safety related to lead-contaminated soils within the project area.
- Traffic control will be used continuously where required and to support entrance and exit from drilling locations.
- After the completion of each geotechnical boring, soil cuttings and drilling fluid generated by the operation will be pumped and/or shoveled into 55-gallon drums for hazardous waste characterization and disposal. Any cuttings and/or drilling fluid inadvertently spilled onto the ground during drilling operations will similarly be shoveled or sponged up and disposed of in 55-gallon drums. If additional water is needed to clean pavement surfaces to prevent contamination of future stormwater or impacts to public safety, a minimal amount will be used and as much of the impacted water captured as practical. Any areas of ground disturbance created during off-road drilling activities will be mitigated with appropriate BMPs to prevent erosion and stormwater pollution.
- Precautions during drilling will be employed using Best Management Practices (BMP) to mitigate excessive noise, possible equipment leaks, or drilling fluid spillage. These may include plastic tarps, absorption mats, and jute waddles. When drilling within the slough channel, potential leakage at the casing mud-line contact will be monitored. If leakage is detected, the wet drilling will be stopped and the casing will be advanced by dry drilling to a depth at which leakage has stopped (adequately sealed off).
- In the event of a spill or leak, the District 1 Spill Communication Plan will be followed, which outlines the process of spill response and notifications to appropriate Agencies and Entities.
- Work window restrictions developed by Caltrans North Region Environmental would be followed for all exploration locations.

- When drilling through the bridge deck into Eureka Slough, each day, prior to drilling, a qualified environmental staff member, or construction staff trained by environmental staff, would scan the water around the drill site for marine mammals. If any marine mammals are spotted within a 50-foot radius around the drill site, no drilling would occur until the marine mammal has left the area.
- Prior to beginning drilling in locations in the slough channel, qualified environmental personnel will survey the location to ensure drilling does not disturb eelgrass.