Attachment 2c

DRAFT

CDFW SECTION 1602 LAKE/STREAMBED ALTERATION AGREEMENT

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
BAY DELTA REGION
2825 CORDELIA ROAD, SUITE 100
FAIRFIELD, CA, 94534

STREAMBED ALTERATION AGREEMENT
EPIMS-MAN-36007-R3
LEWIS GULCH CREEK

MARIN COUNTY – PARKS & OPEN SPACE DISTRICT
BOLINAS LAGOON WYE WETLANDS RESILIENCY PROJECT

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and Marin County – Parks & Open Space District (Permittee) as represented by Veronica Pearson.

RECITALS

WHEREAS, pursuant to Fish and Game Code section 1602, Permittee notified CDFW on December 23, 2022, that Permittee intends to complete the Project described herein.

WHEREAS, pursuant to Fish and Game Code section 1603, CDFW has determined that the Project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the Project in accordance with the Agreement.

PROJECT LOCATION

The Project is located at Lewis Gulch Creek, a tributary to Bolinas Lagoon, in the unincorporated community of Bolinas, County of Marin, State of California; Latitude 37.934451 °N, Longitude -122.69857 °W; Assessor's Parcel Numbers (APN) 188-110-10 and 188-140-04. The site is located at the intersection of Fairfax Bolinas Road and Olema Bolinas Road.

PROJECT DESCRIPTION

The Project is limited to the rerouting and construction of a new channel for Lewis Gulch Creek onto its former alluvial fan, elevating Olema Bolinas Road onto a full span bridge, installing rock slope protection at the new bridge, improving the Olema Bolinas Road intersection at SR-1, decommissioning the section of Fairfax Bolinas Road that bisects the Wye wetlands, installing an upland 18 inch culvert which will drain a roadside ditch, removing 123 trees (including 24 oaks and 1 buckeye), replanting with native vegetation, and stabilizing the left bank of Lewis Gulch Creek at SR-1. The Project will also install logs and rootwads to enhance the habitat for steelhead and other native fish within the new channel and on the floodplain (Exhibit A).

PROJECT IMPACTS

Existing fish or wildlife resources the Project could substantially adversely affect include:

Scientific Name	Common Name	Status
Amphibians		
Rana draytonii	California red-legged frog	FT, SSC
Rana boylii	Foothill yellow-legged frog	SSC
Dicamptodon ensatus	California giant salamander	SSC
Birds		
Falco peregrinus anatum	American peregrine falcon	FP
Haliaeetus leucocephalus	Bald eagle	SE, FP, BGEPA
Laterallus jamaicensis	California black rail	ST, FP
Aquila chrysaetos	Golden eagle	FP, BGEPA
Geothlypis trichas sinuosa	San Francisco common yellowthroat	SSC
Icteria virens	Yellow-breasted chat	SSC
Setophaga petechia	Yellow warbler	SSC
Contopus cooperi	Olive-sided flycatcher	SSC
Multiple species	Nesting birds	
Multiple species	Waterfowl	
Fish		
Oncorhynchus kisutch	Coho salmon – Central CA Coast (CCC) ESU	FE, SE
Oncorhynchus mykiss irideus	Steelhead – Central CA coast (CCC) DPS	FT
Entosphenus tridentatus	Pacific lamprey	SSC

Invertebrates		
Danaus plexippus	Monarch butterfly	FC, ICP
Mammals		
Corynorhinus townsendii	Townsend's big eared bat	SSC
Antrozous pallidus	Palled bat	SSC
Multiple species	Other bat species	
Reptiles		
Actinemys marmorata	Pacific (western) pond turtle	SSC

Notes: FC = federal candidate species under the Endangered Species Act (ESA); FE = federally endangered under ESA; FT = federally threatened under ESA; BGEPA = Bald and Golden Eagle Protection Act protected; SE = state endangered under the California Endangered Species Act (CESA); SCE = state candidate for listing as endangered under CESA; SCT = state candidate for listing as threatene d under CESA; SFP = state fully protected; SSC = state species of special concern; ST = state threatened under CESA ; ICP = California Terrestrial and Vernal Pool Invertebraes of Conservation Priority. CRPR ranking system: 1B = plants rare, threatened, or endangered in California and elsewhere; 2B = plants rare, threatened or endangered in California, but common elsewhere. Threat ranks: 0.1 = seriously threatened in California; 0.2 = moderately threatened in California: S3 = Subnational Conservation Status Rank of high inventory priority.

Other existing fish and wildlife resources that the Project could substantially adversely impact include:

- Riparian and aquatic habitat
- Water quality
- Common aquatic and terrestrial species

The adverse effects the Project could have on the fish or wildlife resources identified above include:

- Temporary loss of riparian habitat
- Temporary loss of tidal habitat
- Temporary loss of aquatic habitat
- Change in contour of bed, bank, and channel
- Change in flow depth, width, or velocity
- Change in composition of channel materials
- Change in gradient of bed, channel, or bank
- Change in channel cross-section
- Degradation or aggradation of channel
- Colonization by exotic plant species
- Short term release of contaminants
- Increased turbidity
- Restriction or increase in sediment transport

- Loss of bank stability during construction
- Soil compaction or other disturbance to soil layer
- Increased bank erosion during Project construction
- Loss of aquatic and terrestrial wildlife species
- Temporary impediment to migration of aquatic and terrestrial species
- Disruption of nesting birds and other wildlife
- Disturbance from Project activities

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the Project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the Project at the Project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify CDFW if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the Project by another local, state, or federal agency. In that event, CDFW shall contact Permittee to resolve any conflict.

1.4 Designer Oversight. The Project designers or another designated qualified professional shall oversee the construction of the Project to ensure all Project elements are being constructed at the correct locations, elevations, grades, and slopes. A field log shall be kept documenting the oversight and provided to CDFW upon request.

1.5 Project Site Entry. Permittee agrees that CDFW personnel may enter the Project site at any time to verify compliance with the Agreement.

1.6 Notify CDFW Prior to Work. The Permittee shall notify CDFW by email at least five working days prior to commencement of covered activities. See contact information below.

1.7 No Trespass. To the extent that any provisions of this Agreement provide for activities that require the Permittee to traverse another owner's property, such provisions are agreed to with the understanding that the Permittee possesses the legal right to so traverse. In the absence of such right, any such provision is void.

1.8 Unauthorized Take. The Permittee is required to comply with all applicable state and federal laws, including the California Endangered Species Act (CESA) and federal Endangered Species Act. This Agreement does not authorize the take[1] of any state or federal endangered or threatened species. Liability for any take or incidental take of such listed species remains the responsibility of the Permittee for the duration of the Project. Any unauthorized take of such listed species may result in prosecution and nullification of the Agreement. The Project has take coverage for coho salmon through CDFW's Consistency Determination (Number 2080R-2022-019-03) of the NOAA Restoration Center's Santa Rosa office Programmatic Biological Opinion.

1.9 Fish Passage. The Project shall comply with Fish and Game Code section 5901 and shall not install or maintain any device or contrivance that prevents, impedes, or tends to prevent or impede, the passing of fish[2] up and down stream. Installation and operation of the temporary cofferdam as described in the Agreement shall not be considered a fish passage impediment.

1.10 Designated Representative. Before initiating ground-disturbing Project activities, Permittee shall designate a representative (Designated Representative) responsible for communications with CDFW and overseeing compliance with this Agreement. The Permittee shall notify CDFW in writing five days prior to commencement of Project activities of the Designated Representative's name, business address, and contact information. Permittee shall notify CDFW in writing if a substitute Designated Representative is selected or identified at any time during the term of this Agreement.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

Work Period and Design

2.1 Work Period. All work within active stream channels or adjacent wetlands shall begin on or after **June 1** and all work shall be completed by **October 31**. Revegetation work conducted with hand tools is not limited to this work window but must be completed within the same season as Project activities.

[1] Take, as defined in Fish and Game Code section 86, means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. Take, as defined in title 16 of U.S. Code section 1532 subsection 19, means harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt any of those activities.
[2] Fish, as defined in Fish and Game Code section 45, means a wild fish, mollusk, crustacean, invertebrate, amphibian, or part, spawn, or ovum of any of those animals.

2.2 Work Period Modification. If a work period modification is needed, the work may be permitted outside of the work period specified in Measure 2.1 by a CDFW representative who reviewed the Project, or if unavailable, through contact with the Regional Office at (707) 428-2002. Permittee shall submit a written request for a work period variance on a week-by-week basis to CDFW. The work period variance request should consider the effects of noise, increased stream flows, rain delays, increased erosion control measures, limited access due to saturated soil conditions, and limited growth of erosion control grasses due to cool weather. Work period variances are issued at the discretion of CDFW. CDFW reserves the right to require additional measures, which shall be implemented by the Permittee, to protect fish and wildlife resources as a condition for granting the variance. At minimum, the work period variance request shall:

1) Describe the extent of work already completed.
2) Detail the activities that remain to be completed.
3) Provide a National Weather Service forecast covering the time needed, up to one week, to complete a phase or activity.
4) Detail the time required to complete each of the remaining activities.
5) Provide photographs of both the completed and proposed work sites.
6) Include an assessment of additional biological impacts as a result of the work extension.

2.3 Conduct Work During Daylight Hours. Work is restricted to daylight hours (one hour after sunrise to sunset).

2.4 Work According to Documents. Except as they are contradicted by measures required by this Agreement, all work shall be conducted in conformance with the Project description above and the avoidance, minimization, and mitigation measures provided in the notification package.

2.5 Work According to Plans. All work shall be completed according to the plans submitted to CDFW titled *Bolinas Lagoon Wye Wetlands Project 60% Design*, prepared by WRA environmental consultants, dated July 2022 (Exhibit B). If the Permittee finds it necessary to update Project plans prior to construction, the updated plans shall be submitted to CDFW **at least 30 days** prior to beginning Project activities to determine if an amendment to this Agreement is required. Project activities shall not proceed until CDFW has accepted the updated plans in writing. At the discretion of CDFW, minor plan modifications may require an amendment to this Agreement. At the discretion of the CDFW, if substantial changes are made to the original plans this Agreement becomes void and the Permittee shall submit a new notification.

Weather Restrictions

2.6 Work Period in Dry Weather Only. Project work shall be restricted to dry weather, as allowed during the work period specified in Measure 2.1. In-channel work may only occur when the stream is dewatered and flow is bypassed around the work area. The Permittee shall monitor forecasted precipitation. When a 0.25-inch or more of precipitation is forecasted to occur by the National Weather Service 72-hour forecast, the Permittee shall stop work before at least 24 hours prior to precipitation commencing. No Project activity may be started if its associated erosion control measures cannot be completed prior to the onset of precipitation. Construction equipment and materials shall be removed if inundation is likely. After any storm event, the Permittee shall inspect all sites currently under construction and all sites scheduled to begin construction within the next 72 hours for erosion and sediment problems and take corrective action as needed. Seventy-two-hour weather forecasts from the National Weather Service shall be consulted and work shall not resume until runoff ceases and there is less than a 30 percent forecast for precipitation for the following 24-hour period. Weather forecasts shall be documented upon request by CDFW.

Qualified Biologist(s) and Biological Monitor(s)

2.7 CDFW-Approved Qualified Biologist(s) and Monitor(s). **No later than 30 days** prior to project activities covered by this Agreement, the Permittee shall submit to CDFW, for review and approval, the qualifications for the biologist(s) that shall oversee the implementation of the conditions in this Agreement and conduct surveys or monitoring work using the Biologist Resume Form available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=202869 or another format containing the same information. Project activities covered by this Agreement may not commence unless CDFW has approved the proposed biologist(s) in writing.

- A Qualified Biologist is an individual who holds a bachelor's degree from an accredited university and: 1) is knowledgeable in relevant species' life histories and ecology, 2) can correctly identify relevant species, 3) has conducted field surveys for relevant species, 4) is familiar with relevant survey protocols, and 5) is knowledgeable of state and federal laws regarding the protection of sensitive species.

- A Biological Monitor is an individual who shall have academic and professional experience in biological sciences and related resource management activities as it pertains to this Project, experience with construction-level Biological Monitoring, be able to recognize species that may be present within the Project area, and be familiar with the habitats and behavior of those species.

2.8 CDFW Approved Qualified Biologist or Biological Monitor On-site. A Qualified Biologist or Biological Monitor shall be on site daily to monitor compliance with all conditions of this Agreement unless otherwise approved in writing by CDFW. Qualified Biologist or Biological Monitor shall have the authority to halt Project activities, through communication with the Project Manager or their on-site designee, to comply with the terms of this Agreement and otherwise avoid impacts to species and or habitats. If the on-site Biologist has requested a work stop due to failure to implement any of the conditions, CDFW shall be contacted within 24 hours.

Dewatering and Aquatic Species Capture and Relocation

2.9 Water Diversion and Capture and Relocation Plan. Work shall be performed in isolation from the stream. Permittee shall implement the Water Diversion and Capture and Relocation Plan (Plan) found in Exhibit D, *titled NMFS Section 7 Biological Assessment*, prepared by WRA Environmental Consultants, dated December 2022 (Exhibit C). Any changes or updates to the Plan shall be submitted to CDFW for review and approval **at least 30 days** prior to implementation. The Plan lists the full stream diversion and dewatering avoidance and minimization measures required for the dewatering and diversion of Lewis Gulch Creek. Water diversion activities shall not occur until aquatic species habitat assessments and surveys have been completed and any special-status species adequately addressed (see Measures 2.23, 2.24, 2.25 and 2.26).

2.10 Guidelines for Fish Relocation: All electrofishing will be conducted according to the National Marine Fisheries Service's Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act (NMFS 2000). A qualified fisheries biologist will perform all fish relocation activities. The biologist will adhere to the following requirements for capture and transport of salmonids:

2.10.1 Capture Methods. Determine the most efficient means for capturing fish. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrated by pumping down the pool and then seining or dip netting fish

2.10.2 Schedule of Relocation. Initial fish relocation efforts will be conducted several days prior to the start of construction, providing the fisheries biologist an opportunity to return to the work area to perform additional electrofishing passes immediately prior to construction if there is water in the isolated construction area. If water is left in the construction area, dissolved oxygen levels sufficient for salmonid survival will be maintained.

2.10.3 Time of Day. If high summer water temperatures are present at the work site, relocation activities will be conducted during morning periods.

2.10.4 Release Locations. Prior to capturing fish, the most appropriate release location(s) will be determined, based on the following guidelines: similar water temperature as capture location; ample habitat for captured fish; low likelihood of fish reentering work site or becoming impinged on exclusion net or screen.

2.10.5 Number of Salmonids. The biologist will note the number of salmonids relocated, and the date and time of collection and relocation.

2.10.6 Temperature. Air and water temperatures will be periodically measured, and captured fish monitored. Temperatures will be measured at the head of riffle tail of pool interface. Activities will cease if health of fish is compromised owing to high water temperatures.

2.10.7 Number of Passes. A minimum of three passes with the electro-fisher or seine will be used to ensure maximum capture probability of salmonids within the area proposed for dewatering.

2.10.8 Overcrowding. Fish will not be overcrowded into buckets.

2.10.9 Salmonid Predators. Every effort will be made not to mix small salmonids with larger steelhead, or other potential predators, that may consume the smaller salmonids.

2.10.10 Relocation of Salmonid Predators. Salmonid predators, including other fishes and amphibians, collected and relocated during electrofishing or seining activities will not be relocated so as to concentrate them in one area. Emphasis will be placed on avoiding relocation of predators into the salmonid relocation pools. To minimize predation of salmonids, these species will be distributed throughout the wetted portion of the stream.

2.10.11 Relocation of Salmonids. All captured salmonids will be relocated, upstream if possible, and placed in suitable habitat. Captured fish will be placed into a pool, preferably with a depth of greater than two feet with available instream cover.

2.10.12 Releasing of Fish before Next Pass. All captured salmonids will be processed and released prior to conducting a subsequent electrofishing or seining pass.

2.10.13 Native Fish. All native captured fish will be allowed to recover from electrofishing before being returned to the stream.

2.10.14 Handling of Salmonids. Handling of salmonids will be minimized. Handlers will not wear insect repellants containing the chemical N,N-Diethyl-meta-toluamide (DEET).

2.10.15 Fish Holding Conditions. Fish will be held temporarily in cool, shaded, aerated water in a container with a lid. Aeration will be provided with a battery-powered external bubbler. Fish will be protected from jostling and noise and will not be removed from this container until time of release.

2.10.16 Water Temperature. If necessary, partial water changes will be periodically conducted to maintain a stable water temperature. If water temperature reaches or exceeds that allowed by NMFS, fish will be released and rescue operations ceased.

2.10.17 Aquatic Vertebrates. In areas where aquatic vertebrates are abundant, capture will be periodically ceased to allow for release at predetermined locations.

2.10.18 Identifying and Counting Fish. Species will be visually identified and year-classes of fish estimated at time of release. The number of fish captured will be counted and recorded.

2.10.19 Capture Methods. Capture methods may include dip nets, seine nets or electrofishing. All nets shall be made of a soft braded nylon material that is non-abrasive. Mesh sizing shall be matched to species and the life stages likely encountered. Electrofishing shall not be used unless recommended by a Qualified Biologist and approved in writing by CDFW. Capture and handling of aquatic animals shall be minimized and the number of animals captured and moved at any one time shall be limited to the number that can be relocated without stress or injury.

2.10.20 Non-native Aquatic Organisms. No non-native animals captured shall be returned to the stream or released alive.

2.10.21 Equipment Sterilization. Before and after each relocation effort all equipment shall be properly sterilized to ensure it is free of aquatic pathogens or invasive species. Equipment sterilization shall follow prevention Best Management Practices such as those prepared by CDFW's Northern Region, https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=92821&inline, or other methodology accepted by CDFW in writing.

2.11 Guidelines for Dewatering. The following guidance for dewatering has come directly from the *NMFS Programmatic Biological Opinion* (2016).

2.11.1 Dewatering Planning. In those specific cases where it is deemed necessary to dewater a work site that is located in aquatic habitat, the work area shall be isolated and all the flowing water upstream of the work site shall be temporarily diverted around the work site to maintain downstream flows during construction. Prior to dewatering, determine the best means to bypass flow through the work area to minimize disturbance to the channel and avoid direct mortality of fish and other aquatic vertebrates (as described more fully below under General Conditions for Fish Capture and Relocation).

2.11.2 Fish Exclusion. Fish will be excluded from reentering the work area by blocking the stream channel above and below the work area with fine-meshed net or screens. Mesh will be no greater than 1/8-inch diameter. The bottom of the seine must be completely secured to the channel bed to prevent fish from reentering the work area. Exclusion screening must be placed in areas of low water velocity to minimize fish impingement. Upstream and downstream screens must be checked daily (prior to, during, and after instream activities) and cleaned of debris to permit free flow of water. Block nets shall be placed and maintained throughout the construction period at the upper and lower extent of the areas where fish will be removed. Block net mesh shall be sized to ensure salmonids upstream or downstream does not enter the areas proposed for dewatering between passes with the electro-fisher or seine.

2.11.3 Dewatering Coordination. Coordinate project site dewatering with a qualified biologist to perform fish and amphibian relocation activities. The qualified biologist(s) will possess all valid state and federal permits needed for fish relocation and will be familiar with the life history and identification of salmonids, state-listed fish, and listed amphibians within the action area.

2.11.4 Fish Relocation. Prior to dewatering a construction site, qualified individuals will capture and relocate fish and amphibians to avoid direct mortality and minimize take. This is especially important if listed species are present within the project site. Bypass stream flow around the work area, but maintain the stream flow to channel below the construction site.

2.11.5 Dewatering Length. Minimize the length of the dewatered stream channel and duration of dewatering.

2.11.6 Artificial Obstruction Materials. Any temporary dam or other artificial obstruction constructed shall only be built from materials such as sandbags or clean gravel that will cause little or no siltation. Impenetrable material shall be placed over sandbags used for construction of cofferdams construction to minimize water seepage into the construction areas. The impenetrable material shall be firmly anchored to the streambed to minimize water seepage. Cofferdams and the stream diversion systems shall remain in place and fully functional throughout the construction period.

2.11.7 Debris Racks. When cofferdams with bypass pipes are installed, debris racks will be placed at the bypass pipe inlet. Bypass pipes will be monitored a minimum of two times per day, seven days a week, during the construction period. The contractor or project applicant shall remove all accumulated debris.

2.11.8 Bypass Pipe Diameter. Bypass pipe diameter will be sized to accommodate, at a minimum, twice the existing summer baseflow.

2.11.9 Seepage and Pumping. The work area may need to be periodically pumped dry of seepage. Place pumps in flat areas, well away from the stream channel. Secure pumps by tying off to a tree or stake in place to prevent movement by vibration. Refuel in an area well away from the stream channel and place fuel absorbent mats under pump while refueling. Pump intakes shall be covered with appropriately sized screening material to prevent potential entrainment of fish or amphibians that failed to be removed. Check intake periodically for impingement of fish or amphibians.

2.11.10 Siltation Basin. If pumping is necessary to dewater the work site, procedures for pumped water shall include requiring a temporary siltation basin for treatment of all water prior to entering any waterway and not allowing oil or other greasy substances originating from the contractor or project applicant's operations to enter or be placed where they could enter a wetted channel. Projects will adhere to currently approved CDFW and NMFS Fish Screening Criteria (NMFS 2011).

2.11.11 Discharging Wastewater. Discharge wastewater from construction area to an upland location where it will not drain sediment-laden water back to the stream channel.

2.11.12 Removal of Flow Diversion Structure. When construction is completed, the flow diversion structure shall be removed as soon as possible in a manner that will allow flow to resume with the least disturbance to the substrate. Coffer dams will be removed so surface elevations of water impounded above the cofferdam will not be reduced at a rate greater than one inch per hour. This will minimize the risk of beaching and stranding of fish as the area upstream becomes dewatered.

2.12 Screen Intake. The pump intake apparatus shall be screened with a fine mesh screen. The screen shall be cleaned as needed. NMFS fish screening requirements shall be implemented, unless otherwise approved in writing by CDFW.

2.13 Qualified Biologist to Check Dewatered Area. The Qualified Biologist shall check daily for stranded aquatic life as the water level in the dewatering area drops and until surface water is no longer present in the dewatering area. If water levels rise such that surface water is present in the dewatering area, daily checks shall resume. All stranded native aquatic vertebrates in the dewatered areas shall be immediately relocated to the nearest suitable habitat. Capture and relocation shall be conducted in a manner that minimizes stress and injury to captured animals.

General Wildlife Protection and Prevention

2.14 Special-Status Species Survey. A Qualified Biologist, approved by CDFW for this Project, shall conduct a pre-construction survey **within 48 hours prior to the start of project activities**, focusing on the presence of special-status species. If any special-status species are discovered during the survey, Project activities shall not begin until CDFW has been consulted with regarding avoidance and minimization measures to avoid and minimize impacts to special-status species. Permittee shall implement the avoidance and minimization measures if required by CDFW.

2.15 Training Session for Personnel. Permittee shall ensure that a CDFW-approved Qualified Biologist conducts an education program for all persons employed on the Project prior to performing covered activities. Instruction shall consist of a presentation by the designated Qualified Biologist that includes a discussion of the biology and general behavior of any sensitive species which may be in the area, how they may be encountered within the work area, and procedures to follow when they are encountered. The status of CESA-listed species, including legal protection, penalties for violations, and Project-specific protective measures provided in this Agreement shall be discussed. Interpretation shall be provided for non-English speaking workers, and the same instruction shall be provided for any new workers prior to on-site Project activity. Copies of the Agreement for this Project shall be maintained at the worksite with the Project supervisor. Permittee or Qualified Biologist shall prepare and distribute wallet-sized cards or a factsheet handout containing this information for workers to carry on-site. Upon completion of the program, employees shall sign an affidavit stating they attended the program and understand all protection measures. These forms shall be filed at the Permittee's office and be available to CDFW upon request.

2.16 Daily Inspections. At the beginning of each workday and prior to construction activities beginning, the work areas, equipment and material left onsite, and any access routes into the work area and nearby vicinity, shall be inspected by a Biological Monitor or qualified person approved in writing by CDFW for the presence of special-status species, roosting bats, nesting birds, or other wildlife. If any species is detected, CDFW shall be notified and construction activities shall not begin until the species has left the site of its own volition, or CDFW provides written permission to proceed.

2.17 Wildlife Encounters. If any wildlife is encountered during the course of construction, all work in the immediate area shall cease and the wildlife shall be allowed to leave the construction area on their own volition unharmed, if possible. If necessary, the Qualified Biologist is permitted to capture and move all species authorized by this agreement immediately.. If any listed fish and wildlife are encountered, the Permittee shall contact CDFW immediately, and any animals relocated by the Qualified Biologist will be noted in daily monitoring logs and listed in the final report to CDFW/

2.18 Trenches and Holes. At the end of each workday all trenches and holes greater than one foot deep shall be completely covered with a material flush with the ground to prevent wildlife from entering. When trenches cannot be fully covered, an escape ramp shall be placed at each end of any constructed open trench to allow any wildlife that may have become entrapped in the trench to climb out overnight. The ramp may be constructed of either dirt fill or wood planking or other suitable material that is placed at an angle no greater than 30 degrees.

2.19 Pipes, Hoses, and Similar Structures. All pipes, hoses, or similar structures less than 12 inches in diameter shall be closed or covered to prevent animal entry. All construction pipes or similar structures greater than 2 inches in diameter stored at the Project site overnight shall be inspected thoroughly for wildlife before the pipe or similar structure is buried, capped, used, or moved.

2.20 No Excavation in Stream Where Surface Water is Present. No excavation shall occur in the portion of the stream bed where surface water is present or anticipated during the seasonal work period.

2.21 No Equipment in Stream Where Surface Water is Present. No equipment shall be operated within the stream where surface water is present or within the stream channel below the level of top-of-bank.

2.22 Cleaning Equipment. All equipment (mechanized or hand tools) shall be sufficiently cleaned before and after use on the Project. Equipment will be cleaned at an offsite facility such that mud which could potentially carry invasive plant materials is removed and thoroughly dried. Any aquatic equipment (e.g., pumps, nets etc.) shall be cleaned sufficiently to prevent the spread of aquatic invasive organisms.

California Red-Legged Frog Protection

2.23 California Red-legged Frog Habitat Assessment and Surveys. At least two weeks prior to the commencement of ground-disturbing activities, the Project area and nearby vicinity, including a minimum 500-foot radius surrounding the Project activity area, shall be assessed by a Qualified Biologist for the presence of California red-legged frog individuals and habitat features. Habitat features include both aquatic habitat such as plunge pools and ponds and terrestrial habitat such as burrows or other refugia. If habitat occurs, then no more than 48 hours prior to ground-disturbing activities the area shall be surveyed by a Qualified Biologist. The results of the habitat feature assessment and survey shall be submitted to CDFW via EPIMS and email (see Contact Information) for written acceptance prior to starting Project activities. Burrows and refugia sites shall be flagged or otherwise marked for avoidance; Project activities shall avoid habitat features to the extent feasible. If California red-legged frogs are encountered during the assessment or Project activities, the Project shall not proceed or all work shall cease, and CDFW shall immediately be notified. Work shall not proceed until the frog, through its own volition, moves out of harm's way and CDFW has provided permission in writing to proceed with the Project. If California red-legged frog is encountered or the Qualified Biologist determines that impacts to the species are likely to occur, Permittee is presently consulting with the U.S. Fish and Wildlife Service (USFWS) regarding California red-legged frog protections; this measure may be changed with written approval from CDFW to comply with USFWS standards

Foothill Yellow-legged Frog Protection

2.24 Foothill Yellow-Legged Frog Survey Methodology. The Permittee or a Qualified Biologist acting on behalf of Permittee, shall provide a foothill yellow-legged frog survey methodology to CDFW for review and written approval no less than 30 days prior to beginning Project activities, unless CDFW approves otherwise in writing. No Project activities shall begin until foothill yellow-legged frog surveys have been completed using a method approved by CDFW. Survey methodology shall target all life stages and shall have an adaptive management approach based on the stream conditions at the time of surveys (i.e., whether ponded or flowing water is present, or whether the stream has been completely dry for less than 30 days). Surveys within and adjacent to the Project activity area shall include searching suitable habitat including but not limited to cavities under rocks, within vegetation such as sedges and other clumped vegetation, and under undercut banks, no less than 50 feet from the streambed and 500 feet upstream and downstream of the Project activity area. Surveys should be conducted at different times of day and under variable weather conditions if possible.

2.25 Foothill Yellow-Legged Frog Surveys for In-channel Activities. Prior to starting Project activities, a Qualified Biologist shall conduct surveys for foothill yellow-legged frog using a CDFW-approved methodology (see above Measure). If foothill yellow-legged frogs, their eggs, or any other special-status species, are found, CDFW shall be notified immediately and construction shall not occur without written approval from CDFW allowing the Project activities to proceed. If foothill yellow-legged frog egg masses are observed in a stream that is scheduled for dewatering, dewatering shall not occur until an egg mass relocation plan is approved in writing by CDFW and implemented. In the event adult foothill yellow-legged frogs are observed, a temporary wildlife exclusion fence shall be installed, if requested by CDFW, to prevent frogs and/or other special-status species from entering the work site. The results of the survey shall be submitted to CDFW via email (see Contact Information) for written acceptance prior to starting Project activities. If the Permittee has collected data that the stream has been completely dry for greater than 30 days prior to starting Project activities, and no water or moist areas within the streambed exist within 500 feet upstream and downstream of the Project, then Permittee may request CDFW written approval that surveys for foothill yellow-legged frogs are not necessary.

Western Pond Turtle Protection

2.26 Western Pond Turtle Surveys. No more than two weeks prior to the commencement of ground-disturbing activities, a Qualified Biologist shall perform surveys for western pond turtles within aquatic and upland habitat at the Project. Surveys will encompass individual turtles and nest sites. An additional survey shall occur no more than 48 hours prior to Project activities. If a pond turtle or nest site is detected at any time, CDFW shall be notified immediately. Survey results shall be submitted to CDFW prior to construction activities. All western pond turtles observed on-site shall be avoided and allowed to leave the Project activity area of their own volition or may be relocated with prior written approval from CDFW. Any turtle nest sites shall be avoided with an appropriate buffer identified by a Qualified Biologist and accepted in writing by CDFW.

California Black Rail Protection

2.27 California Black Rail Surveys. Prior to initiating construction activities in the spring, protocol surveys will be performed to determine if black rail or Ridgway's rail territories are present within 700 feet (213 meters) of the Project area.

2.27.1 California Black Rail Territory Buffer. If a territory is identified, a 165-foot (50 meters) non-disturbance buffer will be established around the territory, and no work shall occur south of the Fairfax Bolinas crossover road within the buffer until after August 31.

2.27.2 California Black Rail General Buffer. If no specific territories are identified, the Project will establish a general buffer of 85 feet (25 meters) from the edge of the high tide line. No work of any type shall occur within the buffer until after August 31, when nesting season has completed.

2.28 Construction Noise Limitations. Any work such as asphalt grinding, jackhammering, concrete sawing, or similar extreme noise-producing construction activities required to remove the Fairfax Bolinas crossover road shall not occur from March 1 – April 30, when black rails are most likely to call in association with the breeding season.

2.28.1 Location of Construction Activities. Standard construction activities, such as motorized equipment operation and staging of equipment or materials, vegetation removal, grading, or other general Project activities may occur on, or north of, the Fairfax Bolinas crossover road, from March 1 – April 30

2.28.2 Temporary Visual Barriers and Sound Attenuating Curtains. If extreme noise-producing activities are necessary during the period from March 1 – April 30, then temporary visual barriers and sound attenuating curtains will be used to decrease visual and auditory disturbances.

2.28.3 Timing of Work. Any general work activities along Fairfax Bolinas Road from March 1 – April 30 shall not begin until one hour after sunrise and shall cease no later than one hour before sunset, to avoid periods when rails are most likely to call.

2.29 Work During High Tide. Between November and January, no work shall occur within 85 feet (25 meters) of the high tide line from 45 minutes before, until 45 minutes after a high tide event measuring 6.0 feet or higher, to allow rails to use adjacent uplands as refugia during high tide events. Work outside of the 85-foot buffer will be allowed, weather permitting.

Nesting Bird Surveys, Prohibitions, and Buffers

2.30 Breeding Bird Nest Take Prohibition. Permittee shall avoid active nests occurring at or near the Project site. Permittee is responsible for complying with Fish and Game Code section 3503 et seq. and the Migratory Bird Treaty Act of 1918.

2.31 Nesting Bird Surveys. If construction, grading, vegetation removal, or other Project-related activities are scheduled during the nesting season, February 1 to August 31, a focused survey for active nests shall be conducted by a Qualified Biologist within 7 days prior to the beginning of Project-related activities. The results of the survey shall be sent to CDFW via EPIMS and by email prior to the start of Project activities, for review and acceptance (see Contact Information). If an active nest is found, Permittee shall consult with CDFW regarding appropriate action to comply with Fish and Game Code. If a lapse in Project-related work of 7 days or longer occurs, another focused survey and, if needed, consultation with CDFW, shall be required before Project work can be reinitiated.

2.32 Active Nest Buffers. If an active nest is found during surveys, Permittee or the Qualified Biologist shall consult with CDFW regarding appropriate action to comply with state and federal laws. Active nest sites shall be designated as “Ecologically Sensitive Areas” (ESA) and protected (while occupied) during Project work by demarking a “No Work Zone” around each nest site.

- Buffer distances for bird nests shall be site specific and an appropriate distance, as determined by a Qualified Biologist. The buffer distances shall be specified to protect the bird’s normal behavior to prevent nesting failure or abandonment. The buffer distance recommendation shall be developed after field investigations that evaluate the bird(s) apparent distress in the presence of people or equipment at various distances. Abnormal nesting behaviors which may cause reproductive harm include, but are not limited to, defensive flights/vocalizations directed towards Project personnel, standing up from a brooding position, and flying away from the nest. The Qualified Biologist and Biological Monitor shall have authority to order the cessation of all nearby Project activities if the nesting birds exhibit abnormal behavior which may cause reproductive failure (nest abandonment and loss of eggs and/or young) until an appropriate buffer is established.

- The Qualified Biologist shall monitor the behavior of the birds (adults and young, when present) at the nest site to ensure that they are not disturbed by project work. Nest monitoring shall continue during Project work until the young have fully fledged (have completely left the nest site and are no longer being fed by the parents), as determined by the Qualified Biologist. Any reduction in monitoring active nests must be approved in writing by CDFW.

2.33 Nesting Habitat Removal or Modification. No habitat removal or modification shall occur within the ESA-marked nest zone (see above measure) until the young have fully fledged and will no longer be adversely affected by the Project, as determined by a Qualified Biologist or Biological Monitor. Any trees or shrubs that are removed shall be “downed” in such a manner as to minimize disturbance to stable soil conditions.

Roosting Bat Protection

2.34 Bat Tree Habitat Assessment and Surveys. Prior to any tree removal, a Qualified Biologist shall conduct a habitat assessment for bats, unless otherwise approved in writing by CDFW. The habitat assessment shall be conducted a minimum of 30 to 90 days prior to tree removal and shall include a visual inspection of potential roosting features (e.g., cavities, crevices in wood and bark, exfoliating bark for colonial species, suitable canopy for foliage roosting species). If suitable habitat trees are found, they shall be flagged or otherwise clearly marked, CDFW shall be notified immediately, and tree trimming or removal shall not proceed without approval in writing from CDFW. Trees may be removed only if: a) presence of bats is presumed, or documented during the surveys described below, in trees with suitable habitat, and removal using the two-step removal process detailed below occurs only during seasonal periods of bat activity, from approximately September 1 through October 15, or b) after a Qualified Biologist, under prior written approval of the proposed survey methods by CDFW, conducts night emergence surveys or completes visual examination of roost features that establish absence of roosting bats. Two-step tree removal shall be conducted over two consecutive days, as follows: 1) the first day (in the afternoon), under the direct supervision and instruction by a Qualified Biologist with experience conducting two-step tree removal, limbs and branches shall be removed by a tree cutter using chainsaws only. Limbs with cavities, crevices, or deep bark fissures shall be avoided, and 2) the second day the entire tree shall be removed.

Vegetation Protection, Prevention, and Restoration

2.35 Habitat Protection. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete the Project. Vegetation outside the construction corridor shall not be removed or damaged without prior consultation and approval of a CDFW representative. Non-native, invasive vegetation may be removed outside of the Project Area

2.36 Vegetation Marked for Protection. Prior to Project activities, the Permittee shall clearly mark all vegetation within the Project area that shall be avoided during Project activities.

2.37 Riparian Tree Protection. No trees will be removed unless otherwise approved in this Agreement or in writing by CDFW. For each existing tree with a greater than four-inch diameter at breast height (DBH) within or adjacent to the work area, a critical root zone shall be established by the Qualified Biologist. The critical root zone shall extend from the trunk to the drip-line (i.e., the outer extent of the tree canopy) of each tree within the project area and shall be flagged or fenced off from work. Protection and avoidance of the critical root zone shall be emphasized during the on-site education program to avoid impacts. If work will be conducted within the root protection zone of a tree, then that tree shall be considered an "impacted tree" and the Permittee or Qualified Biologist shall monitor the tree for signs of mortality as a result of project. If the tree becomes injured or shows signs of mortality, additional revegetation actions shall be required.

2.38 Tree Drip Line. Construction materials, equipment storage, and parking areas shall be located outside the drip line of any preserved tree. Construction equipment shall not cause root compaction.

2.39 Tree Replacement. Any trees that were within the channel or riparian zone removed or impacted as a result of the Project shall be replaced according to the planting plans submitted to CDFW, titled *Planting Plans*, prepared by WRA environmental consultants and Mark Thomas, dated August, 2022 (Exhibit D).

2.40 Treat Exposed Areas. All exposed/disturbed areas and access points within the riparian zone left barren of vegetation as a result of the construction activities shall be restored by seeding with a blend of native erosion control grass seed. Seeded areas shall be mulched. Landscape fabric shall not be used. Revegetation shall be completed as soon as possible after construction activities in those areas cease. Seeding placed after October 15 must be covered with broadcast straw, jute netting, coconut fiber blanket or similar erosion control blanket.

2.41 Riparian Revegetation Monitoring Plan. Riparian revegetation will be completed as outlined in the submitted planting plans (Exhibit D). A riparian monitoring plan shall be submitted to CDFW for acceptance **within 60 days** of the Effective Date of the Agreement. Once submitted, the Riparian Monitoring Plan shall be attached to this Agreement as Exhibit E and incorporated herein by this reference. The plan shall be implemented the same year that impacts occur, unless otherwise approved by CDFW. The plan shall include specific performance criteria, as well as details on monitoring, adaptive management, and invasive species removal in order to allow for successful habitat creation and maintenance.

2.42 Revegetation Monitoring. To ensure a successful revegetation effort, all plantings shall be monitored and maintained as necessary for a minimum of five years. Each category of plantings (e.g., oaks, other trees, shrubs, etc.) shall have a minimum of 75% survival at the end of the minimum monitoring period and plantings shall attain 70% cover after 3 years and 75% cover after 5 years. Survival and cover criteria shall both be required unless the herbaceous or spreading plants cannot be differentiated by individual, in which case only cover success criteria are required. If the survival or cover requirements are not meeting these goals, the Permittee is responsible for replacement planting, additional watering, invasive exotic eradication, or any other practice, to achieve these requirements. Irrigation shall be done in the most water-efficient manner possible, such as using hand-watering, drip/micro-irrigation, or using a time-release system. Permittee shall monitor replacement plants with the same survival and growth requirements for five years after planting.

2.43 Revegetation Remediation. If revegetation survival and/or cover requirements do not meet established goals, Permittee is responsible for replacement planting, additional watering, weeding, invasive exotic eradication, or any other practice, to achieve these requirements. Replacement plants shall be monitored with the same survival and growth requirements for five years after planting.

2.44 Irrigation. When supplemental watering is used to establish and maintain plant growth in order to meet success criteria, irrigation shall be done in the most water efficient manner possible, such as using hand watering, drip/microirrigation or through the use of a time release system.

2.45 Phytophthora. Permittee shall ensure that all plantings come from local nurseries implementing best management practices to avoid and minimize the spread of *Phytophthora*.

2.46 Exotic Plants. Permittee shall not plant, seed or otherwise introduce invasive exotic plant species. Prohibited exotic plant species include those identified in the California Invasive Plant Council's database, which is accessible at: https://www.cal-ipc.org/plants/inventory/.

2.47 Control Invasive Species. Permittee is responsible for monitoring and if needed, eradication of invasive exotic species that may occur within the Project area for a minimum of two years following construction. All revegetation efforts shall include local plant materials native to the Project area.

2.48 Allowable Herbicide. If herbicide use is necessary, only herbicides registered with the California Department of Pesticide Regulation shall be used. All herbicides shall be applied in accordance with regulations set forth by the California Department of Pesticide Regulation and according to label instructions. Only herbicides approved for use in aquatic environments are permitted. Care shall be taken to avoid herbicide contact with native vegetation, and it shall only be applied on calm days (wind speed less than 5 miles per hour) to prevent airborne transfer of herbicide. No herbicides shall be used where threatened or endangered species occur, unless otherwise approved in writing by CDFW.

2.49 Disposal of Vegetation and Debris. All removed vegetation and debris shall be moved outside the ordinary high-water mark prior to inundation by water. All removed vegetation and debris shall be disposed of according to state and local laws and ordinances.

Culvert Design and Construction

2.50 Culvert Design. The culvert design shall be properly aligned within the channel and otherwise engineered, installed and maintained, to resist washout and erosion of the stream bed, stream banks and/or fill. The culvert design shall be:

- Adequately sized to convey the 100-year storm flow with a headwall to depth ratio that is able to sufficiently pass sediment loads.
- Designed to facilitate the transport of debris and sediment.

2.51 Culvert Backfill. Backfill material shall be free of tree limbs or other debris that could dent pipe or allow water to seep around pipe. The crossing backfill base and sidewall material shall be compacted before the pipe is placed in its bed. A minimum amount of fill material shall be used for the bed to reduce seepage into and along the fill.

2.52 Culverts Shall be Kept Open. Culverts shall be maintained and kept free flowing year-round for as long as they are in place. Substantial changes to the bed, channel, or bank necessary for maintenance may require separate notification under Fish and Game Code section 1602, subdivision (a).

2.53 Culvert Monitoring. Permittee shall monitor all replacement culverts for a minimum five-year monitoring period to ensure culverts are functioning as intended and are not creating debris jams or excessive erosion downstream of culverts. Permittee shall contact CDFW of any excessive stream erosion or debris jams observed within and around culverts to determine appropriate remediation measures. At the discretion of CDFW, implementation of measures to address excessive streambed and bank erosion may require an amendment to this Agreement.

Bridge Design and Construction

2.54 100% Basis of Design Report. The Permittee shall provide CDFW with a 100% Basis of Design Report, which must be accepted by CDFW in writing prior to beginning project construction. This Basis of Design Report shall include the 100% design plans and all supporting documentation.

2.55 Bottom of Bridges above 100-year Mark. The bottom of bridge superstructure shall be of sufficient height to allow unrestricted passage of water and debris during 100-year storms. As long as the bridge remains, the Permittee is responsible for maintaining free-flowing conditions under the bridge and clearing of all debris. Substantial changes to the bed, channel, or bank necessary for maintenance may require an amendment to this Agreement or separate notification under Fish and Game Code section 1602 subdivision (a).

2.56 Abutment Location. Abutments shall be located outside the stream banks and above ordinary high water.

Concrete and Cement-based Products

2.57 Cement Based Products. All cement-based products (concrete, mortar, etc.) poured or applied wet onsite shall be excluded from the wetted channel or areas where they may come into contact with water for a period of 30 days after application. During that time the product shall be kept moist and runoff from the product shall not be allowed to enter the stream. Commercial sealants may be applied to the product surface or mixture where difficulty in excluding flow for a long period may occur. If sealant is used, water shall be excluded from the site until the sealant is cured.

2.58 Concrete – Primary Containment. The Permittee shall install the necessary containment structures to control the placement of wet concrete and to prevent it from entering the channel outside of those structures. No concrete shall be poured within the high flow line if the 15-day weather forecast indicates any day with a greater than 20% chance of rain.

2.59 Concrete – Designated Monitor. At all times when the Permittee is pouring or working with wet concrete there shall be a designated monitor to inspect the containment structures and ensure that no concrete or other debris enters into the channel outside of those structures.

Rock Armoring

2.60 Rock Slope Protection - Limitations. Rock slope protection (i.e., RSP or riprap) shall not be used for armoring/protecting the bank if any of the following criteria apply:

- Rock slope protection could transfer erosive forces to the opposite bank or another area downstream;
- Rock slope protection would narrow or otherwise constrain the stream channel such that it limits passage of peak flows and debris; or
- Installation of the rock would require removal of woody vegetation and/or trees over 4” DBH, unless otherwise permitted in this Agreement.

2.61 Rock Slope Protection. Permittee shall install angular, energy dissipating rock slope protection that is properly sized to withstand washout during peak flows. Permittee shall use the least amount and smallest size rock necessary to stabilize the banks and withstand washout. Only clean material such as rock riprap that is free of trash, debris and deleterious material shall be used as bank stabilization. Asphalt shall not be considered an acceptable material.

2.62 Fill Voids in Rock Slope Protection. Permittee shall ensure that all voids and spaces within the riprap are filled with smaller rock, gravels, and native soil material, and/or willow cuttings. Cementitious grouts shall not be used.

2.63 Geotextile Linings. If non-biodegradable geotextile linings must be used to ensure the engineered stability of the rock slope protection, it shall be monitored for the life of the project to ensure that it is never exposed to the stream. If the geotextile fabric is exposed to the stream, CDFW shall be notified and an amendment to this Agreement or a new notification may be required, as determined by CDFW.

Erosion and Sediment Control

2.64 Erosion Control. At no time shall silt laden runoff be allowed to enter a river, stream, or lake or directed to where it may enter a river, stream, or lake. Erosion control measures shall be utilized throughout all phases of operation where sediment runoff from exposed slopes threatens to enter a river, stream, or lake. Erosion control measures, such as, silt fences, straw hay bales, gravel or rock lined ditches, water check bars, and broadcasted straw shall be used wherever sediment has the potential to leave the work site and enter the river, stream, or lake.

2.65 Monofilament. Permittee shall not use erosion control materials containing plastic monofilament netting (erosion control matting) or similar material containing netting within the project area due to documented evidence of amphibians and reptiles becoming entangled or trapped in such material. Acceptable substitutes include coconut coir matting or similar.

2.66 Excavation. No spoil from the excavation shall be placed on the bed or bank of the stream. Excavated spoil shall be removed to an area where the sediment will not deliver to a watercourse.

2.67 Groundwater Encountered. Nuisance groundwater encountered during excavation within the streambed or floodplain shall be discharged at a location where it will infiltrate into the soil, resulting in no overland flow. Turbid water shall not be allowed to flow downstream.

2.68 Erosion Control Monitoring. Permittee shall monitor erosion control measures during and after each storm event and repair and/or replace ineffective measures immediately.

2.69 Disposal and Removal of Materials. All removed spoils and construction debris shall be moved outside the work area prior to inundation by water. Spoil sites shall not be located within the stream channel or areas that may be subjected to stream flows, where spoil may be washed back into a stream, or where it may impact streambed habitat, aquatic or riparian vegetation. All removed material shall be disposed of according to state and local laws and ordinances.

Equipment and Vehicles

2.70 Operating Equipment and Vehicle Leaks. Any equipment or vehicles driven and/or operated adjacent to the stream shall be checked and maintained daily to prevent leaks of materials that could be deleterious to aquatic and terrestrial life or riparian habitat.

2.71 Stationary Equipment Leaks. Stationary equipment such as motors, pumps, generators, and welders, located within or adjacent to the stream shall be positioned over drip pans. Stationary heavy equipment shall have suitable containment to handle a catastrophic spill/leak.

2.72 Equipment Storage. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents, shall be located outside of the stream channel and banks.

2.73 Refueling of Equipment. Refueling of construction equipment and vehicles may not occur within 175 feet of any water body, or anywhere that spilled fuel could drain to a water body. Tarps or similar material shall be placed underneath the construction equipment and vehicles, when refueling, to capture incidental spillage of fuels. Equipment and vehicles operating in the project area shall be checked and maintained daily to prevent leaks of fuels, lubricants, or other liquids.

Material Handling, Debris, and Waste

2.74 Stockpiled Materials. Building materials and/or construction equipment shall not be stockpiled or stored where they may be washed into the water or cover aquatic or riparian vegetation. Stockpiles shall be covered when measurable rain is forecasted.

2.75 No Dumping. Permittee and all contractors, subcontractors, and employees shall not dump any litter or construction debris within the stream, or where it may pass into the stream.

2.76 Pick Up Debris. Permittee shall pick up all debris and waste daily.

2.77 Wash Water. Water containing mud, silt, or other pollutants from equipment washing or other activities, shall not be allowed to enter a lake or flowing stream or placed in locations that may be subjected to high storm flows.

Toxic and Hazardous Material

2.78 Toxic Materials. Any hazardous or toxic materials that could be deleterious to aquatic life that could be washed into the stream or its tributaries shall be contained in watertight containers or removed from the project site.

2.79 Hazardous and Deleterious Materials. Debris, soil, silt, bark, slash, sawdust, rubbish, creosote-treated wood, raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, wildlife, or riparian habitat resulting from the Project related activities shall be prevented from contaminating the soil and/or entering the Waters of the State.

Spills and Emergencies

2.80 Spill Kits. Prior to entering the work site, all field personnel shall know the location of spill kits and trained in their appropriate use.

2.81 Spill of Material Deleterious to Fish and Wildlife. In the event of a hazardous materials spill into a stream (e.g., concrete or bentonite), Permittee shall immediately notify the California Office of Emergency Services State Warning Center by calling 1-800-852-7550 and immediately provide written notification to CDFW by email at R3LSA@wildlife.ca.gov. Permittee shall take all reasonable measures to document the extent of the impacts and affected areas including photographic documentation of affected areas, injured fish and wildlife. If dead fish or wildlife are found in the affected area, Permittee shall collect carcasses and immediately deliver them to CDFW. Permittee shall meet with CDFW within ten days of the reported spill in order to develop a resolution including: site clean-up, site remediation and compensatory mitigation for the harm caused to fish, wildlife and the habitats on which they depend as a result of the spill. The Permittee shall be responsible for all spill clean-up, site remediation and compensatory mitigation costs. Spill of materials to waters of the state that are deleterious to fish and wildlife are in violation of Fish and Game Code section 5650 et seq. and are subject to civil penalties for each person responsible. CDFW reserves the right to refer the matter to the District Attorney's Office if a resolution cannot be agreed upon and achieved within a specified timeframe, generally six months from the date of the incident.

2.82 Spill Containment. All activities performed in or near a river, stream, or lake shall have absorbent materials designated for spill containment and cleanup activities on-site for use in an accidental spill. The Permittee shall immediately notify the California Emergency Management Agency at 1-800-852-7550 and immediately initiate the cleanup activities. CDFW shall be notified by the Permittee and consulted regarding clean-up procedures.

3. Reporting Measures

Permittee shall meet each reporting requirement described below.

3.1 Notification Prior to Work. Per Measure 1.6, Notify CDFW Prior to Work, **at least five days prior** to the start of Project activities, Permittee shall notify CDFW that work will commence.

3.2 Notification of Designated Representative. Per Measure 1.10, Designated Representative, **at least five days prior** to the start of Project activities, Permittee shall submit to CDFW the name, business address, and contact information of the Designated Representative.

3.3 Qualified Biologist Approval. Per Measure 2.7, CDFW-Approved Qualified Biologist(s) and Monitor(s), **no later than 30 days prior** to Project activities Permittee shall submit to CDFW, for review and approval, the qualifications for the biologist(s) that shall oversee the implementation of the conditions in this Agreement and conduct surveys or monitoring work.

3.4 Survey Reports. Survey results for nesting birds, California red-legged frog, Foothill yellow-legged frog, western pond turtle, roosting bats, and all other sensitive species identified in the above measures shall be submitted to CDFW for review and written acceptance prior to the start of work.

3.5 Riparian Revegetation and Monitoring Plan. Per Measure 2.44, Riparian Revegetation and Monitoring Plan, Permittee shall submit a riparian revegetation and monitoring plan to CDFW for written acceptance **within 60 days** of the Effective Date of the Agreement.

3.6 Monitoring Reports. Permittee shall submit to CDFW a status report by January 31 every year until restoration goals identified in Measure 2.44 [and culvert monitoring requirements identified in Measure 2.53] are accomplished. This report shall include the survival and percent cover of species planted and native species that have colonized the area. The number by species of plants replaced, an overview of the revegetation effort, and the method used to assess these parameters shall also be included. The report shall include photos from designated photo stations and other relevant information such as: a summary of invasive species control, methods used to remove non-native plants, and a list of wildlife observed on-site. After CDFW's review of the fifth-year monitoring report, if plantings have achieved the required success criteria, and culverts appear to be functioning as intended (i.e., no excessive erosion has been observed and no debris jams have been formed), CDFW shall email Permittee stating that the monitoring requirements have been satisfied. **Monitoring requirements will not be deemed complete until CDFW emails Permittee stating so**.

3.7 Photographic Documentation of Work and Project Completion Report. Prior to commencement of work a minimum of four (4) vantage points that offer representative views of the Project site and work areas shall be identified. The Permittee shall photograph the Project area from each of the vantage points, noting the direction and magnification of each photo. Upon completion of work, the Permittee shall photograph post-Project conditions from the vantage points using the same direction and magnification as pre-Project photos. A Project Completion Report shall be submitted to CDFW with the photos and a reference key describing the location of the photo, the direction of the view, and whether the photo is pre- or post-construction. **The Project Completion Report shall be submitted within 30 days of Project conclusion.**

3.8 Notification to the California Natural Diversity Database. If any listed, rare, or special status species are detected during Project surveys or on or around the Project site during Project activities, the Permittee shall submit CNDDB Field Survey Forms to CDFW in the manner described at the CNDDB website (https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data) **within 30 working days** of the sightings. Copies of such submittals shall also be submitted to the CDFW regional office as specified below.

3.9 As-Builts. A Record of Construction (As-Built Plans) shall be submitted to CDFW **within 60 days** of completion of the Project.

CONTACT INFORMATION

Any communication that Permittee or CDFW submits to the other shall be submitted through EPIMS as instructed by CDFW.

To Permittee:

Veronica Pearson
Marin County – Parks & Open Space District
EPIMS-MAN-36007-R3
Bolinas Lagoon Wye Wetlands Resiliency Project
3501 Civic Center Drive, Suite 260, San Rafael, CA 93903
vpearson@marincounty.org

To CDFW:

Department of Fish and Wildlife
Region 3: Bay Delta Region
EPIMS-MAN-36007-R3
Bolinas Lagoon Wye Wetlands Resiliency Project
R3LSA@wildlife.ca.gov; Michael.Stuhldreher@wildlife.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the Project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW’s endorsement of, or require Permittee to proceed with, the Project. The decision to proceed with the Project is Permittee’s alone.

SUSPENSION AND REVOCATION

CDFW may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with, or obtaining any other permits or authorizations that might be required under, other federal, state, or local laws or regulations before beginning the Project or an activity related to it. For example, if the Project causes take of a species listed as threatened or endangered under the Endangered Species Act (ESA), such take will be unlawful under the ESA absent a permit or other form of authorization from the U.S. Fish and Wildlife Service or National Marine Fisheries Service.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the Fish and Game Code including, but not limited to, Fish and Game Code sections 2050 *et seq*.

(threatened and endangered species), section 3503 (bird nests and eggs), section 3503.5 (birds of prey), section 5650 (water pollution), section 5652 (refuse disposal into water), section 5901 (fish passage), section 5937 (sufficient water for fish), and section 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and Permittee. To request an amendment, Permittee shall use the “Amendments & Extension” form in EPIMS to submit the request. Permittee shall include with the completed form, payment of the corresponding amendment fee identified in CDFW’s current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall use the “Amendments & Extension” form in EPIMS to submit the request. Permittee shall include with the completed form, payment of the minor amendment fee identified in CDFW’s current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with Fish and Game Code section 1605, subdivision (b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement’s term. To request an extension, Permittee shall use the “Amendments & Extension” form in EPIMS to submit the request. Permittee shall include with the completed form, payment of the extension fee identified in CDFW’s current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with Fish and Game Code section 1605, subdivisions (b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the Project the Agreement covers (Fish & G. Code § 1605, subd. (f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after Permittee's signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable Fish and Game Code section 711.4 filing fee listed at https://www.wildlife.ca.gov/Conservation/CEQA/Fees.

TERM

This Agreement shall expire on December 31, 2027, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as Fish and Game Code section 1605, subdivision (a)(2) requires.

EXHIBITS

The documents listed below are included as exhibits to the Agreement and incorporated herein by reference.

A. Exhibit A. *Figures 1-11*, prepared by WRA environmental consultants, dated December 2022.
B. Exhibit B. *Bolinas Lagoon Wye Wetlands Project 60% Design*, prepared by WRA environmental consultants, dated July 2022.
C. Exhibit C. *NMFS Section 7 Biological Assessment*, prepared by WRA environmental consultants, dated December 2022
D. Exhibit D. *Planting Plans*, prepared by WRA environmental consultants and Mark Thomas, dated August 2022
E. Exhibit E. [Reserved for future exhibit: Riparian Monitoring Plan]

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the Project described herein. If Permittee begins or completes a Project different from the Project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with Fish and Game Code section 1602.

CONCURRENCE

Through the electronic signature by the permittee or permittee's representative as evidenced by the attached concurrence from CDFW's Environmental Permit Information Management System (EPIMS), the permittee accepts and agrees to comply with all provisions contained herein.

The EPIMS concurrence page containing electronic signatures must be attached to this agreement to be valid.

Version 1 uploaded X.

CDFW CESA/2081 INCIDENTAL TAKE PERMIT

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
ECOSYSTEM CONSERVATION DIVISION
POST OFFICE BOX 944209
SACRAMENTO, CA 94244-2090

CALIFORNIA ENDANGERED SPECIES ACT
CONSISTENCY DETERMINATION NO. 2080R-2022-019-03

Project: Bolinas Lagoon Wye Wetland Resiliency Project

Location: Marin County

Applicant: Marin County Parks

Background

Marin County Parks (Applicant) proposes to return Lewis Gulch Creek to its former alluvial fan, re-align the intersection of Olema Bolinas Road and SR-1, and install a bridge crossing for Lewis Gulch Creek. The Bolinas Lagoon Wye Wetland Resiliency Project (Restoration Project) is located in Marin County, at coordinates 37.923722°, -122.698889°. The site is located at the northern end of Bolinas Lagoon.

Bolinas Lagoon and the watersheds of its north end tributaries (Lewis Gulch Creek, Wilkins Gulch Creek, Wharf Creek, and Salt Creek) have been altered by historical uses (logging, mining, and agricultural) and infrastructure changes. Both Lewis Gulch Creek and Wilkins Gulch Creek have been relocated from their original channels. While wetlands have slowly recovered, the remaining road infrastructure continues to impair Lewis Gulch Creek and the surrounding wetland habitats by restricting stream flows, floodplain connectivity, and habitat connectivity.

To restore Lewis Gulch Creek to its historical alignment on the alluvial fan, the creek will be redirected to the east side of Olema Bolinas Road, which will require re-aligning the intersection of Olema Bolinas Road at SR-1 and installing a bridge crossing for Lewis Gulch Creek. Fairfax Bolinas Road currently bisects the Wye wetlands and is a physical barrier to the movement of water and wildlife. The road will be removed, further allowing restoration of wetland habitats and allowing incremental landward migration of tidally influenced habitat types.

The Restoration Project will also install large woody debris and channel-facing rootwad structures to scour and maintain pool habitat, and the process-based design approach would allow space for pools and riffles to form from scour. The Restoration Project activities are expected to take[1] Central California Coast coho salmon (*Oncorhynchus kisutch*) (Covered Species) where those activities occur within Lewis Gulch Creek. In particular, the Covered

[1] Pursuant to Fish and Game Code section 86, "'Take' means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." See also *Environmental Protection Information Center v. California Department of Forestry and Fire Protection* (2008) 44 Cal.4th 459, 507 (for purposes of incidental take permitting under Fish and Game Code section 2081, subdivision (b), "'take'…means to catch, capture or kill").

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Species could be taken as a result of fish relocation efforts, dewatering of the stream, and the use of heavy equipment in the stream. The Covered Species is designated as an endangered species pursuant to the federal Endangered Species Act (ESA) (16 U.S.C. § 1531 et seq.) and an endangered species pursuant to the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.). (See Cal. Code Regs., tit. 14, § 670.5, subd. (a)(2)(N).)

Covered Species individuals are documented as present in Pine Gulch creek, a Bolinas Lagoon tributary within a half mile of the Restoration Project site, and there is suitable habitat for the Covered Species within and adjacent to the Restoration Project site. Because of the proximity of the nearest documented Covered Species, dispersal patterns of the Covered Species, and the presence of suitable habitat for the Covered Species within the Restoration Project site, the National Marine Fisheries Service (Service) determined that the Covered Species is reasonably certain to occur within the Restoration Project site and that Restoration Project activities are expected to result in take of the Covered Species.

According to the Service, with respect to the Covered Species, the Restoration Project will result in the temporary loss of 1.8 acres of aquatic habitat. Construction of the Restoration Project will also result in the permanent loss of 0.2 acres of aquatic habitat.

Because the Restoration Project is expected to result in take of a species designated as endangered under the ESA, the US Army Corps of Engineers (Corps) consulted with the Service as required by the ESA. On June 14, 2016, the Service issued a programmatic biological opinion, entitled Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation, Service file No. WCR-2015-3755, to the Corps for eligible restoration projects. On August 3, 2022, the Service issued an addendum to that programmatic biological opinion. The June 14, 2016, programmatic biological opinion and the August 3, 2022, addendum to that programmatic biological opinion are hereinafter referred to collectively as the “PBO.” The PBO describes eligible restoration projects and requires all project applicants operating under the PBO to comply with the terms of the PBO and its incidental take statement (ITS). The Applicant submitted a project-specific application for the Restoration Project dated September 21, 2022, to the Service, a copy of which is attached hereto and incorporated herein as Exhibit 1. The Service issued a project-specific approval to the Applicant for the Restoration Project on December 12, 2022, a copy of which is attached hereto and incorporated herein as Exhibit 2. The Service’s project-specific approval for the Restoration Project requires the Applicant to comply with the terms of the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, when carrying out the Restoration Project.

On December 27, 2022, the Director of the Department of Fish and Wildlife (CDFW) received a notice from the Applicant requesting a determination pursuant to Fish and Game Code section 2080.1 that the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, is consistent with CESA for purposes of the Restoration Project and the Covered Species. (Cal. Reg. Notice Register 2023, No. 2-Z, p. 19)

Determination

CDFW has determined that the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, is consistent with CESA as to the Restoration Project and the Covered Species because the measures contained in the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, meet the conditions set forth in Fish and Game Code section 2081, subdivisions (a) and (c), for authorizing take of CESA-listed species. Specifically, CDFW finds that: (1) take of the Covered Species will be for management purposes; (2) the measures required are roughly proportional in extent to any impact on the Covered Species that is caused by the Restoration Project; (3) the measures required maintain the Permittee's project purpose to the greatest extent possible; and (4) the Restoration Project will not jeopardize the continued existence of the Covered Species.

Avoidance, Minimization, and Mitigation Measures. The avoidance, minimization, and mitigation measures in the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, include, but are not limited to, the following:

1) In those specific cases where it is deemed necessary to dewater a work site that is located in aquatic habitat, the work area shall be isolated and all the flowing water upstream of the work site shall be temporarily diverted around the work site to maintain downstream flows during construction.

2) Fish will be excluded from reentering the work area by blocking the stream channel above and below the work area with fine-meshed net or screens. Mesh will be no greater than 1/8-inch diameter. The bottom of the seine must be completely secured to the channel bed to prevent fish from reentering the work area. Exclusion screening must be placed in areas of low water velocity to minimize fish impingement. Upstream and downstream screens must be checked daily (prior to, during, and after instream activities) and cleaned of debris to permit free flow of water. Block nets shall be placed and maintained throughout the construction period at the upper and lower extent of the areas where fish will be removed. Block net mesh shall be sized to ensure salmonids upstream or downstream does not enter the areas proposed for dewatering between passes with the electro-fisher or seine.

3) The Applicant shall coordinate project site dewatering with a qualified biologist to perform fish relocation activities. The qualified biologist(s) will possess all valid state and federal permits needed for fish relocation and will be familiar with the life history of the Covered Species.

4) Fish relocation and dewatering activities shall only occur between June 15 and October 31 of each year. If precipitation sufficient to produce runoff is forecast to occur while construction is underway, work will cease and erosion control measures will be put in place sufficient to prevent significant sediment runoff from occurring. Exceptions on the fish relocation/dewatering time period will be considered on a case-by-case

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basis only if justified and if precipitation sufficient to produce runoff is not forecast to occur during any of the above activities, and if approved by the Service and the Corps. If the channel is expected to be seasonally dry during this period, construction shall be scheduled so that fish relocation and dewatering are not necessary.

5) A qualified fisheries biologist shall perform all seining, electrofishing, and fish relocation activities. The qualified fisheries biologist shall capture and relocate salmonids and other native fish prior to construction of the water diversion structures (e.g., cofferdams). The qualified fisheries biologist shall note the number of salmonids observed in the affected area, the number of salmonids relocated, and the date and time of collection and relocation. The qualified fisheries biologist shall have a minimum of three years of field experience in the identification and capture of salmonids, including juvenile salmonids. The qualified biologist will adhere to the following requirements for capture and transport of salmonids:

    a. Determine the most efficient means for capturing fish.

    b. Conduct initial fish relocation efforts several days prior to the start of construction. This provides the fisheries biologist an opportunity to return to the work area and perform additional electrofishing passes immediately prior to construction if there is water in the isolated construction area.

    c. At project sites with high summer water temperatures, perform relocation activities during morning periods.

    d. Prior to capturing fish, determine the most appropriate release location(s).

    e. Periodically measure air and water temperatures and monitor captured fish. Temperatures will be measured at the head of riffle tail of pool interface. Cease activities if health of fish is compromised owing to high water temperatures, or if mortality exceeds three percent of captured salmonids.

6) All electrofishing will be conducted according to the Service's Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act (NMFS 2000).

7) The electro-fisher shall be used a minimum of three passes to ensure maximum capture probability of salmonids within the area proposed for dewatering.

8) Fish shall not be overcrowded into buckets, allowing no more than 150 young-of-year fish (approximately six cubic inches per young-of-year individuals) per 5 gallon bucket and fewer individuals per bucket for larger/older fish.

9) All captured salmonids shall be relocated, preferably upstream, of the proposed construction project and placed in suitable habitat. Captured fish shall be placed into a pool, preferably with a depth of greater than two feet with available instream cover.

10) If more than three percent of the salmonids captured are killed or injured, the project permittee shall contact the Service.

Monitoring and Reporting Measures. The monitoring and reporting measures in the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, include, but are not limited to, the following:

1) Following construction, the Applicant must submit a post-construction implementation report to the Service and the Corps. Implementation reports shall include Restoration Project as-built plans and photo documentation of project implementation taken before, during, and after construction. For fish relocation activities, the report shall include: all fisheries data collected by a qualified fisheries biologist, including the number of any salmonids killed or injured during the proposed action; the number and size (in millimeters) of any salmonids captured and removed; and any unforeseen effects of the proposed action on salmonids.

Although not a condition of the ITS, or the accompanying PBO, project-specific application, or project-specific approval, CDFW requests a copy of the post-construction implementation report as well. The report should include dates construction occurred and the success of revegetation and restoration.

Pursuant to Fish and Game Code section 2080.1, take authorization under CESA is not required for the Restoration Project for take of the Covered Species, provided the Applicant implements the Restoration Project as described in the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, including adherence to all measures contained therein, and complies with the measures and other conditions described in the ITS, along with the accompanying PBO, project-specific application, and project-specific approval. If there are any substantive changes to the Restoration Project, including changes to the measures, or if the Service amends or replaces the ITS, accompanying PBO, or project-specific approval, the Applicant shall be required to obtain a new consistency determination or a CESA take permit for the Restoration Project from CDFW. (See generally Fish & G. Code, §§ 2080.1, 2081, subds. (a) and (c)).

CDFW's determination that the ITS, along with the accompanying PBO, project-specific application, and project-specific approval, is consistent with CESA is limited to the Covered Species and the Restoration Project.

DocuSigned by:
By: Josh Grover
703E59B6047A482...
Date: 1/26/2023

Joshua Grover, Deputy Director
Ecosystem Conservation Division
California Department of Fish and Wildlife

Exhibits:

Exhibit 1 – Application Checklist for Inclusion in the NOAA RC Santa Rosa Office Programmatic Approach

Exhibit 2 – NOAA RC Email Approval of PBO Sec7 Coverage for Project and NOAA Application Checklist for Inclusion in the NOAA RC Santa Rosa Office Programmatic Approach

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NOAA

APPLICATION CHECKLIST FOR INCLUSION IN THE NOAA RC SANTA ROSA OFFICE PROGRAMMATIC APPROACH

INSTRUCTIONS

- Read through the Programmatic Approach to determine if the project fits under the described activities.
- Fill out an online application from the U.S. Army Corps of Engineers, if necessary.
- Fill out the application below.
- Sign and date the application.
- Attach a map of the project site, project site photos, a dewatering plan, completed designs and any other needed documents as necessary, then submit the completed form to the NOAA Restoration Center by e-mailing it to joe.pecharich@noaa.gov.

General Information

Applicant Name	Marin County Parks
Landowner Name	Marin County Open Space District, County of Marin, Caltrans (State of California)
Project Name	Bolinas Wye Wetlands Restoration Project
Project Location	Bolinas Wye, adjacent to intersection of Olema Bolinas Road/Fairfax Bolinas Rd/SR-1, Marin County

Project Start Date	06/01/23	Stream	Lewis Gulch Creek	Latitude	37.934722
Project End Date	05/30/26	Watershed	Bolinas Lagoon	Longitude	122.698889

Project Description

How does the project fit under the Programmatic Approach?

- ✔ This project is applying for / has received funding from the NOAA Restoration Center.
- ✔ This project is expected to require / has received a permit from the U.S. Army Corps of Engineers.

Which salmonid species are present at your project site?

- ✔ Central California Coast Coho Salmon
- ☐ Coastal California Chinook Salmon
- ✔ Central California Coast Steelhead Trout
- ☐ Northern California Steelhead Trout
- ☐ South-Central California Coast Steelhead Trout

What is the current problem addressed by this project? What is the context of this issue in the watershed?

In the early 19th century, logging, mining, agriculture and infrastructure changes altered the Bolinas Lagoon shoreline and watersheds of the north end tributaries (Lewis Gulch Creek, Wilkins Gulch Creek, Wharf Creek, and Salt Creek). Logging, mining, and ranching has now ceased in the region and the land is held in public ownership. Prior land management activities greatly increased the delivery to of sediment to the Lagoon and altered stream paths. Lewis Gulch Creek was relocated to the western hillside within a roadside ditch along Olema Bolinas Road, and Wilkins Gulch Creek relocated to the northeastern hillside. In that period, the wetlands have begun to recover, but the remaining road system continues to impair Lewis Gulch Creek and surrounding wetland habitats by restricting stream flows, floodplain connectivity, and

What solution are you proposing? What are the goals, objectives, and proposed benefits of your project?

The primary goal of the project is to restore hydrologic, geomorphic, and ecologic processes to support wetland habitats for wildlife and salmonids using a process based channel design approach. This requires restoring Lewis Gulch Creek to its historic alignment on the alluvial fan by redirecting it to the east side of Olema Bolinas Road (AECOM and Watershed Sciences 2016). Due to site constraints, moving the creek requires re-aligning the intersection of Olema Bolinas Road at SR-1 and installing a bridge crossing for Lewis Gulch Creek. Several creek crossing and road alternatives were analyzed before a final design was selected that maximized that amount of available floodplain habitat to allow for Lewis Gulch Creek to laterally migrate and self-form and the installation of large woody debris to create channel dynamism and in-stream

NOAA

APPLICATION CHECKLIST FOR INCLUSION IN THE NOAA RC SANTA ROSA OFFICE PROGRAMMATIC APPROACH

PROJECT INFORMATION (continued)

Please indicate the type(s) of techniques your project is likely to involve.
Check all that apply.

- [x] Instream Habitat Improvements
- [x] Instream Barrier Mod. for Fish Passage Improvements
- [x] Streambank and Riparian Habitat Restoration
- [ ] Upslope Watershed Restoration
- [ ] Removal of Small Dams
- [x] Creation of Off-/Side-channel Habitat Features
- [ ] Water Conservation Project
- [ ] Developing of Alt. Off-stream Water Supply
- [ ] Water Storage Tanks
- [ ] Installation of Water Measuring Device(s)
- [ ]
- [ ]

Will construction occur between Jun 15 - Oct 31?	Yes
Will riparian vegetation (>2 inches dbh) removal exceed 1.0 acre?	No
Will native trees >16 inches dbh and 20 feet high with cavities, trees with nests, or trees > 48 inches dbh be removed ?	Yes
Will dewatering and/or fish relocation be required?	Yes
Will mechanized equipment be working in the stream channel or within 25 feet of a wetted channel?	Yes

Does the project involve additional activities not described in the Program Activities sections (2.2-2.3) in the PA?
If so, please explain.

One of the main proposed project goals is to return Lewis Gulch Creek to its former alluvial fan on the east side of Olema Bolinas Road where it previously flowed (AECOM and Watershed Sciences 2016). Redirecting the creek would involve re-aligning the intersection of Olema Bolinas Road and SR-1 and installing a bridge crossing for Lewis Gulch Creek. The creek morphology design element works in conjunction with all the other project elements, and several alternatives were analyzed before a final design was selected.

The re-alignment of Olema Bolinas Road, the new intersection of Olema Bolinas Road and SR-1, elevation of Olema-Bolinas Road, and the proposed bridge creek crossing of the re-aligned Lewis Gulch Creek are the main civil engineering aspects of the proposed project. The road design requires improving the road conditions to meet current design specifications to improve circulation and safety, and providing the ability

Please describe the specific construction elements of your project, including dimensions, timing, equipment used, and any staging area / access roads needed.

Olema-Bolinas Road is the main access route in and out of Bolinas, and the roadwork in this proposed project would be planned to always provide through access. The proposed design is therefore being prepared to require construction over two construction seasons, generally between May 1 and October 31, although considerations for special status species may influence the work window dates.

The work schedule is projected to occur for two summer construction seasons (May through October) totaling approximately 12 months of construction (excluding replanting). The first season would include constructing the proposed Olema Bolinas roadway, the bridge, and the proposed channel underneath the bridge. The second season would conclude construction by removing the Fairfax Bolinas Road (Crossover Road) and constructing the remaining portion of the channel and restoration activities. Planting is expected

What minimization and avoidance measures are planned as a part of this project?

Conservation (avoidance and minimization) measures for the proposed project include numerous measures for potential impacts that are detailed in the CEQA IS/MND document and biological assessments prepared for submission to NMFS and USFWS. For this application, only measures specific to the NOAA RC's programmatic approach to fisheries habitat restoration projects, which are included in the proposed project, are listed below.

2.4 PROTECTION MEASURES
a. General Protection Measures for All Project Types:
1. Work shall not begin until a) the RC and/or Corps has notified the permittee that the requirements of the ESA and CWA have been satisfied and that the activity is authorized and b) all other necessary permits and

Please attach photos and a map of the project site.

Attach photos separately. Pre-project photos should be taken from the four cardinal directions and from established locations for comparison to post-project photos. Post-project photo documentation will be required of all approved projects.

Additional Information Required for Specific Project Activities

Upslope Restoration

- Will all stream crossing removals in fish bearing streams be more than 1500 feet (stream distance) apart, or removals in a non-fish-bearing more than 100 feet apart?........... Yes

Dewatering / Fish Relocation

- Will more than 1000 feet of stream need to be dewatered?........ No
- Please describe your planned methods for temporarily dewatering the stream, and how they will meet the Guidelines for Dewatering [Section 2.4.1.a.] in the Programmatic Approach.

The project's dewatering plan is adapted from the NMFS Santa Rosa Office 2016 programmatic biological opinion for aquatic habitat restoration projects. Temporary dewatering of the stream will be conducted in accordance with the NOAA RC Guidelines, Section 2.4.1 REQUIREMENTS FOR FISH RELOCATION AND DEWATERING ACTIVITIES, A. GUIDELINES FOR DEWATERING.

a. The work area will be isolated and all flowing water upstream of the work site temporarily diverted

- Will fish relocation likely be necessary?........ Yes
- If so, please describe your fish removal and relocation plan and how it will meet the *General Conditions for Fish Capture and Relocation Activities, Electrofishing Guidelines, Seining Guidelines*, and *Guidelines for Relocation of Salmonids* [Sections 2.4.1, b-e.] in the Programmatic Approach.

The project's fish removal and relocation plan will be planned and conducted in accordance with the NOAA RC's General Conditions for Fish Capture and Relocation Activities, Electrofishing Guidelines, Seining Guidelines, and Guidelines for Relocation of Salmonids [Sections 2.4.1, b-e] in the Programmatic Approach. The plan is adapted from the NMFS Santa Rosa Office 2016 programmatic biological opinion for aquatic habitat restoration projects.
Fish Capture and Relocation Plan

Off-Channel and/or Side-Channel Habitat

- Will the project involve a flashboard dam, a head gate, or other mechanical structure?....... No
- Will the resulting ponds be used as a point of water diversion?........ No
- Please attach descriptions of the following as separate files:
  - How the project will consider water supply, including channel / overland flow, and groundwater;
  - Water quantity and reliability, risk of channel change, and channel and hydraulic grade.
- Please explain how your project will meet the protection measures for off-channel /side-channel projects as identified in the Programmatic Approach (Sections 2.4 and 2.5).

The project will employ robust protection measures for Lewis Gulch Creek, fish within the creek, riparian habitat and other species within the project area. The construction work window is anticipated to be between June 15 and October 15, and may be shortened due to other species concerns. Detailed protection measures for species of special concern and the adjacent wetland areas will be created and followed during construction. Qualified biologists will provide Worker Environmental Awareness program (WEAP) training to all persons entering the site during construction, and will be on site during construction if required by

Barrier Modification for Fish Passage Improvement

- Does the proposed project meet NMFS and CDFW fish passage criteria?........ Yes
- Please explain.

A fish passage analysis was completed to assess the potential for the proposed Project to create suitable passage and habitat conditions for salmonids, attached to this application (Appendix C. Bolinas Fish Passage Analysis). As detailed in the analysis, the Proposed Project is designed to meet the Stream Simulation Design Criteria as presented in the California Salmonid Stream Passage Restoration Manual (Flosi, et al. 2010)) through inclusion of design features that mimic natural stream characteristics, including wood and boulder placement, and suitable water velocities and flows to facilitate successful fish passage.

- Please attach your project designs as a separate file.

ADDITIONAL INFORMATION REQUIRED FOR SPECIFIC PROJECT ACTIVITIES (continued)

Removal of Small Dams

- Does the proposed project meet NMFS & CDFW fish passage criteria? ....
- Please explain.

- Is the structure less than 25 feet in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, or from the lowest elevation of the outside limit of the barrier to the maximum possible water storage elevation? ....
- Was the structure designed to have an impounding capacity of less than 50 acre-feet? ....
- Will the project form a natural grade/shape upstream, naturally or with excavation? ....
- Is the project site located downstream of potential contamination sources such as current or historical lumber or paper mills, industrial sites, or intensive agricultural production? ....
- Is there risk of significant loss or degradation of downstream spawning or rearing areas from potential sediment deposition resulting from the project? ....
- Please explain how your project will meet the protection measures for small dam removal projects as identified in the Programmatic Approach (Section 2.4.6).

- Please attach your project designs as a separate file.

Water Conservation

- To aid us in verifying compliance with applicable water rights, please attach the following as separate files:
  - A copy of the small domestic use or livestock stockpond registration, appropriative water right, or a statement of riparian water use registered with the State Water Resources Control Board.
  - Any additional associated permitting that may have been required (e.g. Lake or Streambed Alteration Agreement, CA Environmental Quality [CEQA] analysis, etc.).
  - Diversion records (riparian and appropriative) both upstream and downstream of the project site.
  - The household / property water conservation plan (low flow shower heads, toilets, etc.).
  - A document detailing the estimated stream gradient and substrate, as well as what method(s) will be used to accurately measure the diversion rate.
- What are the proposed dates of diversion? .... From ____ to ____
- What is the proposed rate of diversion (in cfs)? ....
- What is the estimated water use / storage needed for this project (in gallons/year)? ....

ADDITIONAL INFORMATION REQUIRED FOR SPECIFIC PROJECT ACTIVITIES (continued)

Development of Off-stream Water Supply

- Please explain how your project will meet the general protection measures as identified in the Programmatic Approach (Section 2.4).

Installation of Water Measuring Devices

Please explain how your project will meet the general protection measures indentified in the Programmatic Approach (Section 2.4).

Construction/ Use of Water Storage Tanks

- Is the landowner / water rights holder willing to enter into a forbearance agreement for at least 10 years
- What are the proposed dates of forbearance? From to
- What is the estimated water need for the forbearance period (in gallons/year)?
- Please explain how your project will meet the protection measures for projects that construct or use water storage tanks, as identified in the Programmatic Approach (Sections 2.3.3.b and 2.4).

Signature

Erik Schmidt

Digitally signed by Erik Schmidt
Date: 2022.09.21 18:04:53 -07'00'

By signing below, the applicant agrees to implement the restoration project described here, contingent on obtaining all permits and funding. In addition, the applicant agrees to inform the Corps and the NOAA Restoration Center of any changes in a timely manner before implementing changes.

Erik Schmidt <schmidt@wra-ca.com>

FW: Completion of NMFS ESA Section 7 Formal Consultation for the Bolinas Wye Wetlands Restoration Project (2020-00306)

21 messages

Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov> Mon, Dec 12, 2022 at 12:31 PM
To: Erik Schmidt <schmidt@wra-ca.com>, "McHugh, Peter@Wildlife" <Peter.McHugh@wildlife.ca.gov>
Cc: David White - NOAA Federal <david.k.white@noaa.gov>

Erik and Pete,

Just wanted to make sure you both knew that I submitted our concurrence email to the Corps today. Erik, you are free to start working on CDFW's requirements for a CD for this project. Please cc me on the future correspondences so that I can learn what is required to help out future applicants. Pete, I will forward you their updated NOAA RC BO application.

Thanks,

Joe

From: Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov>
Sent: Monday, December 12, 2022 12:26 PM
To: Ohlhaver, Jayme A CIV USARMY CESPN (USA) <Jayme.A.Ohlhaver@usace.army.mil>
Cc: David White - NOAA Federal <david.k.white@noaa.gov>; Jodi Charrier - NOAA Federal <jodi.charrier@noaa.gov>; Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov>
Subject: Completion of NMFS ESA Section 7 Formal Consultation for the Bolinas Wye Wetlands Restoration Project (2020-00306)

Jayme,

The NOAA Restoration Center (RC) has reviewed Marin County's application documents to the NOAA RC's Santa Rosa Office Programmatic Approach (Program) and has determined that the Bolinas Wye Wetlands Restoration Project (2020-00306) fits within the scope of the Program. NOAA RC and the United States Army Corps of Engineers' (USACE) completed programmatic consultation with NMFS under section 7(a)(2) of the ESA for the NOAA RC's Program on June 14, 2016. Thus, no further ESA consultation with NMFS is required for this project at this time other than the submittal of the construction ready (90%) designs to the NOAA Restoration Center. If **ANY** modifications are made to the design or construction plans of this project, please contact me to ensure the project remains within the scope and criteria of NOAA RC's Program.

Please e-mail a copy of the 404 at your convenience when it is completed.

Thank you,

Joe

NMFS/NOAA SECTION 7 FORMAL CONSULTATION AND PROGRAMMATIC BIOLOGICAL OPINION (BO)

Erik Schmidt <schmidt@wra-ca.com>

FW: Completion of NMFS ESA Section 7 Formal Consultation for the Bolinas Wye Wetlands Restoration Project (2020-00306)

21 messages

Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov> Mon, Dec 12, 2022 at 12:31 PM
To: Erik Schmidt <schmidt@wra-ca.com>, "McHugh, Peter@Wildlife" <Peter.McHugh@wildlife.ca.gov>
Cc: David White - NOAA Federal <david.k.white@noaa.gov>

Erik and Pete,

Just wanted to make sure you both knew that I submitted our concurrence email to the Corps today. Erik, you are free to start working on CDFW's requirements for a CD for this project. Please cc me on the future correspondences so that I can learn what is required to help out future applicants. Pete, I will forward you their updated NOAA RC BO application.

Thanks,

Joe

From: Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov>
Sent: Monday, December 12, 2022 12:26 PM
To: Ohlhaver, Jayme A CIV USARMY CESPN (USA) <Jayme.A.Ohlhaver@usace.army.mil>
Cc: David White - NOAA Federal <david.k.white@noaa.gov>; Jodi Charrier - NOAA Federal <jodi.charrier@noaa.gov>; Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov>
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Please e-mail a copy of the 404 at your convenience when it is completed.

Thank you,

Joe

Joe Pecharich
Fish Biologist/Habitat Specialist
NOAA Restoration Center
777 Sonoma Ave., Suite 325
Santa Rosa, CA 95404-6515
(707) 575-6095 - office
(707) 583-3189 – cell

Erik Schmidt <schmidt@wra-ca.com> Mon, Dec 12, 2022 at 12:58 PM
To: Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov>
Cc: "McHugh, Peter@Wildlife" <Peter.McHugh@wildlife.ca.gov>, David White - NOAA Federal <david.k.white@noaa.gov>

Thank you, Joe and Dave, this is great news. I will share it with Marin County Parks & Open Space and our team at WRA. We are grateful for all your work on this programmatic consultation.

I plan to get started on applying for a CD for CESA take coverage with CDFW right away.

Erik

Erik Schmidt
Restoration Permitting Specialist

schmidt@wra-ca.com
Direct 415.524.7361 | Cell 707.548.6400

Make a positive lasting impression™

[Quoted text hidden]

Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov> Mon, Dec 12, 2022 at 1:00 PM
To: Erik Schmidt <schmidt@wra-ca.com>
Cc: "McHugh, Peter@Wildlife" <Peter.McHugh@wildlife.ca.gov>, David White - NOAA Federal <david.k.white@noaa.gov>

No problem Erik!

From: Erik Schmidt <schmidt@wra-ca.com>
Sent: Monday, December 12, 2022 12:58 PM
To: Joe Pecharich - NOAA Federal <joe.pecharich@noaa.gov>
Cc: McHugh, Peter@Wildlife <Peter.McHugh@wildlife.ca.gov>; David White - NOAA Federal <david.k.white@noaa.gov>
Subject: Re: FW: Completion of NMFS ESA Section 7 Formal Consultation for the Bolinas Wye Wetlands Restoration Project (2020-00306)

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I plan to get started on applying for a CD for CESA take coverage with CDFW right away.

Erik

CALIFORNIA COASTAL COMMISSION (CCC) CONSISTENCY DETERMINATION

STATE OF CALIFORNIA - NATURAL RESOURCES AGENCY GAVIN NEWSOM, *GOVERNOR*

CALIFORNIA COASTAL COMMISSION
ENERGY, OCEAN RESOURCES AND FEDERAL CONSISTENCY
455 MARKET STREET, SUITE 300
SAN FRANCISCO, CA 94105-2421
VOICE (415) 904-5200
FAX (415) 904-5400

F9a

Filed:	10/26/22
60th Day:	12/25/22
75th Day:	1/9/23
Staff:	A. Barrera-SF
Staff Report:	11/23/22
Hearing Date:	12/16/22

STAFF REPORT: REGULAR CALENDAR

Consistency Determination No.: CD-0006-22

Federal Agency: **National Oceanic and Atmospheric Administration Restoration Center**

Location: Northern and Central California (**Exhibit 1**)

Project Description: Ten-year continuation of the Community-based Restoration Program for habitat restoration and conservation projects supporting threatened and endangered salmonids and freshwater, marine and estuarine species and habitats.

Staff Recommendation: Concurrence

SUMMARY OF STAFF RECOMMENDATION

The National Oceanic and Atmospheric Administration Restoration Center (NOAA RC) has submitted a general consistency determination to renew its Community-based Restoration Program (CRP) for an additional 10 years. The purpose of this program is to simplify and streamline the permit process for landowners and non-profit organizations as they undertake habitat improvement projects in the coastal zone of northern and central California, primarily to benefit threatened and endangered salmonid species. NOAA RC proposes to continue implementing the CRP, which provides funding and technical assistance for habitat restoration projects in California, into the coastal zone areas of Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, Monterey and San Luis Obispo Counties.

NOAA RC's proposal is based on an existing model of coordinated, multi-agency, regulatory review that ensures the integrity of agency mandates, makes permitting of conservation projects more accessible to farmers, ranchers, rural landowners, and local non-profit restoration groups, and increases the number and quality of conservation projects and beneficial effects in a given area. The subject proposal by NOAA RC builds on the success of the previous general consistency determination (CD-021-13) and 26-year history of the CRP program in California to restore riparian habitat, tidal and freshwater wetlands, and submerged aquatic vegetation.

Implementation of NOAA RC's Community-based Restoration Program over the past ten years led to the completion of 29 individual restoration projects and restoration and enhancement of approximately 27 miles of native riparian habitat and 200 acres of native wetland and estuarine habitat. Through the CRP, a total of 27,284 cubic yards of sediment was prevented from entering important salmonid habitat and a total of 51.5 acre-feet of water storage was created to protect salmonid habitat from periods of low streamflow. This program, facilitated through the Commission's concurrence with NOAA RC's 2013 general consistency determination, represents one of the most successful and comprehensive examples of ongoing efforts to expedite and streamline native habitat and species restoration in coastal California.

Commission concurrence with this consistency determination would allow NOAA RC to provide funding, technical support, monitoring, and annual reporting for specific conservation projects selected and approved by NOAA RC for the enhancement of aquatic habitat and control of sedimentation without further formal review by the Coastal Commission. NOAA RC will notify the Commission's Executive Director annually of selected projects before their implementation, so that they can be reviewed for compliance with this consistency determination. Any activities that do not fall within the scope of the CRP and this consistency determination would be subject to the Commission's normal regulatory review processes.

NOAA RC proposes that the CRP be implemented in the coastal zone of the aforementioned counties for ten years beginning in 2023, with a full evaluation and summary report of the program's activities and progress provided to the Commission in 2033. NOAA RC will also prepare an annual report summarizing the results of projects implemented under the CRP during the most recent construction season within the coastal zone, and the results of post-construction implementation and effectiveness monitoring for that year and previous years. The annual report shall include a summary of the specific type and location of each project and the amount of habitat restored. NOAA RC anticipates that the majority of the projects implemented under this consistency determination will be salmonid habitat restoration projects and related upland restoration projects that improve stream cover, pool habitat and spawning gravel; remove or modify barriers to fish passage; ensure adequate streamflows; and reduce or eliminate ongoing erosion or sedimentation.

The proposed program includes protective measures to ensure that conservation projects will conform to the policies of the Coastal Act, enhance natural resources, improve coastal water quality, protect and enhance environmentally sensitive habitats, improve populations of threatened and endangered species, and help maintain the environmental viability of agricultural lands. The proposed program is consistent with the stream, wetlands, ESHA, water quality, agriculture, cultural, and visual resource policies of the Coastal Act (Sections 30230-33, 30240-44, and 30251). Therefore, the staff recommends that the Commission **concur** with consistency determination CD-0006-22. The motion to implement this recommendation can be found on Page 5 below.

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I. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

The National Oceanic and Atmospheric Administration Restoration Center (NOAA RC) has determined the project is consistent with the California Coastal Management Program.

II. MOTION AND RESOLUTION

Motion:

> *I move that the Commission **concur** with Consistency Determination No. CD-0006-22 on the grounds that the project described therein is fully consistent, and therefore consistent to the maximum extent practicable, with the enforceable policies of the California Coastal Management Program (CCMP).*

Staff Recommendation:

> Staff recommends a **YES** vote on the motion. Passage of this motion will result in a concurrence with the determination and adoption of the following resolution and findings. An affirmative vote of a majority of the Commissioners present is required to pass the motion.

Resolution:

> *The Commission hereby concurs with Consistency Determination No. CD-0006-22 on the grounds that the project described therein is fully consistent, and therefore consistent to the maximum extent practicable, with the enforceable policies of the CCMP.*

III. FINDINGS AND DECLARATIONS

A. PROJECT BACKGROUND AND PROCEDURES

The National Oceanic and Atmospheric Administration Restoration Center (NOAA RC) has submitted a general consistency determination to continue implementing its Community-based Restoration Program (CRP) for an additional 10 years. The purpose of this program is to simplify and streamline the review and authorization process for landowners and non-profit organizations as they undertake habitat improvement projects in the coastal zone of northern and central California, primarily to benefit threatened and endangered salmonid species. Another primary objective of the CRP is to promote community involvement and stewardship of local habitat restoration projects. NOAA RC proposes to continue implementing the CRP through this alternative regulatory process, which provides funding and technical assistance for habitat restoration projects in the coastal zone areas of Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, Monterey, and San Luis Obispo Counties **(Exhibit 1)**.

In 2013, the Commission concurred with general Consistency Determination No. CD-021-13 for the implementation of NOAA RC's CRP restoration projects for 10 years and a full evaluation and summary report of the program's activities and progress provided to the Commission in 2023. As detailed in this report, from 2013 to 2022, twenty-nine projects were approved under CD-021-13 throughout coastal Central and Northern California. NOAA RC's 2022 Annual Report summarizes each approved restoration project (**Appendix A**). Project types included fish passage improvements, instream and riparian habitat restoration, tidal wetland restoration, upland road sediment improvements, floodplain enhancement, and developing alternative water supply and off-channel storage for livestock. In total, approximately 200 acres and 27 miles of native habitat was restored through these 29 projects. Local project partners included Sonoma Resource Conservation District; Trout Unlimited; San Francisco Zen Center; Pacific Coast Fish, Wildlife and Wetlands Restoration Association; The Nature Conservancy; Northcoast Regional Land Trust; U.S. Fish and Wildlife Service; San Mateo Resource Conservation District; Resource Conservation District of Monterey County; California State Parks; City of Arcata; Marin Resource Conservation District; Gold Ridge Resource Conservation District; and the Yurok Tribe.

In its consistency determination for the current proposal, NOAA RC explains the purpose of the program and the need for an alternate and more efficient regulatory review process for restoration projects in the coastal zone:

> *The NOAA RC's CRP has funded and provided technical assistance for habitat restoration projects in California since 1996. From 1996-2013, 390 CRP projects were completed; of those, at least 13 occurred in the Coastal Zone. These projects were permitted under the Coastal Act through issuance of Coastal Development Permits by a certified Local Coastal Program (LCP) or the California Coastal Commission, or they received Commission concurrence with a Consistency Determination or Negative Determination made by the NOAA RC. Many more projects were never developed due to project proponent concerns with difficulties obtaining permits for work in the Coastal Zone. NOAA RC restoration partners in Del Norte, Humboldt, Sonoma, Santa Cruz and Monterey Counties had expressed a strong reluctance to initiate projects in the Coastal Zone for this reason.*
>
> *Since the issuance of federal Consistency Determination CD-021-13 in 2013, the NOAA RC approved 29 projects in the Coastal Zone. The number of applicants and restoration projects taken on in the Coastal Zone has increased over the last ten years.*
>
> *The NOAA RC seeks to continue to partner with the Commission to make the process of regulatory review and permitting of environmentally beneficial habitat restoration projects more efficient. Before issuance of CD-021-13, the process of obtaining regulatory approval for these projects was perceived by project applicants to be a significant barrier to implementing conservation work with limited grant funding. With the increase in federal and state funding combined with the NOAA RC's programmatic CD,*

project proponents now have a new outlook on restoration in the Coastal Zone and are taking on many more projects.

Programmatic permitting of CRP projects through the programmatic federal CD was intended to reduce costs and time for project applicants and help ensure that important restoration projects are implemented as planned. These projects benefit a range of coastal resources, including streams, floodplains, wetlands and estuaries, providing populations of threatened and endangered salmon and steelhead better conditions for spawning, rearing and migration. NOAA RC is willing to continue to take the lead role to ensure that proposed restoration projects meet the environmental and coastal protection standards of the Commission – thereby allowing NOAA RC staff to focus on design, construction and other aspects of the technical assistance they provide to applicants, furthering fisheries habitat restoration goals.

CRP projects can be funded, permitted and implemented throughout California's Coastal Zone (and elsewhere in the state), from the Oregon border to the Mexican border. This proposed renewal of CD-021-13 would cover the geographic jurisdiction of NMFS Santa Rosa and Arcata offices, namely San Luis Obispo County north to Del Norte County. CRP projects in Santa Barbara, Ventura, Los Angeles, Orange and San Diego Counties are covered under a separate federal programmatic CD.

NOAA RC is proposing to continue this alternative regulatory process for another 10 years to further accelerate the implementation of environmentally beneficial projects that meet the standards of the Coastal Act as well as the federal Endangered Species Act and other state fish and wildlife and water quality laws and regulations. This alternative process gives the Coastal Commission the opportunity to programmatically review the NOAA Restoration Center's clear, well-defined goals, processes, and procedures for consistency with the Coastal Act and the CCMP. Projects that are consistent with the terms of this review will be implemented with NOAA RC oversight, avoiding the need for LCP or Coastal Commission project-by-project review and accelerating the restoration of California's coastal resources.

In this consistency determination, the Commission is reviewing the continuation for an additional ten years of a general habitat restoration program and general types of projects rather than a specific project at a single location. NOAA-RC has made this consistency determination pursuant to the federal regulations implementing the Coastal Zone Management Act (CZMA), 15 CFR §930.36(c). These regulations provide that:

In cases where Federal agencies will be performing repeated activity other than a development project (e.g., ongoing maintenance, waste disposal) which cumulatively has an effect upon any coastal use or resource, the Federal agency may develop a general consistency determination, thereby avoiding the necessity of issuing separate consistency determinations for each incremental action controlled by the major activity. A Federal agency may provide a State agency with a general consistency determination only in situations where the incremental actions are repetitive and do not affect any coastal use or resource when

> *performed separately. A Federal agency and State agency may mutually agree on a general consistency determination for de minimis activities (see §930.33(a)(3)) or any other repetitive activity or category of activity(ies). If a Federal agency issues a general consistency determination, it shall thereafter periodically consult with the State agency to discuss the manner in which the incremental actions are being undertaken.*

NOAA RC staff is substantially involved with both funded and non-funded projects included in the CRP. NOAA RC staff may provide hands-on technical assistance; participate in feasibility studies, design plans, and construction oversight to ensure benefits are realized; support the development of appropriate monitoring protocols to ensure project performance can be evaluated; aid in tracking the progression of restoration projects through site visits and progress report evaluation; and be involved in public meetings and events to discuss or highlight restoration activities.

To help ensure successful projects, NOAA RC also assists applicants in obtaining the required federal and state permits and regulatory authorizations for their projects. NOAA RC and state and federal regulatory agencies have cooperatively developed permits and agreements to protect and restore sensitive habitats and resources; implementation of CRP projects is based on those agreements. Project applicants receiving funding or technical assistance from NOAA RC under the CRP considered in this consistency determination must comply with all other federal, state, and local regulatory requirements to ensure protection of sensitive resources during implementation of restoration projects. In addition to the Commission, regulatory agencies with jurisdiction over CRP projects include the following:

- U.S. Fish and Wildlife Service (USFWS)
- NOAA’s National Marine Fisheries Service (NMFS)
- U.S. Army Corps of Engineers (Corps)
- California Department of Fish and Wildlife (CDFW)
- State and Regional Water Quality Control Boards
- County planning, public works and other local agencies

Applicants for all projects funded by NOAA RC, or which receive NOAA RC technical assistance, must complete the Section 404/Section 10 permit process with the Corps Regulatory Division. In cooperation with the Corps, NOAA RC works with NMFS to apply programmatic consultations under Section 7 of the Endangered Species Act (ESA) for habitat restoration projects it funds or authorizes. NMFS’ programmatic biological opinions (BO) cover NOAA RC projects affecting anadromous salmonid habitat and EFH across the four NMFS offices with NOAA RC staff (Arcata, Santa Rosa, Long Beach and Sacramento). The BOs include detailed environmental protection measures, including project type prohibitions, and additional mandatory terms and conditions for all projects conducted under NOAA RC’s restoration program. NOAA RC and the Corps are also required to consult with the USFWS for all NOAA RC restoration projects. Currently, NOAA RC and the Corps must consult with USFWS on a project-by-project basis, however a statewide programmatic basis for habitat restoration projects is in the process of being finalized. Similarly, the State Water Board is in the process of developing a Statewide Restoration General Order to approve restoration projects that do not qualify for the General Water Quality Certification for Small Habitat Restoration Projects under the State Water Board's 2012 Order for Clean Water Act Section 401. NOAA RC projects must also receive either a Section 2080 Consistency Determination (under state statutory authority different from the federal Coastal Zone Management Act), a Section 2081 incidental take permit, a restoration permit from CDFW, or approval through the Habitat Restoration and Enhancement Act process for compliance with the California Endangered Species Act.

NOAA RC has established specific guidelines and procedures for the installation, maintenance, and monitoring of the projects included in this consistency determination. This helps ensure that project development activities, implemented with the assistance of the project partner such as a Resource Conservation District (RCD) (or another entity receiving funding or assistance from NOAA RC) and the landowner/operator, are consistent with NOAA RC and CRP objectives and comply with all applicable state and federal regulations, including the Coastal Act for projects located within the coastal zone. Habitat restoration projects funded or authorized through the CRP are designed and implemented consistent with techniques and minimization measures presented in CDFW's *Salmonid Stream Habitat Restoration Manual*, NMFS' West Coast Region Anadromous Salmonid Passage Design Manual, and other widely accepted manuals guiding habitat restoration and erosion control work in California. The program requires detailed avoidance and minimization measures for all projects to reduce the potential for ancillary effects to listed species and riparian and aquatic habitats. In addition, construction monitoring and post-project monitoring and reporting requirements follow standard procedures established by CDFW as part of its Fisheries Restoration Grant Program.

To address potential direct, indirect, and cumulative effects to sensitive species, habitats, and coastal water quality associated with the construction and installation of the proposed projects, the CRP includes a detailed set of environmental protection measures. These protective measures ensure that conservation projects will conform to the policies of the Coastal Act and protect environmentally sensitive habitats and the quality and biological productivity of coastal waters. NOAA RC proposes to provide the Commission with an annual status report for the program that will list participating landowners, describe each activity, its purpose and design, quantify the area affected and potential impacts to the coastal zone, and list conservation benefits.

Commission concurrence with this consistency determination would allow NOAA RC to provide funding, technical support, monitoring, and annual reporting for specific conservation projects selected and approved by NOAA RC for the enhancement of aquatic habitat and control of sedimentation within Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, Monterey and San Luis Obispo Counties, without further formal review by the Coastal Commission. NOAA RC has agreed to notify the Executive Director of the Coastal Commission of selected projects before their implementation, so that they may be reviewed for compliance with this consistency determination. Any activities that do not fall within the scope of the CRP and this consistency determination, or that the Executive Director determines to be potentially inconsistent with the California Coastal Management Program or that otherwise warrant individual review, will be subject to the Commission's normal regulatory review processes. Landowners working on projects not eligible for inclusion in the CRP or on projects determined by NOAA RC or the Executive Director to require individual coastal development permits or individual consistency determinations due to their complexity or potential adverse effects on coastal resources will be evaluated individually by the Commission or the appropriate local government through the coastal development permit or federal consistency process, as relevant.

Federal consistency review is therefore an appropriate way for the Commission to evaluate the Chapter 3 consistency of this federal program, which is not subject to coastal development permit (CDP) requirements. Commission concurrence with this federal consistency determination will supplant any coastal development permit requirements for activities covered under this federal program (i.e., for those restoration projects that meet the requirements of NOAA RC's Community-based Restoration Program), both within the CDP jurisdiction of the aforementioned coastal counties, as well as within the Commission's original jurisdiction. Normal CDP requirements will still apply for those restoration projects located within the coastal zone that are not specifically authorized by this consistency determination.

B. Project Description

NOAA RC reports in its consistency determination that its project types fall into three general categories: (1) salmonid habitat restoration; (2) estuarine restoration (marsh, submerged aquatic vegetation, and native shellfish (oysters)); and (3) coastal kelp and native shellfish (abalone) restoration. To qualify for the program restoration projects need to: (1) Contribute to the return of degraded or altered marine, estuarine, coastal, and freshwater, diadromous fish habitats to functioning habitats, or (2) include techniques that return target species to their historical habitats. NOAA RC additionally states that:

> *Most NOAA RC projects included in the program are salmonid habitat restoration projects such as riparian revegetation, large woody debris placement, fish passage barrier removal, invasive species removal, and off channel habitat creation. The NOAA RC also conducts a variety of estuarine habitat restoration projects designed to restore and enhance seagrass beds, mudflats, salt marsh, brackish marsh and other tidally influenced habitats. Off shore coastal habitats like kelp forests are also restored.*
>
> *Within the geographic scope of this Federal Consistency Determination, it is anticipated that the majority of the projects implemented as part of the CRP will be salmonid habitat restoration projects and related upland restoration projects that benefit aquatic habitat. They are intended to restore degraded salmonid habitat through improving stream cover, pool habitat and spawning gravel; reconnecting floodplains, removing or modifying barriers to fish passage; ensuring adequate flows; and reducing or eliminating ongoing erosion or sedimentation impacts.*
>
> *… salmonid habitat restoration projects authorized through the Program must be designed and implemented consistent with the techniques and minimization measures presented in CDFW's California Salmonid Stream Habitat Restoration Manual, NMFS's Guidelines for Salmonid Passage at Stream Crossings, and NMFS Fish Screening Criteria for Anadromous Salmonids, all of which contain specific guidance on effective*

implementation of habitat restoration practices and pre- and post-construction protection measures.

As noted above in Section A of this report, NOAA RC provides funding and technical assistance to conservation applicants proposing selected habitat restoration projects that meet the standards of the CRP. NOAA RC has identified a set of program activities or types of restoration work that it will approve and support under the CRP, as summarized in Table 1, below. Further detail on the restoration project types and design guidelines can also be found in NOAA RC's consistency determination.

Table 1. Habitat Restoration Activities

1. **Improvements to stream crossings and fish passage** Improvements to stream crossings and fish passage provide safe passage for migratory and non-migratory species, enhance beneficial transport of sediment and debris, and improve hydrology and hydraulics. Stream crossing, culvert, and bridge projects generally involve removing, replacing, modifying, retrofitting, installing or resetting existing culverts, fords, bridges and other stream crossings and water control structures of any size. This includes projects that are developed to upgrade undersized, deteriorated, or misaligned culverts.
2. Fish Screens This category includes the installation, operation, and maintenance of fish screens. Constructing/installing a fish screen usually includes site excavation, forming and pouring a concrete foundation and walls, and installation of the fish screen structure.
3. Removal of small dams, tide gates, levees, bank revetments, and other legacy structures These projects are designed to reconnect stream corridors, floodplains and estuaries, establish wetlands, improve aquatic organism passage, restore more natural channel and flow conditions, restore fisheries access to historic habitat for spawning and rearing, and improve long-term aquatic habitat quality and stream geomorphology. This project type may also include separation of streams from artificial impoundments (e.g., ponds or lakes) by realigning and/or rerouting channels around these artificial water bodies and/or through the use of vertical concrete or sheet-pile walls.
4. Riparian restoration and protection Riparian restoration and protection projects are intended to improve salmonid habitat through increased stream shading intended to lower stream temperatures, increased future recruitment of large woody debris to streams, and increase bank stability and invertebrate production. These projects will aid in the restoration of riparian habitat by increasing the number of plants and plant groupings, and will include the following types of projects: natural regeneration, livestock exclusion fencing and crossings, off channel stock watering, bioengineering, non-native invasive vegetation removal, and revegetation.
5. Restoration and enhancement of off-channel and side-channel habitat

This project type typically involves reconnecting side-channel, alcove, oxbow, pond, off-channel, floodplain, and other habitats, and potentially removing off-channel fill, berms and plugs. This activity category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events. The creation of new side-channel, alcove, oxbow, and pond habitats is included.
6. Floodplain restoration Floodplain restoration projects involve either 1) removing barriers (such as setback, breaching, and removal of levees, berms and dikes, 2) excavation of elevated surfaces to reconnect to the channel, or 3) or channel fill for hydraulic reconnection, and combinations of these approaches to create streams that are fully-connected with their floodplains. These projects generally involve reconnecting historical stream and river channels and freshwater deltas with floodplains, and reconnecting historical estuaries to tidal influence, through levee removal, setback and breaching, or construction of floodplain surfaces that connect at base flow. Typically, these projects take place where floodplains and estuaries have been disconnected from adjacent streams and rivers.
7. Establishment, restoration, and enhancement of tidal, subtidal, and freshwater wetlands This project type includes excavation, removal, and/or placement of fill materials to restore or approximate pre-disturbance site conditions; contouring wetlands to establish more natural topography, hydrology, and/or hydraulics; and setting back, modifying, or breaching existing dikes, berms and levees. This project type also creates ecotones (transitional zone between two habitat or community types [aquatic and upland interface]), "horizontal levees", and/or setback berms) and/or “living shorelines” that use fill and excavation with native vegetation (submerged and/or emergent), alone or in combination with offshore sills, to stabilize the shoreline.
8. Water conservation projects for enhancement of fish and wildlife habitat Creation, operation, and maintenance of water conservation projects, including off-stream storage tanks and ponds and associated off-channel infrastructure and rainwater harvest systems, reduce low-flow stream withdrawals and enhance stream flows, particularly base flows for fish and wildlife habitat during the dry season. These projects typically require placing infrastructure (e.g., pumps and piping, fish screens and head gates) in or adjacent to the stream to provide alternative water intake facilities. Other projects in this category include piping ditches to create a more efficient use of water where the water saved will be dedicated to fish and wildlife under State Water Code Section 1707 or forbearance agreements. These projects are designed to improve streamflow and riparian habitat for fish and wildlife.
9. Removal of pilings and other in-water structures

Untreated and chemically treated wood pilings, piers, vessels, boat docks, derelict seawalls (within embayments), and derelict fishing gear, and similar structures built using plastic, concrete and other materials may be removed and/or replaced to improve water quality and habitat for fish and wildlife. These projects are designed to remove contaminant sources and hazards from stream, river, and estuary habitats. These projects are intended to cover only the removal of debris or structures and not the replacement of any structures or pilings. The removal of any pilings in estuarine waters under this Program requires compliance with the California Eelgrass Mitigation Policy (CEMP), to ensure that eelgrass resources are not affected by the project.
10. Instream Restoration Instream habitat structures and improvements provide predator escape and resting cover, increase spawning habitat, improve migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. These projects may include placing large woody material or boulders; constructing engineered logjams; installing small wood structures or beaver dam analogues; beaver habitat restoration; augmenting and placing gravel; stream channel reconstruction; removing revetment and other streambank armoring materials; improving stream morphology and channel dynamics; restoring sediment input and retention balance; and improving water quality.
11. Upslope Watershed Restoration Sites in upslope and riparian watershed areas may be restored to reduce delivery of sediment to streams, promote natural hydrologic processes, restore wildlife habitat, and improve water quality. This project type includes road- and trail-related restoration, including decommissioning, upgrading, and storm-proofing. Implementation of these types of projects may require the use of heavy equipment (e.g., excavators, bulldozers, dump trucks, front-end loaders).
12. Kelp Forest Restoration Transplanting lab grown kelp or drifting kelp into the marine environment to restore structural and functional attributes of kelp forests. In some projects, sea urchins are removed from planted or already established areas to increase survival and growth of the kelp forest.

As described in NOAA RC's 2022 Annual Report, the most common project type in the CRP over the last 10 years was instream habitat restoration (12 projects), followed by improvements to stream crossings and fish passage (6 projects), and upslope watershed restoration (6 projects). Other project types that were implemented as part of the CRP include riparian restoration and protection (5 projects); water conservation projects for enhancement of fish and wildlife habitat (4 projects); restoration and enhancement of off-channel and side-channel habitat (4 projects); floodplain restoration (3 projects); and establishment, restoration, and enhancement of tidal, subtidal, and freshwater wetlands (2 projects). The following project types were not implemented: kelp forest restoration; fish screens; and removal of small dams, tide gates, levees, bank revetments, and other legacy structures. NOAA RC expects that these project types would receive funding and/or assistance in the next 10 years and thus are included in the proposed consistency determination. NOAA RC also expects to receive an increase in projects that may qualify under the CRP over the next 10 years and is currently in the process of consulting with project partners on future potential CRP projects.

One project type that was not included in the initial CRP was the removal of pilings and other in-water structures from stream, river, and estuary habitats. Wood pilings, both chemically treated and untreated, and other derelict in-water structures can adversely affect water quality and sensitive habitats. Chemicals from the pilings can leach into the sediments and water column, causing harm to native fish species and high mortality rates in fish eggs. Derelict in-water structures also pose hazards to species and habitats and obstruct natural habitats. Careful removal of these hazardous structures is needed in many areas that the CRP covers. Due to the need to restore these types of degraded areas to functioning habitats, NOAA RC expects to provide funding and assistance for the removal of pilings and in-water structures as part of the CRP over the next 10 years.

Environmental Protection Measures

The overall effect of this program's implementation will be to restore native riparian, marine and estuarine habitat and reduce erosion and sedimentation, and thereby improve water quality, the health of natural resources, and agricultural sustainability. NOAA RC acknowledges that any activity taking place in or near sensitive resources requires the use of careful methods. In order to minimize or avoid potential adverse impacts on coastal zone resources, the project has established conditions (e.g. timing, location, etc.) for the design and construction of restoration projects. Only a limited set of activities proposed by project applicants will be considered for inclusion in the CRP. Each approved project shall implement a set of general environmental protection measures and conditions, as well as monitoring requirements, as outlined in **Table 2**, below. In addition, several of the eligible activities require further environmental protection measures and conditions. Finally, each eligible project must comply with all additional requirements specified in federal, state, and local permits and authorizations.

A full description of protection measures can be found in the NOAA RC Programmatic Biological Opinion for the Arcata field office (Appendix A), NOAA Programmatic NEPA Documents, the CDFW Salmonid Restoration Manual, and NMFS Screening and Fish Passage Criteria.

Table 2. General Requirements and Protections Measures

General Protection Measures a) Engineering review required for complex projects b) All other permits must be obtained before the project may commence c) Contractors must be briefed in advance by qualified biologist on all protection measures d) Impact evaluation criteria must be followed: first avoidance, then minimization, and mitigation e) Detailed success criteria required for revegetation projects f) Prohibited activities include, but are not limited to gabions, treated wood, migration obstruction, projects with toxic sediments g) NOAA retains right of reasonable access to property to monitor effectiveness of project h) Monitoring and reporting required (see section below) i) BOs also specify: a. Specific protection measures for species, water quality, and several other resources areas b. Maximum stream dewatering length: 1000' at a time c. Consistency w/ CDFW Salmonid Stream Habitat Restoration Manual, CDFW Culvert Criteria for Fish Passage, CDFW/NOAA Fish Screening Criteria for Salmonids, Handbook for Forest and Ranch Roads (Weaver and Hagans) d. Construction work windows, typically limited to June 15-November 1 with planting allowed beyond November 1
Water Quality Measures a) Detailed water quality protection and erosion control requirements during and following construction b) Dewatering for in-channel work, with specific rules for how dewatering shall occur c) Specific avoidance of impacts from poured concrete d) Specific requirements for access road maintenance and road decommissioning e) Temporary erosion controls will be in place before any significant alteration of the action site and will be monitored during construction to ensure proper function. Turbidity curtains, hay bales, and erosion mats shall be used where appropriate. f) Confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action. g) Cease work under high flows or seasonal conditions that threaten to disturb turbidity reduction measures, except for efforts to avoid or minimize resource damage. h) *General On-site Pollution Controls*: a. Properly confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout,

washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site. b. All vehicles and other heavy equipment will (a) be stored, fueled, and maintained in a vehicle staging area set back from any natural waterbody or wetland; (b) inspected daily for fluid leaks before leaving the vehicle staging area. c. Generators, cranes, and any other stationary equipment operated within 150 feet of any natural water body or wetland will be maintained as necessary to prevent leaks and spills from entering the water. d. Use procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. e. When local conditions indicate the presence of contaminated sediments is likely, soil samples will be tested for contaminant levels and precautions will be taken to avoid disturbance of or provide for proper disposal of contaminated sediments
<u>Listed Species and Sensitive Habitat Protection</u> a) Work windows for all listed species b) Detailed fish capture and relocation and dewatering requirements; qualified biologist required; reporting all encounters with listed species. c) Water quality, water quantity, sensitive habitat protection, and other general measures also serve to protect species. d) Flagging required around sensitive areas and buffers e) Specific measures to minimize impacts to riparian vegetation f) Tree size removal limits g) Construction access point must minimize vegetation and soil disturbance and compaction h) Invasive Species Removal a. *Herbicide Application Controls* - Use of herbicides in project areas will be conducted according to established protocols for the locality, as determined by a state-licensed herbicide applicator. Such protocols will include information and guidelines for appropriate use, timing, amounts, application methods, and safety procedures relevant to the herbicide application. Chemicals used should be appropriate for the location. **i)** Wetlands - Wetlands projects follow standard protection measures listed through this table including, but not limited to, flagging sensitive areas, on-site erosion controls, on-site pollution prevention controls, methods to reduce soil compaction, seasonal work periods, adequate training of volunteers, and planting and installing vegetation standards.
<u>Visual Resources and Public Access</u> a) Not likely to be visual impacts because most projects are on private lands, and result in a net benefit to visual impacts by restoring degraded habitat and vegetation.

b) Project applications are also evaluated and ranked based on their level of public and landowner support. c) All other permits/approvals must be acquired before project commences. NOAA's mission supports public access and recreation as long as it does not negatively impact listed species. d) Public access not likely impacted because many projects are on private lands. Projects on public lands often include partners with shared mission of maintaining public access for educational and/or recreation purposes (USFWS).
Monitoring, Success Criteria, and Reporting a) Pre- and post-construction monitoring plan required of all projects; monitoring protocol typically follows CDFW FRGP b) Development of success criteria c) BOs require photo-monitoring d) Annual report required and prepared by NOAA RC e) Pre-construction reporting for qualifying projects in the Coastal Zone provided to Coastal Commission by May 15; qualifying projects in the Coastal Zone funded later in the year will be reported to Coastal Commission on a project-by-project basis

NOAA RC further states in its consistency determination that:

> *The NOAA RC and USACE have established general requirements and environmental protection measures that must be implemented for projects to be included in the Program. For example, a key component of the NOAA RC's Programmatic Biological Opinions involves the use of "sideboards" that establish a minimum distance between instream projects and limit the number of instream projects annually within a watershed, relative to the size of the watershed. NOAA Biological Opinions also contain specific requirements for dewatering, riparian restoration, species protection, and more, as well as general project review procedures conducted by NOAA RC Staff.*
>
> *As part of NOAA RC's general review process, NOAA RC staff will evaluate individual projects and assess whether they can be covered under existing NOAA RC programmatic BOs, applicable BOs for existing restoration programs that fall within the scope of activities covered by the CRP (e.g., existing Partners in Restoration permit coordination programs with pre-existing BOs), or whether a project should be reviewed through an individual Section 7 consultation because the project is outside the program or geographic scope of an existing BO and warrants separate analysis. NOAA RC staff will also screen applications for applicability to this Federal Consistency Determination, applying criteria from the "General Exclusions" and "Qualifying Projects" sections of this report. All projects will be subject to applicable general project requirements, as well as project specific conditions that NOAA RC and NMFS deem necessary in order to protect coastal resources.*

Table 1 in NOAA RC's consistency determination summarizes the agency's review process, general requirements, and protection measures for coastal resources (**Exhibit 2**).

NOAA RC will provide the Executive Director with early notification and project information about qualifying projects to be covered by NOAA RC's programmatic Consistency Determination on a project-by-project basis. Project information will include the title of the project, project applicant and partners, project location and habitat benefit. The Executive Director would review these projects and coordinate with NOAA RC staff to address any potential concerns, including through removal of individual projects from the program so that they may be individually reviewed and brought to the Commission for consideration.

Further, NOAA RC will also prepare an annual report summarizing the results of projects implemented under the CRP during the most recent construction season within the coastal zone, and results of post-construction implementation and effectiveness monitoring for that year and previous years. The annual report shall include a summary of the specific type and location of each project and the amount of habitat restored.

General Exclusions

NOAA RC and the Executive Director would review every potential project prior to inclusion in the proposed CRP. To be included in the program, projects must meet NOAA RC's goals to protect, restore, and manage use of coastal and ocean resources through ecosystem-based management. Projects that do not meet those goals, are beyond the scope of this proposed program, or are potentially controversial would be excluded from consideration. In addition, the Executive Director may also determine that projects are not consistent with the California Coastal Management Program or the California Coastal Act and would not qualify for this program. In its consistency determination, NOAA RC describes the types of projects that would be excluded from the proposed program:

> *All projects included under the Program must involve on-the-ground habitat restoration resulting in physical habitat modifications and beneficial ecological impacts for federal trust species. The following projects will be excluded from this action due to their scope, complexity, or potentially controversial nature and individual project review from the Coastal Commission or the approved Local Coastal Program will be sought:*
>
> *• Projects the NOAA RC determines to be inconsistent with NOAA RC goals or standards, the CDFW Manual, or other applicable restoration practices and guidelines.*
> *• Projects determined to be inconsistent with Section 7 of the Endangered Species Act.*
> *• Projects the Executive Director of the Coastal Commission determines to be potentially inconsistent with the California Coastal Management Program or that otherwise warrant individual review.*

C. Streams/Wetlands/ESHA/Water Quality

Section 30230 of the Coastal Act states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Section 30233 states in part:

> *The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> *(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.*
> *(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.*
> *(3) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.*
> *(4) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.*
> *(5) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.*
> *(6) Restoration purposes.*
> *(7) Nature study, aquaculture, or similar resource-dependent activities.*

Section 30240 states:

> *(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
>
> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

The purpose of NOAA RC's CRP is to provide funding and technical assistance for high quality, necessary, and beneficial habitat restoration and erosion control projects on private and public lands in coastal California. This program would result in substantial benefits to habitat for anadromous fish and other aquatic species, water quality, coastal wetlands and the estuarine and marine environments. However, whenever work of this kind takes place, the potential exists for long- and short-term disturbance or degradation of the environment due to incidental effects. The projects and activities approved for funding and/or technical assistance by NOAA RC are expressly designed to avoid long-term disturbance or degradation altogether, minimize any short-term adverse impacts, protect and enhance sensitive habitat, improve water quality in coastal watersheds, and restore coastal resources to a more naturally functioning state.

In order to participate in the CRP, projects must clearly meet the program's goals and standards. CRP activities that will increase the health of wetlands, streams, and other environmentally sensitive habitats as part of a project include, but are not limited to:

- Instream Habitat Structures and Improvements
- Bioengineering and Riparian Habitat Restoration
- Upslope Watershed Restoration
- Creation of Off-channel/Side-channel Habitat
- Invasive Species Control

Due to the adverse effects of past and present development, hydromodification, pollution, and invasive species, there has been a drastic loss of functional riparian and wetland habitat available for plant and animal species, including threatened and endangered species. The need for conservation efforts in riparian and wetland habitats of the coastal zone is high.

Within the proposed CRP program area that would be covered under this general consistency determination, there are hundreds of impaired waterways declared under the Clean Water Act section 303(d) and listed in California's 2018 and 2020-2022 Integrated Reports. Many of the impairments or "pollutant categories" for these waterways – including water temperature, sediment, nutrients, pathogens, other organics, pesticides and hydromodification – affect habitat for fish and other aquatic species and water quality. Unstable geology, erodible soils and high seasonal precipitation cause erosion and sedimentation in these waterways. Sedimentation reduces water quality and impairs spawning and rearing of salmonids, including the protected coho salmon and steelhead present in many of these waterways. Roads constructed along canyon floors and steep inner gorges cause channel realignment resulting in direct delivery of sediment to waterways. Excess sediment alters the natural hydrology of coastal wetlands, and affects recruitment of native wetlands vegetation and aquatic life. The lack of riparian vegetation leads directly to high stream temperatures and runoff from agricultural fields and other land uses into waterways. Stream modifications from decades of flood control efforts, channelization and small dams have altered natural fluvial regimes and degraded stream habitat. At river and stream mouths, sediment and other pollutants as well as constructed fill have degraded and destroyed estuarine resources, including oyster and other native shellfish populations and submerged aquatic vegetation. These resource impairments can be addressed by CRP projects and activities, which are designed to reduce and eliminate anthropogenic sources of sediment, and benefit riparian, wetlands, estuarine and uplands habitat, and improve water quality.

To protect environmentally sensitive habitats, NOAA RC ensures that, in time and manner of implementation, all funded and authorized CRP projects meet the program's goals and standards, comply with its environmental protection measures, and comply with all conditions required by programmatic and project permits and authorizations from the Corps, NMFS, USFWS, CDFW, State and Regional Water Boards and the Commission. The consistency determination includes a detailed description of the environmental commitments that will be attached to each eligible project in the CRP. These measures, used to the maximum extent possible, will minimize impacts to sensitive species and habitats, and include, but are not limited to, the following:

- Limit construction temporally in order to avoid spawning, rearing and migration periods of anadromous fish, and the nesting or breeding seasons of birds and terrestrial animals
- Limit construction temporally in order to reduce erosion during rainy periods;
- Optimize planting of seedlings by planting close to or during the rainy season;
- Limit the size and grade of disturbance to existing grades;
- Restrict the number and size of access routes, staging areas and total work site area to the minimum necessary;
- Restrict habitat improvements to techniques that are in accordance with the "California Salmonid Stream Habitat Restoration Manual"
- Use native plants in revegetation efforts, and use native plants of local genetic stock where feasible.

The CRP's environmental protection measures, and all conditions required by NOAA RC's Arcata and Santa Rosa Biological Opinions and other federal and state regulatory permits and approvals, will ensure that the short-term impacts that could result from implementation of CRP projects will not have significant adverse effects on riparian areas, wetlands, the marine environment, and water quality. The proposed restoration activities are allowable uses under Sections 30233 and 30240 of the Coastal Act. The long-term benefits of the CRP in the coastal zone will enhance riparian vegetation and bank stability, provide additional habitat areas for foraging, breeding, and shelter, and improve water quality and aquatic habitats by decreasing sediment and other pollutants flowing to coastal waters. In addition, as described in the General Exclusions section of NOAA RC's consistency determination, the Executive Director would have the ability to review all projects proposed by NOAA RC for inclusion in the program and exclude those with the potential to result in adverse impacts to coastal resources. This would allow those projects to be individually reviewed and considered by the Commission outside of the program so that any project modifications or protective measures the Commission deems appropriate for the protection of wetlands, water quality, marine resources and ESHA could be developed and required. With this precautionary measure in place and the expected restoration benefits provided by the projects and program, the Commission therefore finds that the project is consistent with Sections 30230, 30231, 30233, and 30240 of the Coastal Act.

D. AGRICULTURE

Section 30241 of the Coastal Act states in part:

> *The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy. . . .*

Section 30242 states:

> *All other lands suitable for agricultural uses shall not be converted to nonagricultural uses unless (1) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land or concentrate development consistent with Section 30250. Any such permitted conversion shall be compatible with continued agricultural use on surrounding lands.*

Section 30243 states:

> *The long-term productivity of soils and timberlands shall be protected, and conversions of coastal commercial timberlands in units of commercial size to other uses or their division into units of noncommercial size shall be limited to providing for necessary timber processing and related facilities.*

One goal of the proposed CRP is to enhance agricultural lands through conservation efforts that will enhance soil and water resources. Consistent with Coastal Act agricultural policies, proposed implementation of the CRP in the coastal zone will help maintain the long-term viability or farming, ranching, and grazing in the coastal zone by reducing the loss of valuable top soil subject to erosion, improving dependable water supplies for livestock, and increasing the function and health of waterways passing through agricultural properties. By improving the compatibility between agricultural land uses and the protection of sensitive habitat areas and waterways, the project will assist in preserving the long-term viability of both agricultural and natural resources. Most of the conservation practices approved for this program act as part of the farming or ranching operation even if the specific project location can no longer be used for economic production. The practices to be implemented in this project are an integral part of production since they enhance resource conditions and prevent loss of productive resources from adjacent crop or rangeland. This does not constitute conversion of agricultural lands to non-agricultural use, as these practices serve the agricultural purpose of controlling erosion and enhancing waterways. The beneficial impacts of retaining significant amounts of soil on site that would otherwise be lost to erosion, and increasing the quality of waterways on agricultural land, greatly outweigh the minor loss in areas of production from a site-specific conservation structure.

Although some projects implemented under the CRP may result in the restoration and conversion of current and/or historic agricultural lands – primarily diked hay and grazing properties – into native salt and brackish marshlands and riparian floodplain habitat, these types of projects are proposed very infrequently. While in past reviews described above, the Commission has found proposed habitat improvements consistent with Sections 30241 and 30242 because only minor amounts of agricultural land would be converted to habitat or water quality improvement measures, the Commission has also, in other contexts, found conversion of agricultural land for habitat restoration activities consistent with the Coastal Act under the conflict resolution provision (Section 30007.5). Further, as described in the General Exclusions section of NOAA RC's consistency determination, the Executive Director would have the ability to review all projects proposed by NOAA RC for inclusion in the program and exclude those with the potential to result in adverse impacts to agricultural lands and other coastal resources. This would allow those projects to be individually reviewed and considered by the Commission. Therefore, the Commission finds that the proposed implementation of the CRP in the coastal zone would help to protect agricultural lands and resources and is consistent with Coastal Act Sections 30241, 30242, and 30243.

E. Cultural Resources

Section 30244 of the Coastal Act states:

> *Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.*

The potential exists for encountering cultural resources from a variety of the proposed activities that would be covered under the CRP, although most projects will take place in areas that have already been developed, modified, cultivated or otherwise disturbed by human land uses, and will not exceed the depth, extent or kind of previous activities. NOAA RC complies with the requirements of the National Historic Preservation Act, Section 106 on an individual project basis. For projects that may adversely impact cultural or historical resources, NOAA RC will consult with the state historic preservation officer and local tribal officers. In addition, NOAA has a Cultural Resource Specialist on staff to help administer the cultural resources compliance process for CRP projects.

In its consistency determination, NOAA RC has committed to not proceed with a project where significant impacts to cultural resources cannot be avoided through agency actions and/or revised plans. Should the project applicant or any project partners uncover human remains in the course of a project, NOAA RC and project proponents will follow procedures established by the Native American Heritage Commission, including immediately stopping work in the area and notifying the County Coroner. With these elements, the CRP includes reasonable measures for the protection of archaeological and paleontological resources, and the Commission therefore finds the project consistent with Section 30244 of the Coastal Act.

F. VISUAL RESOURCES

Section 30251 of the Coastal Act states:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

CRP projects are not expected to have significant negative effects on scenic or visual resources. Minor adverse impacts to viewsheds may occur from re-establishment of native vegetation where it has not been present for some time, and from construction and soil disturbance during and following project installation. However, these effects are expected to be temporary, and would be offset by beneficial effects to scenic or visual resources accruing from the restoration of native riparian, wetland and estuarine habitats and other coastal resources. Therefore, the Commission finds the program will not likely have negative impacts and is most likely to have beneficial impacts to scenic/visual resources consistent with Section 30251 of the Coastal Act.

APPENDIX A – Substantive File Documents

NOAA Restoration Center, 2022. Consistency Determination No. CD-0006-22

NOAA Restoration Center, 2022. Programmatic Biological Opinion for the Arcata field office (NMFS No: WCRO-2021-02830)

NOAA Restoration Center, 2022. Annual Report for NOAA Restoration Center's Programmatic Federal Consistency Determination CD-021-13 (Projects covered from 2013 – 2022)

USACE SECTION 404 NWP 27 AQUATIC HABITAT RESTORATION, ENHANCEMENT AND ESTABLISHMENT

USACE SECTION 404 NWP 17 LINEAR TRANSPORTATION

SECTION 106 CONSULTATION WITH SHPO / NATIONAL HISTORIC PRESERVATION ACT

USFWS SECTION 7 FORMAL CONSULTATION AND PROGRAMMATIC BIOLOGICAL OPINION (BO) FOR CALIFORNIA RED-LEGGED FROG

RWQCB 401 WATER QUALITY CERTIFICATION AND WATER DISCHARGE REQUIREMENT

CEQA DOCUMENTS

Initial Study/Mitigated Negative Declaration

for the proposed

Bolinas Lagoon Wye Wetlands Resiliency Project

Public Comment Period: July 5 to August 4, 2023

Prepared by Marin County Parks

3501 Civic Center Drive, Suite 260

San Rafael, CA 94903

www.marincountyparks.org

(415) 473-5283

This document has been prepared pursuant to the California Environmental Quality Act of 1970, as amended.

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I. PROJECT INFORMATION SHEET

Project Title

Bolinas Lagoon Wye Wetlands Resiliency Project

Lead Agency and Project Applicant

Marin County Open Space District
3501 Civic Center Drive #260
San Rafael, CA 94903

Contact Person and Phone Number

Veronica Pearson
Sr. Ecological Restoration Planner
Tel: (415) 473-5086
Email: vpearson@marincounty.org

Parcel Numbers

APN: 188-140-04 (Marin County Open Space District), 188-110-10 (County of Marin)

General Plan Designation

C-AG3 (Agriculture Coastal Zone); C-OS (Open Space Coastal Zone)

Zoning

C-ARP-5 (Agriculture Residential Planned); C-OA (Open Area)

Location

Latitude 37.93400 N; Longitude 122.69856 W
Southwest and southeast of State Route 1/Olema Bolinas Road intersection, Bolinas, Marin County, California

Preparers of the CEQA Document

WRA Environmental Consultants
2169-G Francisco Boulevard E
San Rafael, CA 94901

MITIGATED NEGATIVE DECLARATION

Marin County Environmental Review

Pursuant to Section 21000 et. seq. of the Public Resources Code and Marin County Environmental Impact Review Guidelines and Procedures, a Negative Declaration is hereby granted for the following Project:

Project Name: Bolinas Lagoon Wye Wetlands Resiliency Project

Location: Southwest and southeast of State Route 1/Olema Bolinas Road intersection, Bolinas, Marin County, California

Project Summary: The proposed Project would reconstruct the physical and biological linkages between Lewis Gulch Creek and Bolinas Lagoon by realigning both Olema Bolinas Road and Lewis Gulch Creek to allow space for natural geomorphic and biological processes to occur. The intersection at Olema Bolinas Road and State Route 1 (SR-1) would be moved approximately 150 feet to the south. The new approach to SR-1 would include a bridge over Lewis Gulch Creek that would allow for lateral stream migration and provide a wildlife corridor. Upstream of Olema Bolinas Road, the left bank of Lewis Gulch Creek (eastern side) adjacent to SR-1 would be stabilized using bioengineering. Downstream of Olema Bolinas Road, a new channel would be constructed for Lewis Gulch Creek within the center of the Wye wetland to flow over its former alluvial fan and restore geomorphic processes to the wetland. The Project requires removal of the section of Fairfax Bolinas Road that passes through the Bolinas Wye wetland between SR-1 and Olema Bolinas Road to allow for the realignment of Lewis Gulch Creek and to allow for wetland migration with 8 feet of sea level rise (SLR) and storm surge. Road and restoration work would include tree removal, earthmoving, road and bridge construction, erosion control planting, large woody debris placement (for habitat), non-native species removal, native wetland habitat restoration, and non-native invasive species management.

Project Sponsor: Marin County Parks (MCP), Marin County Open Space District (MCOSD), Marin County Department of Public Works

Finding: Based on the attached Initial Study and without a public hearing, it is my judgment that:

☒ The Project will not have a significant effect on the environment.

☒ The significant effects of the Project noted in the Initial Study attached have been mitigated by modifications to the project so that the potential adverse effects are reduced to a point where no significant effects would occur.

Rachel Reid ______________________ Date: June 27, 2023

Rachel Reid
Environmental Coordinator

Based on the attached Initial Study, a Mitigated Negative Declaration is granted.

______________________ Date: 6/27/23

Max Korten
Director and General Manager
Marin County Parks and Open Space District

Mitigation Measures:

☐ No potential adverse impacts were identified; and therefore, no mitigation measures are required.

☒ Please refer to mitigation measure in the attached Initial Study.

☒ The potential adverse impacts have been found to be mitigable as noted under the following factors in the Initial Study attached.

The mitigation measures for the potentially significant environmental impacts have been incorporated into the Project and are required as conditions of approval.

Preparation:

This Mitigated Negative Declaration was prepared by Veronica Pearson, Senior Open Space Planner of the Marin County Parks and Open Space District.

The document and the online comment form is available for review on the Marin County Parks website at: marincountyparks.org

II. INTRODUCTION

This Initial Study/Mitigated Negative Declaration (IS/MND) has been prepared to provide information to the public and decision-makers regarding the scope of the proposed Bolinas Lagoon Wye Wetlands Resiliency Project (Project), the potentially significant environmental impacts which could result from implementation of the proposed Project, and mitigation measures which would reduce potentially significant environmental impacts to a less-than-significant level in compliance with the California Environmental Quality Act (CEQA). This Introduction provides some basic details regarding the proposed Project; a more detailed background and description is presented in subsequent sections.

The purpose of the proposed Project is to restore hydrologic, geomorphic, and ecologic processes in the Bolinas Wye (the Wye) wetlands to improve aquatic, wetland, and upland habitats, as well as maintaining existing transportation access along Olema Bolinas Road for the town of Bolinas during scenarios consisting of up to 5.5 feet of sea level rise (SLR) and a 100-year storm event (8 feet combined). By restoring natural processes to the Bolinas Wye Wetlands and alleviating chronic flooding of Marin County and state roadways, the wetlands and roadways would be more resilient to anticipated SLR through the end of the century. Major goals of the project include reconnecting the lower portion of Lewis Gulch Creek with its historic floodplain and improving anadromous (migrating) fish and amphibian habitat. A complete listing of the defined goals and objectives of the proposed Project is presented in Section IV, Project Need, Purpose, and Objectives.

To accomplish these goals, the proposed Project would remove the westernmost segment of Fairfax Bolinas Road (also known as Crossover Road), realign the intersection of Olema Bolinas Road with State Route 1 (SR 1), and construct a bridge to carry Olema Bolinas Road over the relocated Lewis Gulch Creek channel. The project would also remove invasive plant species and construct a new channel for the lower portion of Lewis Gulch Creek through its historic floodplain, leading to the reestablishment of wetlands within the Wye. A complete description of each major project component is provided in the Project Description section.

The proposed Project is located on lands owned by the County of Marin and the Marin County Open Space District (MCOSD). The MCOSD is an independent legal entity and a special district operating pursuant to the California Public Resources Code. Marin County Parks (MCP) oversees the management of the county parks system and provides public information on behalf of the MCOSD. The proposed Project is adjacent to subtidal lands (below Mean High Water) that are owned by the County of Marin within the Bolinas Lagoon Open Space Preserve and are under the management of Marin County Parks. Bolinas Lagoon Open Space Preserve is 1,080 acres and is part of the Greater Farallones National Marine Sanctuary. The Bolinas Lagoon Open Space Preserve is one of 34 open space preserves in Marin County and includes shoreline areas surrounding the northern end of Bolinas Lagoon, as well as segments on Kent Island and along the lagoon side of Seadrift Beach. The Bolinas Lagoon Open Space Preserve was acquired by Marin County in the mid-1960s and has been managed by the MCOSD since 1988. The Preserve contains a network of trails and walking paths for hikers and dog walkers and provides opportunities for fishing and kayaking/canoeing. The Preserve is known for its shorebird and seal watching opportunities.

Under MCP, the MCOSD is leading a consortium of stakeholders working on a long-term vision to improve aquatic habitat, transportation safety, and climate resilience at the north end of Bolinas Lagoon near Bolinas, California. The proposed Project is the first step in implementation of the larger Bolinas Lagoon North End Vision, which aims to re-establish and rehabilitate hydrologic, geomorphic, and ecologic processes; improve habitat connectivity; increase wetland resiliency to sea-level rise (SLR);

improve special-status species' habitat; and protect community safety by moving roads out of flood inundation areas.

The Wye Wetland (the Wye) is framed by California Department of Transportation (Caltrans) SR-1 to the east and Olema Bolinas Road to the west. The Wye is bisected by Fairfax Bolinas Road (also known as Crossover Road), which breaks the Wye into a northern triangle and southern area that transitions into Bolinas Lagoon. Lewis Gulch Creek flows from the north, crosses under SR-1 approximately 500 feet northwest of the Wye and flows along the western edge of Olema Bolinas Road before making a sharp turn to cross through an undersized box culvert within a dredged channel to the lagoon. The box culvert is 5 feet wide and 25 feet long, with an inlet depth of 2.9 feet and an outlet depth of 1 foot—which is insufficient to carry flows greater than the 1.5-year storm event. The box culvert size results in a flow-depth restriction to fish movement during low flow. Lewis Gulch Creek is known to have a population of federally threatened Central California Coast steelhead (steelhead, *Oncorhynchus mykiss*), California state threatened California black rail (*Laterallus jamaicensis coturniculus*), and federally threatened and CDFW species of special concern California red-legged frog (*Rana draytonii*).

III. SUMMARY OF THE PROPOSED PROJECT

This section provides a brief summary of the proposed Project. A more expansive, detailed description is presented in Section VI, Project Description, while a detailed discussion of the existing setting in the Project area is provided in Section V, Project Setting. To better orient the reader, Figure 1 provides a map of the Project's regional location. Figure 2 provides an aerial photograph of the Project site and illustrates the limits of proposed Project grading and disturbance. Figure 3 shows the property ownership and parcel boundaries within the Project site vicinity. Figure 4 provides an overview of the relative locations of each of the Project components within the overall study area.

The proposed Project would reconstruct the physical and biological linkages between Lewis Gulch Creek and Bolinas Lagoon by realigning both Olema Bolinas Road and Lewis Gulch Creek to allow space for natural geomorphic and biological processes to occur. The intersection at Olema Bolinas Road and SR-1 would be moved approximately 150 feet to the south. The new approach to SR-1 would include a bridge over Lewis Gulch Creek that would allow for lateral stream migration and provide a wildlife corridor. Upstream of Olema Bolinas Road, the left bank of Lewis Gulch Creek (eastern side) adjacent to SR-1 would be stabilized using bioengineering. Downstream of Olema Bolinas Road, Lewis Gulch Creek would be realigned to the center of the Wye to flow over its former alluvial fan and restore geomorphic processes to the Bolinas Wye wetland.

The Project requires permanent removal of the section of Fairfax Bolinas Road that passes through the Bolinas Wye wetland between SR-1 and Olema Bolinas Road to allow for the realignment of Lewis Gulch Creek, and to allow for wetland migration with an anticipated 5.5 feet of SLR and storm surge (8 feet combined). Road and restoration work would include tree removal, earthmoving, road and bridge construction, erosion control planting, large woody debris placement (for habitat), non-native invasive species removal, native wetland habitat restoration, and non-native invasive species management.

IV. PROJECT NEED, PURPOSE, AND OBJECTIVES

This section describes the need, purpose, goals, and objectives that have been established for the proposed Project. A detailed description of individual project components is provided in Section VI, Project Description.

A. PROJECT NEED

Over the past 150 years, logging, mining, agricultural practices, roads, and other infrastructure have affected the watersheds and tributaries of Bolinas Lagoon. Within the Project Area, Lewis Gulch Creek has been significantly impacted by the three surrounding roadways that disrupt ground and surface water connection. Lewis Gulch Creek has been relocated to flow into a roadside ditch and box culvert, resulting in the creek being disconnected from a large portion of the alluvial fan (see Figure 4). The surrounding roads, channels, and culverts (Lewis Gulch Creek at SR-1, Wilkins Gulch Creek, Salt Creek; described further below) further constrain stream, wetland, and floodplain processes in the Bolinas Wye wetland. Under these conditions, sediment is being transported to and is accumulating in the roadside ditch and box culvert instead of the Bolinas Lagoon and wetland areas. Restoration of more natural hydrologic processes is needed for wetlands to continue to exist with future SLR encroaching against the current hardscapes within the Wye.

At the Project's north end, Lewis Gulch Creek is eroding the left (east-side) channel bank, undercutting SR-1, and is incised and disconnected from its floodplain. Further downstream, the creek flows along Olema Bolinas Road within a ditch with minimal riparian habitat, then makes an abrupt turn into an undersized box culvert. Coarse sediment accumulates upstream within the undersized box culvert and requires periodic dredging (WRA, 2019). Central California Coast Steelhead trout (*Onchorhynchus mykiss*) are present within the Project Area (WRA, 2020), but passage can be restricted by the box culvert. The roadside ditch is also poor habitat for steelhead in that it lacks natural form (riffles, pools, overhead canopy) to support fish habitat and can impair migration, as is also described below in Project Setting.

Historically, Lewis Gulch Creek and Wilkins Gulch Creek ran through the Bolinas Wye wetland in a network of diffuse, interconnected channels that drained to Bolinas Lagoon and allowed for the conveyance of nutrient-rich sediments onto the alluvial fan during overbank flow events (AECOM, 2017). The altered channels and the configuration of roadways, particularly Fairfax Bolinas Road, further limit the wetlands' ability to adapt to SLR. Removal of the "crossover" segment of Fairfax Bolinas Road and elevation of Olema Bolinas Road are essential to accommodate SLR and associated upward migration of wetlands, and for restoration of natural flooding and alluvial fan processes (dispersal of nutrient-rich sediment) in the Bolinas Wye wetland. Preventing the current annual flooding of roadways is an additional benefit.

A recent bathymetric study (ESA, 2016) of the underwater depth of Bolinas Lagoon found that the lagoon would lose 160 acres of frequently exposed mudflats and seven acres of salt marsh by 2050 with 1.5 feet of projected SLR. A recent U.S. Geological Survey (USGS) report (Thorne, et al., 2016) found that by 2100, Bolinas Lagoon's low tidal marsh would be completely submerged with 1.4 feet of SLR. A large portion of this marsh loss would be habitat for the state-listed California black rail and other wetland-dependent species. As discussed in the AECOM Site Conditions Report (AECOM, 2016), one of the most important benefits of the proposed Project is to address mid- to late-century SLR projections and ameliorate potential wetlands loss due to SLR by restoring natural hydrological and geomorphic processes and removing barriers to upland migration.

B. PROJECT PURPOSE

The purpose of the proposed Project is to restore hydrologic, geomorphic, and ecologic processes in the Bolinas Wye wetlands to improve aquatic, wetland, and upland habitats, as well as maintaining existing transportation access along Olema Bolinas Road for the town of Bolinas during scenarios consisting of up to 5.5 feet of SLR and a 100-year storm event (8 feet combined). By restoring natural processes to the

Bolinas Wye Wetlands and alleviating chronic flooding of Marin County and state roadways, the wetlands and roadways would be more resilient to anticipated SLR through the end of the century.

C. PROJECT OBJECTIVES

The Project goals were derived from the *Bolinas Lagoon Ecosystem Restoration Project: Recommendations for Restoration and Management* (GFNMS, 2008) and the visioning work in the Bolinas Lagoon North End Project (see Project Development section). The Project objectives are the actions that define how the goal will be achieved and were refined by the MCOSD, Golden Gate National Parks Conservancy (GGNPC), and a Technical Advisory Committee (TAC) that was established for the Project by the MCOSD to provide technical guidance, design review, and regulatory consultation. The TAC is comprised of technical experts and regulatory agency staff from the California Department of Fish and Wildlife (CDFW), Regional Water Quality Control Board (RWQCB), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the California Coastal Commission. The TAC provides continual guidance on Project objectives, design, and permitting to ensure the design and implementation plan adheres to Project goals and regulatory requirements.

The TAC assisted in refining the Project goals and objectives (summarized in Table 1 below) and provided recommendations for early design concepts during their meeting on February 18, 2020.

Table 1. Bolinas Lagoon Wye Wetlands Resiliency Project Goals and Objectives

GOALS	OBJECTIVES
1. Restore hydrological, geomorphic, and ecological processes in the Bolinas Wye wetland.	• Allow for an unimpeded flow of surface and groundwater in the Bolinas Wye wetland.
	• Restore natural sediment transport processes in Lewis Gulch Creek.
	• Direct Lewis Gulch Creek into the wetland and design channel system to promote natural geomorphic processes.
2. Enhance freshwater wetland communities.	• Enhance the extent of estuarine and palustrine wetland vegetation.
3. Reconnect Lewis Gulch Creek with its historic floodplain.	• Design Lewis Gulch Creek to encourage frequent overbank flows.
4. Prevent further stream bank erosion and incision to protect habitat.	• Use bioengineering methods along Lewis Gulch Creek to protect areas experiencing accelerated erosion which impacts infrastructure.
5. Protect and restore native riparian and wetland species.	• Prevent colonization of invasive, non-native species by re-vegetating with native riparian and wetland species.
6. Accommodate Sea-Level Rise and climate change by providing areas for the lagoon's habitats to migrate, and by restoring natural geomorphic and floodplain processes.	• Remove Fairfax Bolinas Road crossover.
	• Raise roadway.
	• Reconnect Lewis Gulch Creek to its alluvial fan and allow for future reconnection with Wilkins Gulch Creek.
7. Improve anadromous fish and amphibian habitat; improve habitat connectivity and habitat for special-status species.	• Raise roadways to provide opportunity for upslope habitat migration and lagoon expansion, thus providing an unimpeded transition zone for areas subject to backwater flooding and delta development.
	• Design a creek/floodplain/wetland mosaic with resiliency to withstand climate variability, including extended drought and excessive rainfall.
	• Install crossings to allow for volitional fish passage and migration corridors for non-fish species.
8. Improve road safety.	• Realign roads and State Route 1/Olema Bolinas Road intersection to improve safety.
	• Reduce roadway flooding during winter storms and high-tide events.
9. Create a sustainable and self-maintaining system.	• Reduce or eliminate flooding of roadways.
	• Decrease needs for vegetation management.
	• Reduce or eliminate dredging of roadside channel.

The goals and objectives listed in Table 1 provided overarching guidance for the review of conceptual designs for the proposed Project, described further in the Project Development and Alternatives Considered section of this document.

D. PROJECT OUTCOMES

The proposed Project would meet the Project purpose, goals, and objectives defined above by realigning Lewis Gulch Creek through the Bolinas Wye wetland, creating a new channel for anadromous fish migration, and restoring floodplain processes while reducing the potential for road flooding. Floodplain connectivity with Lewis Gulch Creek would provide rearing and refugia habitat for juvenile steelhead and promote alluvial fan processes through sediment deposition. This would also improve wetland habitat in the Bolinas Wye by encouraging overbank flows on the alluvial fan without inundating Olema Bolinas Road or SR-1. The proposed bridge over Lewis Gulch Creek on Olema Bolinas Road would be sized to pass the 100-year flood event and account for 5.5 feet of SLR, allowing for upstream flows to pass through the Bolinas Wye wetland and protecting Olema Bolinas Road from flooding and extreme weather events in the long term. The proposed bridge would also be much wider than the creek channel, allowing for safe animal passage under the road as well as lateral stream channel migration.

Removal of the crossover segment of Fairfax Bolinas Road between SR-1 and Olema Bolinas Road allows for the reconnection of the bisected wetlands. The crossover road segment would be converted to wetland habitat which would offset impacts to wetland habitat occurring as a result of construction of the new Lewis Gulch Creek alignment. Newly created wetlands and creek alignment would provide a habitat linkage between upland and wetland habitats within an area that would likely be inundated by 2100 with a SLR projection of 5.5 feet. Removal of the road would allow for wetlands to migrate to higher elevations.

Raising Olema Bolinas Road and realigning the Lewis Gulch Creek channel would eliminate the near-annual flooding of the roads that occurs which will increase over time with SLR. The realignment of the Olema Bolinas Road/SR-1 intersection would also improve road safety and ensure continued access for the town of Bolinas.

V. PROJECT SETTING

This section provides a detailed description of the existing features and characteristics of the Project site and surrounding vicinity. The individual components of the proposed Project are described in greater detail in Section VI, Project Description.

A. LOCATION

The proposed Project is located on two adjacent parcels in Marin County at the north end of the Bolinas Lagoon between Olema Bolinas Road and SR-1. Figure 1 provides a map of the Project’s regional location. The Bolinas Wye wetland is bounded by SR-1 to the north/east, Olema Bolinas Road to the west, and Bolinas Lagoon to the south, within an area that is commonly referred to as the “Wye.” Figure 2 provides an aerial photograph of the Project site and illustrates the limits of proposed Project grading and disturbance. At its northern end, the tributaries to Bolinas Lagoon are Lewis Gulch Creek, Wilkins Gulch Creek, Salt Creek, and Wharf Creek. The Bolinas Wye wetland is bisected by the westernmost segment of Fairfax Bolinas Road (also referred to as the Crossover Road), which separates the Bolinas Wye wetland into a northern triangle and a southern segment that transitions into Bolinas Lagoon. The County of Marin owns the parcel containing the Wye wetland, and the MCOSD owns the parcel west of Olema Bolinas Road. These two parcels comprise the area where the bulk of the Project work will be performed. Figure 3 shows the property ownership and parcel boundaries within the Project site vicinity. SR-1 is owned and maintained by Caltrans. Small portions of Project work would extend into the Caltrans right-of-way along SR-1. Olema Bolinas Road and Fairfax Bolinas Road are both within County-maintained rights-of-way. Figure 4 provides an overview of the relative locations of each of the Project components within the overall study area.

B. INTERTIDAL LAGOON AND STREAM HABITATS

Bolinas Lagoon is one of 37 internationally designated Ramsar sites in the United States, and one of four along the west coast (U.S. Fish and Wildlife Service, 2015). Ramsar sites are wetland areas designated to be of international importance under the Ramsar Convention, an intergovernmental treaty established in 1971 by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). It is also an Audubon Important Bird Area, and part of the Golden Gate Biosphere Reserve and Greater Farallones National Marine Sanctuary. The lagoon, connected to the Pacific Ocean at the south end and located along the Pacific Flyway, contains 1,000 acres of marsh, subtidal, and intertidal lagoon habitat of importance for migratory birds, critical habitat for steelhead, and special-status species including California black rail (*Laterallus jamaicensis coturniculus*) and California red-legged frog (*Rana draytonii*). The lands to the east of the Project site across SR-1 are protected as part of the Golden Gate National Recreation Area, including the historic Wilkins Ranch and is managed by the National Park Service.

The Bolinas Wye wetland contains habitats unique to the area, primarily due to the amount of freshwater inflow—both surface and subsurface—that drains through the Bolinas Wye wetland and into the northern tip of Bolinas Lagoon. The freshwater input, the interface among the varied habitats, and the connectivity between the lower marsh, high marsh, and uplands, provides a mix of vegetative communities and alliances that support several special-status species.

Moving to the north from the lagoon edge and lower mudflats into the Project area, the site transitions from pickleweed mats to saltmarsh bulrush. The vegetation then transitions into a freshwater wetland complex of arroyo willow/red alder forest marshes due to the influence of subsurface and surface water. The red alder forest continues north of the crossover segment of Fairfax Bolinas Road into the Bolinas Wye wetland. To the east of Olema Bolinas Road, the hillside is dominated by coast live oak forest.

Lewis Gulch Creek flows from north to south and crosses under SR-1 through a corrugated metal pipe about 500 feet north of the Bolinas Wye wetland before entering the Project area. Within the Project area, the creek flows in a ditch along the western edge of Olema Bolinas Road for approximately 950 feet before making a sharp left turn and crossing through an undersized box culvert under the road and as described above. The creek is then contained within a dredged channel for approximately 200 feet before connecting to a natural course of approximately 300 feet to Bolinas Lagoon. Within the Project area, the reach of Lewis Gulch Creek along Olema Bolinas Road is intermittent and surrounded by coast live oak forest.

To the west and outside of the Project area is Wharf Creek. It drains to the southeast and converges with Lewis Gulch Creek from the south at the box culvert that passes under Olema Bolinas Road. East of the Olema Bolinas Road box culvert the creek becomes perennial and is influenced by groundwater and tidal flows. The location of Wharf Creek is shown on Figure 4.

To the east and outside of the proposed Project area, Wilkins Gulch Creek and Salt Creek flow through two separate box culverts under SR-1 into the wetland complex and intersect directly south of the crossover segment of Fairfax Bolinas Road. Both creeks are to the east of the Project area with Wilkins Gulch Creek providing surface flow into the Project area. Wilkins Gulch Creek is shown on Figure 4. Their contributions have been included in the hydrologic analysis to compute potential flood inundation (WRA, 2023). No changes to the Wilkins Gulch and Salt Creek SR-1 culverts are being proposed as part of the Project.

C. HUMAN DEVELOPMENT

In the early 19th century, logging, mining, agriculture, and infrastructure changes altered the Bolinas Lagoon shoreline and watersheds of most of the north end tributaries. The deforestation and land-use changes increased sediment delivery to the Lagoon and altered the flow paths of many of the streams in the region. Improvement of Olema Bolinas Road resulted in the relocation of Lewis Gulch Creek to a roadside ditch running along the west side of the road. Over the last 50–100 years, logging and mining ceased in the region, and ranching and farming activities ceased within the Project area. During that period, the Wye has become a densely vegetated wetland. Today, scattered rural residential properties are located to the south and west of the Project site but the area is largely undeveloped.

The Bolinas Lagoon watershed includes not only the streams in the vicinity of the Project site at the north end of the Lagoon, but also several drainages on each side of the lagoon extending southward to the unincorporated town of Stinson Beach and the Lagoon's mouth at Bolinas Bay. Efforts to reduce sediment deposition into the Lagoon from the surrounding watershed have been ongoing since the early 1970s. Much of the land within the watershed is under public ownership, with privately held parcels generally limited to the areas adjacent to the towns of Stinson Beach and Bolinas. Scattered private parcels subject to agricultural use exist throughout the watershed.

Protected areas within the watershed include lands administered by the U.S. National Park Service (NPS) within the Golden Gate National Recreation Area, the MCOSD within the Bolinas Lagoon Preserve, and California State Parks within Mt. Tamalpais State Park.

D. PROJECTED EFFECTS OF CLIMATE CHANGE AND SEA-LEVEL RISE

The Project site is vulnerable to SLR, as well as other climate change-related effects including prolonged drought and storms with high magnitudes and intensities. One of the goals of the proposed Project is to reduce the impact of SLR on the ecosystem and infrastructure. Many projections of SLR exist, and SLR estimates used for the Project are based on the Ocean Protection Council (OPC) State of California Sea-Level Guidance (OPC, 2018).

Improving the resiliency of the wetlands and infrastructure at the Project site is imbedded in the design objectives of the proposed Project. Resilience is the ability to recover quickly from disasters and to adapt to future conditions, such as SLR. To date, the accepted projections used for SLR planning are the State of California Sea-Level Guidance produced by the Ocean Protection Council (OPC, 2018). Using OPC's Table 1 (Projected Sea-Level Rise [in feet] for San Francisco), the Project is within the projections for specific greenhouse gas emissions scenarios (RCPs) for 2090 for low and high emissions (RCP 2.6 and 8.5 respectively), medium-high risk aversion (1 in 200 chance), resulting in up to 5.6 feet of sea-level rise. Table 2 presents the various tide scenarios used for the hydrologic and hydraulic modeling of the proposed Project that were determined by adding the predicted amount of SLR to current documented tide elevations.

Table 2. Project Site Tide Elevations with Projected Sea-Level Rise

TIDE SCENARIO	TIDE ELEVATION 1983-2001 EPOCH (FEET NAVD88)	SEA-LEVEL RISE PREDICTION (FEET)	ELEVATION FOR DOWNSTREAM BOUNDARY CONDITION (FEET NAVD88)
Mean Higher High Water (MHHW)	5.6	0	5.6
Mid-Century (2050) MHHW	5.6	2.0	7.6
Mid-Century (2050) Maximum Tide	8.0	2.0	10.0
End-of-Century (2100) MHHW	5.6	5.5	11.1
End-of-Century (2100) Maximum Tide	8.0	5.5	13.5

OPC's SLR projection numbers do not include impacts of El Nino, storms, or other acute additions to SLR. The hydrology and hydraulics analysis conducted for the Project added consideration of a 100-year return interval storm to the SLR/tide elevation projections shown in Table 2 and concluded that the Project site could accommodate an increase in water elevation of up to 7.9 feet prior to inundation occurring at the proposed Olema Bolinas Road bridge over Lewis Gulch Creek (WRA, 2023).

Designs for the proposed Project were created to accommodate a combination of the expected 5.5 feet of SLR by 2100 and a 100-year flood event, increase groundwater recharge to counteract drought effects, and decrease the vulnerability of the site's habitats and wildlife to the effects of climate change. Figure 18 depicts the extent of inundation at the Project site during the 100-year flow event with 2050 and 2100 sea-level rise scenarios. The projected end-of-century SLR is not expected to reach the proposed bridge or upgraded portions of Olema Bolinas Road under these tidal scenarios, a correction of current conditions in which flooding occasionally inundates Olema Bolinas Road.

VI. PROJECT DESCRIPTION

This section provides a detailed discussion of the Project's components. A description of the methods, phasing, and sequencing of Project construction is provided in Section VII, Construction.

- The proposed Project includes multiple components ranging from construction of hard-engineered structures such as roads and a bridge, to excavation of a new creek channel capable of supporting aquatic habitat, as well as salvaging trees and the reuse of downed, large woody debris for creating floodplain complexity. These elements of the Project have been organized into nine components, which are described in the subsections below. The components are presented in the general order in which they would be constructed or implemented. A detailed description of the proposed construction sequencing and phasing for the Project is presented in Section VII, Construction. The Project components are shown on Figure 4, Figure 6, and Figure 7.

A. OLEMA BOLINAS ROAD ALIGNMENT AND NEW BRIDGE

The first component of the Project consists of the construction of a new intersection at the junction of Olema Bolinas Road and SR-1, the elevation of Olema Bolinas Road, the realignment of Olema Bolinas Road, and the construction of a bridge to carry the realigned Olema Bolinas Road over the realigned channel of Lewis Gulch Creek. The proposed geometrics of this new intersection design are shown in Figure 8. This element comprises the main civil engineering aspect of the proposed Project. The road design would focus on creating a more standard intersection with SR-1 and providing the ability to safely pass the 100-year flood event in Lewis Gulch Creek with projected end-of-century SLR (8 feet). Prior to arriving at the proposed design for this Project element, two intersection alignments and three creek crossing alternatives were assessed.

Caltrans required an Intersection Control Evaluation (ICE) Study at the proposed realigned intersection of SR-1 and Olema Bolinas Road. Mark Thomas, Inc. engaged Fehr and Peers, Inc. to prepare the study and summarized results in an ICE memorandum. In completing the report, detailed accident data for the existing intersections on the Project site were analyzed, and traffic studies were completed. The results of the study show that an intersection with stop control on Olema Bolinas Road is suitable and neither a traffic signal nor a left-turn pocket lane on northbound SR-1 is warranted.

A tsunami scour analysis was performed because the bridge site lies within a mapped tsunami hazard zone. Tsunami loading tolerances for the new bridge must be in accordance with the draft American Association of State Highway and Transportation Organizations (AASHTO) 2021 Guide Specifications for Bridges Subject to Tsunami Effects. In accordance with this guidance, the bridge will be designed for the tsunami event with a 975-year return period.

Based on the preliminary results of the tsunami scour analysis, the new bridge will utilize the design option shown in Figure 9. The proposed design (see Figure 9) is a three-span bridge, 80 feet in length and 38.3 feet in width. This bridge is proposed to be a cast-in-place, post-tensioned, concrete slab on reinforced concrete two-column piers, founded on four approximately 60-inch diameter cast-in-drilled-hole concrete piles. The abutments are proposed to be short diaphragm abutments without any foundation system. The end spans and diaphragm abutments will be cantilevered spans.

B. OLEMA BOLINAS ROAD ELEVATION

Olema Bolinas Road is being realigned through the Wye and elevated to reduce flooding and impacts from projected SLR, requiring the road to be elevated to meet the proposed new bridge. The road will be elevated on fill that includes maximum 2:1 side slopes constructed using 320 cubic yards of engineered fill for long-term side slope stability, and also hydroseeded to promote the quick establishment of vegetative cover.

C. LEWIS GULCH CREEK BANK STABILIZATION

Lewis Gulch Creek has eroded into SR-1 just north of the existing intersection with Olema Bolinas Road. Caltrans implemented an emergency repair that consisted of riprap and live willow stakes. To ensure that the creek does not impact SR-1 in the future, the proposed Project includes one area with a restoration design focused on bank stabilization along the outboard curve in the creek, on the west side of SR-1, north of the Olema Bolinas Road intersection. Stabilization of this area is desirable to prevent the potential for future damage to SR-1, and it must also consider the fact that this reach of stream contains high-quality aquatic habitat for steelhead as well as California red-legged frog. As a result, an approach that relies heavily on bioengineering methods has been selected.

The stabilization concept proposes a mix of channel realignment, large wood, and soil bioengineering as shown on Figure 11. The channel would be shifted to the west slightly to reduce the near bank stress associated with the small radius of curvature, and to accommodate space to install rootwads harvested on site from native species (e.g., coast live oak, redwood) along approximately 50 feet of channel length and 20 feet of the left channel bank. A small floodplain bench would be graded on the inside of the meander to allow for flow relief during high flow events.

The toe would be protected by a series of rootwads buried into the bank and bed of the channel on the outside meander bend. The rootwads would sit so they are aligned with the channel bank and their trunks extend into the bank. Two layers of coir fabric-encapsulated soil lifts between 6 and 8 inches in height would be installed above the rootwads along the bank. A row of live arroyo willow branches or rooted cuttings, collected on site, would be placed between the two lifts. The elevation of the topsoil lift would be set to a height approximately 0.5 foot higher than the floodplain graded on the inside meander bend, and the slope above would be graded at a maximum slope of 3:1 up to the elevation of SR-1.

D. INITIAL INVASIVE SPECIES REMOVAL AND FINE GRADING

Several species of invasive plants occupy the site. Most notably, Cape ivy (*Delairea odorata*) and periwinkle (*Vinca major*) are found in shrub/scrub and forested areas and Himalayan blackberry (*Rubus armeniencus*) in open areas. Efforts to remove and manage these species would focus mainly on manual removal with some mechanical removal of large thickets of Himalayan blackberry. In areas where these methods are infeasible or ineffective, selective chemical controls approved for use within regulated wetlands may be used following the guidelines of the County of Marin (Integrated Pest Management (IPM) Policy (Marin County, 2004).

Initial vegetation management actions include:

- Himalayan blackberry (*Rubus armeniacus)* removal, two large thickets including soil to a maximum depth of 3 feet;
- cape ivy (*Delairea odorata*) removal, currently persistent throughout Project area;
- periwinkle (*Vinca major*) removal, within the construction limit of disturbance;
- yellow flag iris (*Iris pseudacorus*) removal, north of the Fairfax Bolinas Road crossover;
- English ivy (*Hedera helix*) removal, within the construction limit of disturbance; and,
- Invasive perennial grasses, such as purple velvet grass (*Holcus lanatus*) and dallis grass (*Paspalum dilatatum*) within the construction limit of disturbance.

The main areas of Cape ivy, periwinkle, and Himalayan blackberry removal are shown on Figure 12. Himalayan blackberry removal is focused southeast of the existing intersection of Fairfax Bolinas (Crossover) Road and Olema Bolinas Road. Blackberry is dominant in this area and removal efforts would include pulling the plants using skid loaders or small excavators outfitted with hydraulic thumbs to pull out the plants' roots. This activity may result in a change to the final grade, and if the final elevation is deemed to have an impact on the proposed wetland function of the proposed Project, topsoil harvested from on-site grading activities may be placed to restore pre-construction grades. Final grades will be set at the elevation of the area after the root mass of invasive species has been removed. Because the ground surface elevation of this area is slightly higher than the surrounding wetlands, and the proposed grades of the wetlands in the footprint of the crossover segment of Fairfax Bolinas Road, the net benefit will be to decrease the depth to groundwater and encourage more robust wetland vegetation growth. No imported fill would be used.

E. LEWIS GULCH CREEK REALIGNMENT

Currently, Lewis Gulch Creek flows along the western edge of the Project site within a roadside ditch, through a box culvert, and then into a manmade channel to the north end of Bolinas Lagoon. The proposed Project design would return Lewis Gulch Creek to the east side of Olema Bolinas Road where it previously flowed, as found on maps from 1910 (AECOM and Watershed Sciences, 2016), and would create a new channel for Lewis Gulch Creek under the proposed bridge and realigned Olema Bolinas Road. Moving Lewis Gulch Creek will involve realigning Olema Bolinas Road and installing a bridge crossing over Lewis Gulch Creek, as discussed above.

The existing box culvert under Olema Bolinas Road would not be removed, but the creek would no longer pass through it. The creek morphology design element works in conjunction with the other Project elements and several channel plan form alternatives were analyzed during the Project design process. The proposed alignment is in keeping with the recommendations from technical experts on fisheries and fluvial geomorphology on the Project's TAC. Lewis Gulch Creek has documented occurrences of steelhead, and considerations of channel morphology relied heavily on providing suitable habitat and passage for a range of steelhead life stages. In addition, the ultimate design included in the Project will ensure that the creek remains resilient during a range of peak flows (1-, 2-, 10-, 50-, 100- and 200-year), accounts for end of century SLR, and promotes overbank flow and floodplain connection.

The new Lewis Gulch Creek channel would contain five distinct reaches as described below:

- **Bank Stabilization Reach (Station 24+10 – 24+75**) – the area of the creek where bioengineering bank stabilization will occur adjacent to SR-1.
- **Upstream Reach (Station 21+00 – 24+10)** – The stream reach between the bioengineering bank stabilization area and the new Olema Bolinas Road bridge, where floodplain grading and channel large wood structure installation (see description below) will occur to enhance steelhead refugia habitat.
- **Bridge Reach (Station 19+50 – 21+00)** – The reach between the existing Lewis Gulch Creek channel upstream of the proposed bridge and the Transitional Reach below the bridge, where channel and floodplain grading will focus on effectively routing flows and sediment around a bend, through the bridge and into the Wye.
- **Transition Reach (Station 18+00 – 19+50)** – The short section of the creek where the Bridge Reach channel width and depth decrease to meet the dimensions of the Wye Reach.
- **Wye Reach (Station 11+00 – 18+00)** – The channel reach with enhanced floodplain connectivity through the Wye wetland that ties into the existing Lewis Gulch Creek at the downstream end of the Project.

Figure 10 depicts the location of the areas described above within the Project site. Design of the Lewis Gulch Creek channel has been based on the hydrology and hydraulics analysis conducted for the Project (WRA, 2023).

The primary considerations in defining the cross-section geometry of the realigned Lewis Gulch Creek channel are: 1) flow conveyance, 2) sediment conveyance, 3) floodplain connectivity, and 4) fish passage. Two methods were used to design the channel. Both methods consider the 1.5-year recurrence interval flow rate of 25 cubic feet per second (cfs) which is the primary scenario for addressing scour and deposition processes. The first method is to contain the 25 cfs flow in an 8- to 10-foot-wide channel to prevent scour at key locations. The Bank Stabilization Reach, Upstream Reach, and Bridge Reach are designed to prevent scour along infrastructure such as SR-1 and the proposed bridge but allow for natural stream processes where acceptable, such as the new floodplain grading upstream of Olema Bolinas Road. The second method is to unleash the 25 cfs flow outside of a channel allowing floodplain inundation as often as possible. The Transition Reach uses the first method to prevent scour and deposition near the proposed bridge and transition to the Wye Reach to begin the second method. The Wye Reach is designed to disperse flows as much as possible and initiate alluvial fan processes while maintaining fish passage characteristics.

The average bed slope of the Upstream Reach is roughly 2.5 percent. The profile design process for the Bridge Reach sought to maintain a bed slope similar to that of the Upstream Reach so that sediment transport capacity would be maintained through the reach. Lowering the channel bed in the vicinity of the bridge would have required increasing bed slope, leading to increased shear stress and velocity that would have resulted in the need for channel armoring. The Bank Stabilization Reach and Upstream Reach use a traditional bankfull channel design based on conditions upstream of the bridge and the calculated 1.5-year recurrence flow of 25 cfs. The 1.5-year recurrence interval flow approximates the flow that is most effective at routing sediment through the system, preventing the risk of aggradation or degradation upslope of the proposed bridge.

The proposed design profile for the Bridge Reach diverges from the existing profile just upstream of the proposed Olema Bolinas Road bridge, where the existing channel would be plugged with an earthen berm to direct flow into the new channel. The Bridge Reach uses a geometry to convey a 35 cfs flow, slightly higher than the 1.5-year recurrence interval, to support sediment transport functions and a 100-year recurrence interval event to alleviate flood risk. A compound channel cross-section design was chosen for the bridge area, with the lower inset channel conveying the 35 cfs flow, and the 100-year event (271 cfs) being conveyed in the floodplain area. The expectation is that sediment will be successfully transported a sufficient distance downstream of the bridge before being deposited in the Wye wetland, where it can eventually be eroded and reworked by natural geomorphic processes.

Through the Transition and Wye Reaches, the proposed bed profile of Lewis Gulch Creek largely follows the existing grade, with no grading of pool or riffle features. The process-based design approach would allow for pools and riffles to develop in the natural substrate during high flow events. To aid in creating deeper pools, channel-facing rootwad structures would be placed on outsides of channel meanders in areas with higher velocities and shear stress to scour and maintain pool habitat. The higher velocity and shear stress areas were identified in the hydraulic modeling conducted during the design process (WRA, 2023). The installation of log structures is described in more detail below. The channel cross section decreases in size through the Transition Reach and is sized to convey the approximate annual peak flow (1-year recurrence interval) of 15 cfs through the upper stretch of the Wye Reach to meet the enhanced floodplain connection goals. In lower areas of the Wye Reach, the channel decreases in size to convey a flow of approximately 9 cfs. The decrease in size is expected to encourage overbank flow and associated deposition of sediment to enhance alluvial fan processes and wetland resilience.

Overall, the proposed channel profile was designed to limit the occurrence of sharp grade breaks that could cause rapid changes in flow shear stress, which may then increase the likelihood of erosion, headcutting, or sediment deposition without the use of channel armoring. Artificially reinforcing the channel is not consistent with the primary Project goal of restoring natural geomorphic processes to Lewis Gulch Creek.

The primary factors considered in the channel alignment were the skew of the bridge opening to the creek and the geometry of the new channel through the Wye. Skew is the angle of the bridge compared to the centerline of the channel. A bridge with zero skew is aligned exactly perpendicular to the flow. As this angle increases, the conveyance of the bridge decreases, and ineffective flow areas (eddies, backwaters, and areas with no velocity) may begin to form within the bridge section, resulting in sediment deposition. The bridge opening was located to minimize skew, minimize impacts to existing habitat, and to achieve Project goals resulting in the need to realign Olema Bolinas Road and create a new intersection with SR-1. Downstream of the proposed bridge, the channel is largely aligned to follow the existing lowest elevation areas of the Wye and connect to the existing creek just above its mouth in Bolinas Lagoon.

The channel profile and geometry are expected to remain largely stable through the Upstream Reach, where it is constrained by existing trees, bank vegetation, the SR-1 embankment, and the proposed Olema Bolinas Road bridge. The left bank (eastern) floodplain of the Upstream Reach would be graded to restore floodplain connection for flows greater than the 1.5-year return interval storm event (approximately 25 cfs). Rootwads would be placed along the left bank of the reach, enhancing scour in existing pools to improve summer habitat for juvenile and resident fish. Some localized lateral bank migration may be expected to occur in response to normal rainfall runoff events.

The profile and cross-sectional area of the Bridge Reach is expected to be maintained over time, although some meandering of the channel is expected. It is expected that the channel planform geometry would change over time, through natural geomorphic processes. The bankfull channel may migrate laterally under the bridge but would be constrained by the bridge structure, which would be set deep enough to allow for scour caused by a 100-year flow event and a potential tsunami as described above. Through the footprint of the proposed bridge and extending a short distance upstream and downstream, the design would include the placement of a layer of large cobble material at the lowest elevation of the channel prior to grading the channel and floodplain under the bridge. This would allow for channel migration while limiting the opportunity for localized scour, channel incision, or headcutting.

Sediment is expected to be deposited within the Wye downstream of the proposed bridge, in the Transition and Wye Reaches where the cross-sectional area of the channel and the bed slope decrease. The Wye Reach and surrounding floodplain areas are expected to function much like the historic Lewis Gulch Creek alluvial fan. This would likely be an area of frequent channel adjustment, as sediment is both actively deposited and eroded by Lewis Gulch Creek in response to storm events. Although the channel alignment follows the lowest points of the existing topography further downstream in the lower Wye, sedimentation could rapidly fill portions of the Project site, causing the channel to change course and potentially cut a new alignment. The use of channel cross-section geometry that is considerably smaller than the bankfull flow estimate would increase the likelihood of dynamic channel adjustments. The presence of existing vegetation and proposed installations of large woody material would contribute to the formation of a hydraulically complex system, with considerable cover, forage, and velocity refugia for all life stages of steelhead and other species of interest.

The hydraulic modeling of the site shows that the 1.5-year flow event and all higher events would spread out through the Wye wetlands, with variable velocities and shear stress values. The results of the model were used to target proposed log structure locations in areas with higher velocities to maximize channel scour to improve summer refugia habitat, as well as to locate proposed floodplain log structures in areas with lower velocities and shear stress to encourage sediment deposition and enhance refugia habitat for juvenile salmonids.

It is expected that a defined channel, sized to convey the amount of water and sediment delivered to it through natural geomorphic processes, would generally be present in the Wye; however, there may be times when the channel in the Wye fills in completely, or is so wide, shallow, and densely vegetated that it is difficult to identify in the field. This would be consistent with conditions that were likely present before European colonization and would represent successful restoration of the alluvial fan and Wye wetland. It is anticipated under these conditions that any channels formed on the floodplain would be suitable to convey passage of upstream migrating steelhead seasonally, as steelhead are thought to generally migrate during turbid, high flow conditions.

Large wood pieces with rootwads would be used in the new channel to enhance habitat conditions. The logs would be harvested on-site, staged on-site, and placed in the channel using heavy equipment. Channel log structures would be installed into the channel banks, with a portion of the stem and rootwad exposed in the channel, providing velocity refugia, forage, cover and hydraulic complexity for steelhead rearing habitat. They would be positioned not to completely block the flow, which could potentially impede volitional fish passage.

Floodplain log structures are proposed for areas within the Wye Reach. These structures are slightly different from the channel log structures, oriented with the rootwad facing downstream and the upper portion of the log buried beneath the ground surface. This would create partial blockages of overbank flows that would result in backwater refugia for fish as well as deposition of both coarse and fine sediment.

It is expected that no imported rock, cabling, or mechanical anchors would be used for any wood pieces, relying solely on embedment or natural materials as ballast to stabilize the wood pieces during high flow events. Risk to property due to log mobilization and entrainment due to a high flow event is very low at this site due to the absence of downstream infrastructure.

F. FLOODPLAIN RESTORATION

Floodplain restoration would occur just downstream of where Lewis Gulch Creek pulls away from SR-1 (see the area within the yellow dashed line on Figure 4). The area east of Lewis Gulch Creek to SR-1 would be graded approximately 2 to 5 feet lower to allow higher floodwaters to inundate the area and then gradually recede without stranding fish. This would recreate a natural pattern that provides high flow refugia for fish during high flows that has otherwise been nearly eliminated in the Project area. The re-graded floodplain would be stabilized using woven coir fiber matting, or an alternative biodegradable erosion control matting combined with seeding and installation of native riparian species for long-term stability. The creek design would allow for it to overtop onto the floodplain periodically. The additional grading would also generate approximately 1,600 square feet of soil removal, some of which would be replaced as topsoil, and the remainder used as fill material in the footprint of the crossover segment of Fairfax Bolinas Road after it is removed.

G. REMOVAL OF FAIRFAX BOLINAS (CROSSOVER) ROAD

The Crossover Road section of Fairfax Bolinas Road currently bisects the Bolinas Wye wetland, creating a physical barrier to surface and groundwater flows and dividing the wetland. The proposed Project would remove the road and restore wetland vegetation throughout the former footprint of the road. After the pavement and any subsurface fill are removed, native soil harvested from the stream channel excavation process would be used to create an even grade. Removing the road would allow the stream channel to migrate across the floodplain as it did previously. In addition, sea level predictions for the area show that portions of the road will be inundated by Bolinas Lagoon by the end of the century. Removing the Fairfax Bolinas (Crossover) Road would reconnect and restore the wetland habitats and allow for the incremental landward migration of tidally influenced habitat types. The Fairfax Bolinas Road is a primary feature of the cultural landscape in the Wye area and is evaluated in the Cultural Resources section of the CEQA Appendix G checklist portion of this IS/MND.

H. SPOILS PILE REMOVAL

An artificial berm, or spoils pile, has been unintentionally created to the south of the existing Lewis Gulch Creek channel just downstream of the existing Olema Bolinas Road culvert (shown on Figure 4). The berm evolved as sediment was removed from the artificial channel and now presents a barrier to overland flow during flood events. To alleviate this effect and ensure appropriate transition of habitat types over the long-term scale of SLR, several notches would be created in the existing berm/dredge spoils pile to the south bank of the creek. The notches would allow flood flow conveyance, while providing high ground refugia for species such as California black rail (*Laterallus jamaicensis coturniculus*).

I. LONG-TERM VEGETATION MANAGEMENT ACTIONS

The majority of the Project site outside of the roadways consists of currently heavily vegetated wetlands, riparian, and upland communities. The goal of the Project's revegetation efforts would be to restore wetland, floodplain, and riparian habitats to all disturbed areas to improve both habitat and the character of the site. To the extent possible, revegetation would involve using native material from the site, including seed collection, taking cuttings for nursery development, or bioengineering.

The Golden Gate National Parks Conservancy (GGNPC), working in conjunction with the MCOSD and the WRA design team, has created a Vegetation Management Plan (VMP) for the site to direct native revegetation and long-term control of non-native invasive species (NNIS) in the Project area (the entire Bolinas Wye wetlands) (GGNPC, 2021). Areas identified on the site for replanting are based on the limits of Project disturbance. In addition to the initial NNIS removal activities discussed above, the VMP proposes continuing actions to limit re-establishment of those species after initial construction is complete. Continuing vegetation management throughout the Project site would be implemented in various Active Management Zones (AMZs) as needed to control invasive vegetation, and to promote healthy native habitats for endemic plant and wildlife species of the area. Major features of the Project's proposed long-term vegetation management include revegetation, use of appropriate plant palettes, tree planting, and invasive species control.

i. Revegetation

The revegetation plan involves caring for plants installed in disturbance areas post-construction, creating plant palettes for each habitat type, and planting trees to compensate for those removed during construction. Four revegetation methods will be employed: salvaging, willow stakes, container planting, and direct seeding.

Certain areas that have plant cover suitable to harvest and replant (salvage) have been mapped and quantified. The primary methods for acquiring salvage plants are by mechanically harvesting sod passes or by manually harvesting desired plants. Willow stakes are an effective way to establish erosion control and vegetative cover on wetland restoration projects. This method is suitable for creek banks in areas closer to Bolinas Lagoon where willows are the dominant species, and anywhere willows are specified in the plant palette. Willows growing along the lagoon and upstream of the Project site will be prioritized as source material for willow stakes. Depending on the population of deer and other grazing animals, exclosures may be necessary to provide the willow stakes a protective barrier to grazing. Container plants will be sourced from a nursery with pathogen-free plants, preferably from Marin County within the Lewis Gulch Greek watershed. Plants will be purchased in a variety of sizes and visually inspected by field staff before installation. Direct seeding may be used as the primary method of revegetation in areas where sheet flow is not expected. Seeding would occur between mid to late November or early December after the first rain event and just before the next round of rain. Seeds may be spread by hand or through use of a seed spreader.

If no rain is forecast within two weeks of the date of installation, plants will be watered every two weeks until soils are fully saturated, and rain is continually in the forecast for the rainy season. If rain is not in the forecast at any time between December through March, supplemental watering will resume. If plants are installed in the late summer or early spring, plants will be watered every two to three weeks for three months. Additionally, a 1.5-inch-deep and 6-inch-wide radius of weed-free straw mulch will be placed around plantings to reduce competition for water and sunlight.

ii. Plant Palettes

As described below, there are nine vegetative communities mapped on the site. Thus, nine distinct planting palettes that can accommodate sea-level rise and climate variability, including large rain event and drought, have been developed for the disturbed areas of the site. The nine palettes are arroyo willow thicket, coast live oak woodland, coastal brambles, red alder forest upland, red alder forest lowland, roadside grasslands, salt grass flats, and salt marsh bulrush marsh. Figure 13 to Figure 17 show only the planting that would occur immediately following Project construction, with Figures 13–15 illustrating the planting that would occur following the first year, and Figures 16–17 illustrating the planting that would occur following the second year. All plantings would be completed at the end of the second year of Project construction.

iii. Tree Planting

An arborist report has been prepared to document existing trees on the Project site (WRA, 2021). A total of 214 trees are located within or directly adjacent to the Project site. Of these, 123 trees are proposed for removal during implementation of the Project. The proposed Project will require the removal of trees within oak woodland, forested wetlands, riparian, and similar habitats to accommodate grading and restoration of the new channel, road relocation, and construction of the new bridge.

A total of 1,246 trees will be planted onsite, in addition to the many shrubs listed in the planting palette. This represents a 10:1 replacement ratio for the 123 trees that will be removed (3.5:1 replacement for oaks). On-site planting may occur within the restored floodplain where the crossover section of Fairfax Bolinas Road is removed, increasing habitat continuity within this floodplain. Of the existing trees to be preserved, some will require pruning where canopies and/or root zones extend into the area of Project disturbance.

iv. Invasive Species Control

Continuing vegetation management practices within lands owned and operated by the MCOSD requires use of an IPM approach, which involves active physical removal to control invasive plant species. BMPs will be implemented during invasive plant species removal to protect adjacent native habitats. Care will be taken during Project implementation to prevent the introduction and movement of weed seeds. Generally, within the site, boots, equipment, and vehicles will be cleaned before moving from an area with weeds to an area without weeds. If work needs to happen where weeds are present, BMPs will be used and contaminated areas visited last, when possible.

Active Management Zones (AMZs) will be developed for focused management of target species and management of other non-native invasive species. Cape ivy, Himalayan blackberry, wisteria, and periwinkle will be removed in the AMZs prior to Project implementation. Treatment will occur regularly for five years following construction to ensure these species do not suppress native vegetation.

IPM requires exhaustion of all physical means to control invasive vegetation first, before limited use of certain approved herbicides would be allowed. If, and only if, physical removal proves to be non-effective or less effective than required for native habitat revitalization, then other biological or chemical approaches, including use of herbicides, may be considered at the Bolinas Wye wetlands. Herbicide use would require approval for use in aquatic environments and would also have to be applied by a licensed applicator with all required warnings posted near the application site(s). Herbicide application methods may include cut stump, foliar, spot spray, and wick/wipe. A registered, nontoxic dye may be added to the herbicide mixture to improve detection, ensure thorough application, and avoid overspray. A surfactant to assist the herbicide in sticking to and penetrating leaf cuticles or bark surfaces may also be added to the mixture. All applications will follow label directions and further directions contained in a pesticide recommendation written by a certified Pest Control Advisor (PCA), as well as guidelines set forth by the California Department of Pesticide Regulation. In general, best practices include: no application occurs in water bodies or active waterways, no foliar spraying occurs when wind speeds are greater than seven miles per hour, no foliar spraying when fog or rain is present, and no application within 24 hours of predicted precipitation. Herbicides should be mixed over secondary containment away from water bodies, and care should be taken to mix only as much herbicide as will be used on site that day.

If a non-native invasive species (NNIS) is continually re-sprouting after the plant has been cut back, then a cut and paint herbicide application would be used as it requires a very small amount of herbicide for treatment and is not subject to wind drift. The small use of herbicide on a previously cut-back plant would be most effective, with the least amount of herbicide, and would limit continual ground disturbance from digging out additional re-sprouts.

VII. CONSTRUCTION

This section provides an overview of the construction process for the proposed Project. Information describing the proposed phasing and sequencing of the Project's components, the necessary equipment, grading and soils management, tree and non-native vegetation removal, access, and staging is presented in the subsections below.

The constructability of the proposed Project has been a major consideration throughout the design process. The Project is complex, involving roadway and bridge construction, and nuances of channel construction in a heavily wooded area. The site is in a liquefaction zone, and soils are poorly suited for providing stability, resulting in the need for over-excavation,[1] pilings, or the use of engineered fill placed in compacted lifts and allowed to settle for a sufficient period of time for roads and bridges. Access to the Project site for heavy equipment is another consideration due to the winding nature of access routes and the distances that need to be traveled.

A. CONSTRUCTION SEQUENCE

Because Olema Bolinas Road is the primary access route in and out of the community of Bolinas, construction of the proposed Project must be sequenced to provide continual through access. To accommodate this, the proposed Project would be built over two construction seasons as shown in

[1] Over excavation refers to an excavation that goes beyond the depth required for the formation of a below-ground structure.

Figures 19 and 20. Phase I of Project construction would consist of the first construction season, while Phase II would consist of the second. Construction seasons generally occur between May 1 and October 31, although work window dates may be influenced by permitting-agency specified measures needed to protect special-status species including black rail, California red-legged frog, and steelhead, among others.

As shown on Figure 19, the first construction season (Phase I) would include:

- Olema Bolinas Road realignment and new bridge construction,
- Elevating Olema Bolinas Road and constructing the roadside slopes,
- Lewis Gulch Creek channel construction through the Bridge Reach, including installation of log structures,
- Lewis Gulch Creek bank stabilization upstream of new bridge,
- Lewis Gulch Creek new channel floodplain restoration, and
- Removal of invasive stands of Himalayan blackberry (*Rubus armeniancus*).

After the first construction season, flows in Lewis Gulch Creek would follow the existing path along the west side of Olema Bolinas Road. The newly graded Bridge Reach channel would be isolated from flow using large volume sandbags placed just upstream of the newly constructed bridge, through the winter between the first and second construction seasons, and up until the end of the second construction season.

As shown on Figure 20, the second construction season (Phase II) would include:

- Removal of the Fairfax Bolinas (Crossover) Road,
- Excavating the Transitional and Wye Reaches of the realigned channel for Lewis Gulch Creek,
- Installation of log structures in the Transitional and Wye Reaches of Lewis Gulch Creek, and
- Notching the existing berm on the southern side of Lewis Gulch Creek, just downstream of the existing Olema Bolinas Road box culvert (spoils pile removal).

At the end of the second construction season, the temporary sandbag diversion dam upstream of the bridge would be removed, and the earthen berm would be installed in the former Lewis Gulch Creek channel to divert all flow into the newly constructed channel. Vegetation management and nonnative invasive species removal will occur prior to construction of the elements described above, during the winter, and post-construction.

B. EQUIPMENT

Construction activities related to realigning the Lewis Gulch Creek channel would involve the use of small excavators, dozers, track trucks, and skip loaders to minimize the disturbance footprint. Dozers, scrapers, excavators, cranes, pile-driving equipment, rollers, compacters, and paving equipment would be used to construct proposed improvements to Olema Bolinas Road and the proposed bridge.

C. SOILS AND GRADING

Topsoil excavated for the constructed channel for Lewis Gulch Creek would be reused in the area where Fairfax Bolinas Road is proposed for removal and in the proposed restored floodplain above Olema Bolinas Road. Wetland sod and topsoil removed from the channel areas would be stored and re-used in the former footprint of Fairfax Bolinas Road. Road fill soil would be prepared at approved facilities and imported to the site in tandem dump trucks. Soil specifications would be prepared by the Project's civil engineer using the recommendations from the geotechnical report. Because of the existing subsurface soil conditions, road grade areas would need extended time to settle and reach the necessary compaction. Soil amendments and/or extra soil compaction efforts may be necessary to reach the required compaction for the new and proposed improved areas of Olema Bolinas Road.

The quantity of material associated with removal of existing roadways is approximately 500 cubic yards, which would be transported to a location outside of the Project area (likely the Marin Resource Recovery Center in San Rafael) for disposal or recycling if it is determined unsuitable for on-site reuse as road fill. Removal of roadway materials, at 8 cubic yards of material per truck, would require 63 trips. The proposed Project will also remove and reuse approximately 1,200 cubic yards of fill excavated from the new channel areas and would require the import of an additional approximately 1,200 cubic yards of fill for roadway construction. Importing this roadway fill would generate approximately 150 truck trips. The depths below existing ground surface for specific ground-disturbing activities proposed as part of the Project are summarized below in Table 3.

Table 3. Grading Depths for Project Components

PROJECT COMPONENT	MAXIMUM DEPTH BELOW GROUND SURFACE (FEET)
Bridge Abutment Stems	15
Bridge Piles	75
New Road Subgrades	2
Old Road Demolition	2
Stream Channel Above Bridge	5
Stream Channel Below Bridge	3
Tree and Stump Removal	5
Utility Modifications	5
Wetland Restoration	2
Himalayan blackberry removal	3

D. TREES AND NON-NATIVE VEGETATION

Trees removed for the constructed Lewis Gulch Creek channel and road realignment areas would be cut to size and stored temporarily on site for re-use as proposed channel and floodplain log structures. All remaining removed trees and brush would be removed from the site and disposed of at appropriate disposal facilities.

Prior to construction, Cape ivy (*Delairea odorata*), Himalayan blackberry (*Rubus armeniacus*) and periwinkle (*Vinca major*) will be removed from the Project area to avoid moving these species during construction and to begin the process of non-native invasive species management and wetland vegetation restoration. Disturbed areas will be planted or direct seeded with locally collected native species following each construction season, and in-fill planting and non-native invasive species control will continue for at least two years following construction.

E. ACCESS

During Phase I construction season work, traffic would be directed to use Fairfax Bolinas Road to access the town of Bolinas from SR-1. Temporary single lane traffic controls would be required during construction season to complete road grading activities on Olema Bolinas Road south of the intersection with Fairfax Bolinas Road. A temporary paved ramp would also be required for the transition from Olema Bolinas Road to Fairfax Bolinas Road. Approximately 2,820 sf of temporary paving would also be added to the intersection of Fairfax Bolinas Road and SR-1 to allow for vehicles to turn onto Fairfax Bolinas Road from southbound SR-1 (see Figure 19).

F. STAGING

As illustrated in Figure 6 (Year 1) and Figure 7 (Year 2), staging of construction activities and stockpiling of materials would use decommissioned areas of Olema Bolinas Road during the first construction season and Fairfax Bolinas Road during the second construction season. A temporary signal on Olema Bolinas Road or intermittent single lane closures may be required for portions of the work.

VIII. CONSERVATION MEASURES

The proposed Project is designed to improve environmental processes and minimize environmental impacts associated with restoration. Conservation Measures have been incorporated into the general construction design and implementation of the proposed Project to improve the overall effectiveness of the restoration and to minimize generally foreseeable adverse impacts. Conservation Measures are distinguished from “Mitigation Measures” in that they are conceived as part of the design of the proposed Project rather than being stipulated as methods of reducing or eliminating unforeseen or unavoidable impacts of the Project. Ultimately, both Conservation and Mitigation Measures will become stipulated conditions of approval by the relevant permitting agencies and the MCOSD. For the proposed Project, Conservation Measures were identified in advance so that they could be incorporated directly into the design. These Conservation Measures have been drawn from recent permitting documents for similar projects issued by the following agencies with permitting authority over aspects of the proposed Project:

- U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) – Programmatic Biological Opinion (PBO) and Biological Assessment (BA)
- California Department of Fish and Wildlife (CDFW) – Selected Section 1602 Lake and Streambed Alteration Agreements
- United States Army Corps of Engineers (Corps) Nationwide Permits (NWP) #27 and #14 for Aquatic Habitat Restoration and Linear Transportation projects, respectively

Conservation Measures for the proposed Project shown below are organized by topic and address general Project conditions to protect the environment. No Conservation Measures pertaining to cultural or tribal resources are included below as these areas are the subject of Project Mitigation Measures required to avoid potentially significant impacts resulting from Project implementation.

A. BIOLOGICAL CONSERVATION MEASURES

1. Prior to initiating ground disturbing activities, the limits of construction shall be marked with stakes, flags or similar high-visibility markers to prevent any work from extending the work area or entering sections of the creek or adjacent wetlands unnecessarily. (USFWS, CDFW, Corps)
2. Staging areas will be located in designated zones within the construction limits. (USFWS, CDFW)

3. Fueling and maintenance of tools or equipment will occur only within designated staging areas or within developed surfaces.
4. A training program will be given to all crew members working on the proposed Project. The training will be given by a qualified biologist (either in person, or via a pre-recorded presentation) and will include education to all crew members on sensitive resources (e.g. wildlife, fish or habitats) that require special protections, as well as general protections such as the boundaries of work, water quality protection practices, environmental protection measures, and permit specified restrictions (CDFW, USFWS).
5. All equipment (mechanized or hand tools) shall be cleaned before and after use on the Project. Equipment will be cleaned at an offsite facility such that mud which could potentially carry invasive plant materials is removed and thoroughly dried such that the spread of invasive plants is minimized. Any aquatic equipment (e.g., pumps, nets etc.) shall be cleaned sufficiently and dried for at least 72 hours to prevent the spread of aquatic invasive organisms.
6. Heavy construction within the ordinary high waterline will occur when stream flows are at their lowest (typically July through October). All disturbed soils will be stabilized by October 31. (SWRCB)
7. All Project activities that could spread *Phytophthora* species (plant-damaging Oomycetes [water molds]) to new locations would be subject to BMPs developed by the California Oak Mortality Task Force, available online at: https://www.suddenoakdeath.org/diagnosis-and-management/best-management-practices/. Phytophthora BMPs include but are not limited to:
    - Informing personnel that they are working in a phytophthora-infested area, unauthorized movement of soil material is prohibited, and the intent of these prevention measures is to prevent spread of phytophthora.
    - Removing or washing off accumulations of plant debris, soil, and mud from shoes, boots, vehicles, and heavy equipment, etc. before entering and leaving the Project area, and cleaning with denatured alcohol or similar materials as needed.

B. NOISE CONTROL

1. Equipment and power tools will utilize the best available noise control techniques such as improved mufflers, and use of intake silencers.
2. Contractors will limit the idling of motors except as necessary for safe operations. Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). (BAAQMD)
3. Project-related construction activities will occur within permitted days and times and would generally be limited to the hours of 7:00 a.m. to 6:00 p.m.

C. AIR QUALITY MANAGEMENT

The Bay Area Air Quality Management District (BAAQMD) recommends basic construction measures to ensure minimal impacts on regional air quality. The contractor would be responsible for implementing the following basic measures during construction:

1. All exposed surfaces such as parking areas, staging areas, soil piles, and graded areas will be watered as needed for dust control. (BAAQMD)
2. All haul trucks transporting soil, sand, or other loose material off-site will be covered. (BAAQMD)
3. All visible mud or dirt track-out onto adjacent public roads will be removed using wet power vacuum street sweepers at least once a day. The use of dry power sweeping is prohibited. (BAAQMD)
4. Clear signage will be provided to direct construction workers to all access points. (BAAQMD)
5. All construction equipment will be maintained and properly tuned in accordance with manufacturer specifications, and all equipment will be checked by a certified visible emissions evaluator. (BAAQMD)
6. A publicly visible sign with the telephone number and person to contact at the lead agency regarding any dust complaints will be posted in a visible location on or near the Project site. The contact person will respond to complaints and take corrective action within 48 hours. The BAAQMD phone number will also be visible to ensure compliance with applicable regulations. (BAAQMD)
7. Evidence of reduced NO_x emissions from off-road diesel-powered equipment shall be provided by the contractor. (BAAQMD)

IX. PERMITS AND APPROVALS

The information contained in this Initial Study will be used by the MCOSD as it considers the proposed Project. If the Project is approved, the Initial Study and the associated Mitigated Negative Declaration (MND) would be used by the MCOSD and other responsible and trustee agencies in conjunction with various approvals and permits.

These actions include, but may not be limited to, meeting all applicable requirements to secure the necessary approvals and/or permits from the following agencies:

National Oceanic and Atmospheric Administration (NOAA)

- Magnuson-Stevens Fishery Conservation and Management Act
- Coastal Zone Consistency Determination for Restoration Projects

U.S. Fish and Wildlife Service (USFWS)

- Federal Endangered Species Act, Section 7 Biological Opinion (California red-legged frog)

U.S. Army Corps of Engineers (Corps)

- Clean Water Act, Section 404, NWP 27 and 14

National Marine Fisheries Service (NMFS)

- Marine Mammal Protection Act
- Federal Endangered Species Act, Section 7 Consultation (Steelhead and Coho)

Greater Farallones National Marine Sanctuary (GFNMS)

- National Marine Sanctuaries Act, Manager's permit

State Historic Preservation Office (SHPO)

- National Historic Preservation Act, Section 106

State Water Resources Control Board (SWRCB)/San Francisco Bay Regional Water Quality Control Board (SFRWQCB)

- Clean Water Act, Section 401 Water Quality Certification
- Porter-Cologne Water Quality Act
- Clean Water Act, Section 402 National Pollutant Discharge Elimination System (NPDES) permit

California Coastal Commission (CCC)

- California Coastal Act, Federal Consistency Determination (CD) for Projects in the Coastal Zone

California Department of Fish and Wildlife (CDFW)

- California Fish and Game Code, Section 1600 Lake or Streambed Alteration Agreement
- California Fish and Game Code, CESA Consistency Determination for Incidental Take of Coho Salmon

California Department of Transportation (Caltrans)

- Right-of-Way Encroachment Permit

Bay Area Air Quality Management District (BAAQMD)

- Federal Clean Air Act

X. PROJECT DEVELOPMENT

Since 2002 the MCOSD has been working in partnership with the Greater Farallones National Marine Sanctuary (GFNMS), Point Reyes National Seashore (PRNS), Golden Gate National Recreation Area (GGNRA), and the Golden Gate National Parks Conservancy (GGNPC), collectively referred to as the Bolinas Partners, to restore Bolinas Lagoon. The MCOSD has also been working with the Bolinas Lagoon Advisory Council (BLAC). The BLAC advises the Board of Supervisors, Board of Directors of the MCOSD, and the MCOSD on the management and ecological restoration of Bolinas Lagoon. It is composed of twelve representatives from local recreational interests, homeowners' groups, environmental nonprofits, county and federal agencies, and appointees made by the county Board of Supervisors.

Bolinas Lagoon has been the subject of several studies and reports with the goal of improving its health and ecological function. The most applicable of these studies and reports are described in this section to provide background for the proposed Project.

A. 2008 BOLINAS LAGOON ECOSYSTEM RESTORATION PROJECT: RECOMMENDATIONS FOR RESTORATION AND MANAGEMENT (GFNMS 2008) – LOCALLY PREFERRED PLAN

In 2008, the Greater Farallones National Marine Sanctuary (GFNMS), the MCOSD, and the U.S. Army Corps of Engineers published the *Bolinas Lagoon Ecosystem Restoration Project: Recommendations for Restoration and Management Report* (also known as the Locally Preferred Plan [LPP]), which focused on addressing historic human impacts to Bolinas Lagoon by aiding ecologic and hydrologic processes. The report provided a suite of recommendations for long-term management actions and established an overall project goal, along with specific restoration objectives.

The stated goal of the LPP was to “ameliorate adverse human impacts to the lagoon, thereby promoting the natural, dynamic, geologically evolutionary processes of this internationally recognized estuarine environment” (p. 7). The objectives of the Project were to:

1. Restore natural sediment transport and ecological functions of Bolinas Lagoon by ameliorating the negative effects of human induced changes.
2. Identify and manage introduced species in the Bolinas Lagoon watershed.
3. Protect water quality by minimizing negative human impacts.

The LPP prioritized projects that ensure the long-term health of the overall Bolinas Lagoon, and was reviewed by technical experts, community groups, and the BLAC. The report includes 14 restoration recommendations and identified restoration recommendations applicable to the Bolinas Wye to improve flood plain function and to reduce flood risk (4a-LPP), improve transitional habitat (6-LPP), and to plan and manage for future SLR (9-LPP) (p. 27, 30, and 32 respectively).

In 2013, the San Francisco Bay Joint Venture sponsored a panel of scientific experts to evaluate the recommendations of the LPP (Design Review Group, DRG). Although the panel confirmed that the LPP remained the guiding document for restoration planning purposes, it identified evolving scientific issues that affect project designs and priorities. The important new perspectives that emerged from the meeting and are relevant to the proposed Project are as follows:

- Accelerated sea-level rise replaces previous concerns over the loss of tidal prism as the overriding impact to the lagoon’s ecosystem structure and function.
- In the context of sea-level rise, sediment can be an important asset to the lagoon.
- Accommodation room for the lagoon to migrate inland as sea level rises is necessary for the long-term health and stability of Bolinas Lagoon.

The DRG also made the following general recommendations:

- Planning for various sea-level rise and storm surge scenarios should be incorporated into the restoration Project.
- Armoring is a liability for lagoon resilience and adaptation to rising sea level.

Lastly, the DRG made the following Project- and area-specific recommendations:

- The Lewis and Wilkins Gulches (the area known as the “Wye”) is another highly important zone for lagoon accommodation space, tidal marsh and floodplain migration, and sediment management opportunities in response to sea-level rise.

The results of the DRG recommendations were presented to the BLAC and led to public support of the development of conceptual designs for the Bolinas Lagoon North End Project described further below.

B. POTENTIAL BOLINAS LAGOON NORTH END RESTORATION PROJECT

The potential Bolinas Lagoon North End Restoration Project (North End Project) was built off the DRG recommendations and LPP recommendations 4a-LPP, 6-LPP, and 9-LPP, and created a future vision for restoring the watersheds at the northern end of Bolinas Lagoon. The stated goals of the North End Project are:

- **Habitat Restoration and Reconnection:** Improve the hydrologic function and stream flow conveyance of Lewis Gulch Creek and Wilkins Gulch Creek and enhance riparian and wetland habitats.
- **Road Safety:** Alleviate chronic flooding of Marin County and State roadways and improve traffic safety.
- **Climate Change and Sea-Level Rise Adaptation:** Allow for future expansion of Bolinas Lagoon and its tidal-freshwater transition zone as sea level rises (AECOM 2016).

The potential North End Project study area includes the proposed Project area as well as the lower watersheds of Wilkins Gulch Creek, Salt Creek, and Wharf Creek that drain through the Wye and into the northern tip of Bolinas Lagoon. The boundaries of the North End Project study area are shown on Figure 21.

The potential North End Project encompasses federal lands managed by the National Park Service (Point Reyes National Seashore and the Golden Gate National Recreation Area), the County of Marin (MCP and the Department of Public Works), private landowners, and the State of California (managed by the California Department of Transportation [Caltrans]). Private properties within the potential North End Project occur to the west of Lewis Gulch Creek, north of the Olema Bolinas Road/SR-1 intersection.

Several studies and reports have been completed to create a vision for restoring the northern end of Bolinas Lagoon and ultimately the proposed Project. The reports were prepared with public input during many public meetings throughout 2016 and 2017. The most applicable are described below.

i. 2016 AECOM Site Conditions Report and Technical Memos

The purpose of the Site Conditions Report and its constituent memoranda is to provide a foundation for developing restoration and climate change adaptation alternatives for the potential North End Project. The Site Conditions Report presents a summary and analysis of the existing site conditions found at the north end of the Bolinas Lagoon and its surroundings, including the current and historical conditions of the north end of the Bolinas Lagoon, Lewis Gulch and Wilkins Gulch Creeks, and the surrounding riparian corridors and uplands. Studies were conducted to address a variety of topics, including cultural and biological resources, history, geology, geomorphology, and hydrology, land ownership, infrastructure, and vehicle traffic. The Technical Memorandums below have been summarized in and serve as attachments to the Site Conditions Report. The studies have contributed substantive information about the Project area and have informed the design development of the proposed Project.

- Bolinas Lagoon North End Restoration Project - Current and Historic Geomorphology and Hydrology. AECOM 2016

- Bolinas Lagoon North End Restoration Project – Additional Studies and Data Needed. AECOM 2016
- Bolinas Lagoon North End Restoration Project – Biological and Cultural Resources. AECOM 2016
- Bolinas Lagoon North End Restoration Project – Utilities and Parcel Ownership. AECOM 2016
- Bolinas Lagoon North End Restoration Project – Traffic Counts and Analysis. AECOM 2016
- Bolinas Lagoon North End Restoration Project – Regulatory Environment. AECOM 2016

ii. 2017 AECOM Conceptual Design Report

The Conceptual Design Report included three conceptual design alternatives that offered different design solutions to meet the goals of providing habitat restoration and reconnection, road safety, and climate change/sea-level rise adaptation. The three conceptual design alternatives were selected collaboratively with the Bolinas Partners, BLAC, and members of the Bolinas and Stinson Beach communities. The design of each conceptual alternative includes three construction phases, representing near-term (Phase 1), mid-term (Phase 2), and longer-term (Phase 3) improvements. The alternatives are comprised of several common design elements, including:

- reconnecting Lewis Gulch Creek and Wilkins Gulch Creek to portions of their floodplain and alluvial fan;
- restoring portions of Lewis Gulch Creek;
- reducing roadway flooding by replacing culverts and elevating roads
- upgrading the Lewis Gulch Creek culvert under SR-1;
- stabilizing the left bank of Lewis Gulch Creek at SR-1 and Olema Bolinas Road;
- constructing a new road crossing and redirecting Lewis Gulch Creek under it and into its former alluvial fan;
- elevating SR-1 on a causeway;
- removing the Fairfax Bolinas Road (Crossover Road) and reconfiguring the Wye road intersection; and
- creating vegetated shoreline and soft erosion protection components wherever feasible to enhance sea-level rise resiliency.

The Conceptual Alternatives were developed to meet the goals of the North End Project, summarized above. The components of each conceptual alternative that are unique to it are bulleted below.

- **Alternative 1:** Includes raising SR-1 onto two causeways and restoring the downstream portion of the Wilkins Gulch Creek floodplain.
- **Alternative 2:** Considered the hybrid approach and includes raising SR-1 onto two causeways and restoring the entire Wilkins Gulch Creek floodplain to the head of the alluvial fan (both downstream and upstream portions of the drainage).
- **Alternative 3:** Includes raising SR-1 onto a single causeway that intersects with a Fairfax Bolinas Road causeway and restoring the entire Wilkins Gulch Creek floodplain to the head of the alluvial fan, both downstream and upstream portions of the drainage.

The Conceptual Design Report included an opportunities and constraints analysis associated with each of the alternatives. The conclusion of the opportunities and constraints analysis was that all alternatives would outline an opportunity to provide the Bolinas Lagoon ecosystem with extensive habitat restoration, traffic safety, and sea-level rise adaptation benefits, and that all alternatives would involve short-term constraints such as disruption of the community during construction; losses of wetland, creek, and sensitive species habitat during construction of roadways and restoration elements; and uncertainty related to availability of funding and uncertainty in climate change projections. The Conceptual Design Report also included a geotechnical evaluation as an appendix.

iii. Recommendations by the BLAC, Marin County Open Space District Board of Directors, and Board of Supervisors

The AECOM Conceptual Design Report was reviewed by the BLAC on September 29, 2017 and they recommended that the MCOSD Board of Directors pursue Phase 1, and to defer subsequent phases as a long-term “vision” that the community could work towards. This would allow for current studies to be completed and additional discussion that could refine the analysis and allow for the development of funding strategies. On February 27, 2018, the MCOSD Board of Directors reviewed the BLAC’s recommendations during a public meeting and approved with proceeding with Phase 1, which included majority of the design components for what is now the Proposed Bolinas Lagoon Wye Wetland Project, the subject of this IS/MND. The BLAC has received project updates at all their public meetings (bi-yearly since 2016), and bi-annual BLAC sponsored State of Bolinas Lagoon Conference (2021 was the last conference).

iv. Additional Studies and Reports

The following additional studies and reports were completed to increase understanding of specific resources and technical subject areas for the potential North End Project and for the proposed Project, apart from the Culvert Maintenance Project Report that was prepared for the Marin County Department of Public Works:

- AECOM Hydraulic Modeling Report, Bolinas Lagoon North End Project, Topographic Survey and Hydraulic Modeling. AECOM 2017.
- North End Bolinas Lagoon Surface and Groundwater Monitoring (Water Years 2018, 2019, 2020).
- Olema Bolinas Road (Lewis Gulch) Culvert Maintenance Project: Summary of pre-construction surveys, biological monitoring, and fish relocation. WRA 2019.
- WRA Salmonid Habitat Assessment, Wilkins Gulch Creek and Lewis Gulch Creek. WRA 2017.
- Bolinas Lagoon North End Restoration Project: Rare Plant Survey. Shelly Benson, July 2017 and 2018.
- WRA Basis of Design Report (30% and 60% Designs). WRA 2020, 2022.
- WRA Hydrologic and Hydraulic Modeling Technical Report (60% Design). WRA 2022.
- WRA Fish Passage Design Criteria and Guidance Report. WRA 2020 (updated 2022).
- Bolinas Lagoon Wye Wetland Project Surface Fault Rupture Study. Slate Geotechnical Consultants Inc. (Slate, 2022).

Additionally, because the Project site straddles the San Andreas Fault, subsurface investigation was required to inform the structural design of the bridge. These actions were taken to gather important information needed to inform the development of alternative design concepts for the Project. These actions are exempt from CEQA based on the Class 6 Categorical Exemption (CEQA Guidelines Section 15306) established for information collection. The MCOSD filed the Categorical Exemption on December 16, 2020.

C. IMPLICATIONS OF PROPOSED PROJECT FOR NORTH END PROJECT

Based on the recommendation from the BLAC and the MCOSD Board of Directors, the proposed Bolinas Wye Wetlands Resiliency Project includes the following components that were included in Phase 1 of the Conceptual Design Report with the exception of the Lewis Gulch Creek culvert at SR-1:

- Remove the crossover road, which connects Olema Bolinas Road with SR-1.
- Reconfigure the SR-1/Olema Bolinas Road intersection.
- Install a bridge crossing just south of the reconfigured intersection along Olema Bolinas Road, raise the adjacent roadway to accommodate the new design grade, and redirect Lewis Gulch Creek onto the relict alluvial fan.
- Stabilize the Lewis Gulch Creek streambank adjacent to SR-1, north of the Olema Bolinas Road intersection.
- Install a new culvert near the intersection of the existing crossover road and Olema Bolinas Road.

The MCOSD determined that the proposed Project could proceed as a stand-alone project distinct from the potential North End Project for the following reasons:

- The proposed Project is located on lands managed solely by the County of Marin, whereas the potential North End Project would be located on lands managed by other entities, including the National Park Service, private landowners, and the State of California – California Department of Transportation (Caltrans).
- The proposed Project does not include upgrading the Lewis Gulch Creek culvert at SR-1, which is an element of the potential North End Project and included in Phase 1 of the Conceptual Design Report because the culvert is entirely within lands owned and managed by Caltrans. Upgrading this culvert was recommended as part of the potential North End Project to provide full fish passage. This work could occur in the future independent of the proposed Project if Caltrans were to pursue it. Implementation of the proposed Project would not affect how the Lewis Gulch Creek culvert at SR-1 could be designed or constructed in the future.
- Implementation of the proposed Project would not impact the range of potential future actions on lands managed by other entities to implement the goals of the potential North End Project. While the proposed Project and the potential North End Project share similar purposes and components, they can be implemented independently because implementation of the proposed Project does not commit the MCOSD or any other agency to implementation of the potential North End Project. Implementation of the potential North End Project is not a necessary reasonably foreseeable consequence of the proposed Project. Furthermore, the potential North End Project would not change the scope, nature, or environmental effects of the proposed Project.
- The potential North End Project was in concept only and contained adaptation and resilience

strategies that would need to occur in the future to improve climate change and sea-level rise resiliency. The Conceptual Design Report included three alternatives, previously described in the Conceptual Design Report section. These alternatives are conceptual, and a preferred alternative has not been selected. While the proposed Project includes most of the elements included in Phase 1 of the Conceptual Design Report, it does not include any elements included in Phases 2 or 3 of the Conceptual Design Report. Details regarding the scope for each phase are not known at this time since no decisions have been made as to how SR-1 would be elevated, or Wilkins Gulch Creek connected to its alluvial fan. The Conceptual Design Report included an analysis of the opportunities and constraints for the alternatives, but an alternative has not yet been selected, the resource studies have not been completed, and a project-specific design has not been completed. The evaluation of environmental effects of the potential North End Project as discussed in the Conceptual Design Report broadly relates to potential impacts to the local community, wetlands, subtidal lands, and species that utilize these habitats and highlight the need to prioritize actions to address sea-level rise within the current Project area, and the need for future actions to elevate SR-1 on a causeway or partial causeway to prevent the loss of tidal wetlands by the end of the century. Therefore, a current evaluation of the potential environmental effects of the potential North End Project would be remote and speculative.

- The proposed Project does not establish criteria for the potential North End Project, and specific project information about the potential North End Project is not necessary to make an intelligent decision whether to proceed with the proposed Project. Should the potential North End Project move forward, it would be described, and the environmental effects would be analyzed in a separate environmental document in compliance with CEQA. Since the details of the potential North End Project are not known at this time, the type of CEQA document is not known. Minimally, an Initial Study would be completed to determine whether a Mitigated Negative Declaration or an Environmental Impact Report would be appropriate.

D. BOLINAS LAGOON WYE WETLANDS RESILIENCY PROJECT STAKEHOLDER AND PUBLIC OUTREACH

The proposed Project's designs were presented to the public for comment at the following public meetings:

- Bolinas Lagoon Advisory Council – 10/16/2020 and 04/29/2022: All members were supportive of the proposed Project as presented.
- Marin Conservation League – 11/20/2020: Members were given an update on Project status and an overview of the plan. Members were supportive of the proposed Project as presented.
- Bolinas Community Public Utility District – December 16, 2020: Overwhelming support but expressed concern with bicyclists having to travel on SR-1 to and from Fairfax Bolinas Road to Olema Bolinas Road. Since the comment was received, the design plans have been updated to include a pullout that bicyclists on SR-1 could utilize near the proposed new intersection of Olema Bolinas Road and at the intersection of the Crossover Road that will be decommissioned. The pullouts will allow bicyclists to wait until they can cross the highway.
- The MCOSD/GGNPC/Marin County Bicycle Coalition (MCBC) – February 23, 2021: Informal call that discussed the proposed Project and discussed potential issues with bicyclists on SR-1. Examples of paved areas of refuge were provided that have informed the 60% design.

E. DESIGN ELEMENT ALTERNATIVES CONSIDERED FOR THE PROPOSED PROJECT

Three main design elements were evaluated by the MCOSD during development of the proposed Project: (1) the Lewis Gulch Creek channel geometry,[2] (2) the Olema Bolinas Road creek crossing and alignment, and (3) the elevation and side slopes of Olema Bolinas Road. Three alternatives were analyzed for each design consideration, except for the Olema Bolinas Road realignment and crossing analyses that included six ultimate configurations because two alignments were considered, each with three crossing types. Concept designs were analyzed, and the analysis was reviewed by the TAC.

As noted in the Basis of Design Report (30% Design) (WRA, 2020), critical short-term constraints common to all alternatives include disruption of the Bolinas community during construction and losses of wetland, creek, and sensitive species habitat during construction of roadways and restoration elements.

Important opportunities common to all alternatives include:

- native habitat expansion and increased resilience with removal of the Crossover Road;
- increased roadway safety and long-term access with improved intersections, roadway elevation (decreased sea-level rise and flooding risk) and widening (with the addition of shoulders);
- restoration of geomorphic processes that encourage sediment accretion in the wetlands;
- removal of barriers to habitat and wildlife species migration; and
- protection of Lewis Gulch Creek channel from bank erosion that undermines SR-1.

The factors weighed for alternative evaluation were:

- cost (15%),
- climate change / resilience / maintenance (20%),
- hydrologic connectivity (15%),
- environmental benefits / impacts (20%),
- schedule / feasibility (10%),
- salmonids (10%), and
- roadway safety / community benefits (10%).

Based on the analysis, the free-span bridge, Lewis Gulch Creek channel form with a one-year flow event conveyance, and Olema Bolinas Road raised on fill with 2:1 side slopes ranked the highest.

i. Lewis Gulch Creek Morphology Alternatives

All three considered alternatives assumed that the creek would cross under Olema Bolinas Road near the north end of the Bolinas Wye wetland and that the Crossover Road section of Fairfax Bolinas Road would be removed.

Alternative 1 would restore an alluvial fan condition through the creation of a diffuse network of shallow channels. Large woody debris would be used to restore habitat for steelhead and other species, promote scour and deposition, and create channel dynamism. Alternative 2 was to restore a single thread channel through the Bolinas Wye wetland that would be sized to carry the mean annual flow of the creek. Flows

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[2] The physical size, shape, and characteristics of a channel in relation to the hydraulic factors of velocity, roughness, slope, and flow frequency.

greater than the mean annual would then overtop the banks and overflow to the floodplain. Alternative 3 involved creating a traditional bankfull channel through the Bolinas Wye wetland. Alternatives 2 and 3 would also use large woody debris to promote channel and floodplain habitat and dynamism.

Alternative 2 was selected as the preferred alternative because it provided valuable floodplain habitat, minimized environmental impacts, and maintained volitional passage for all life stages of steelhead.

ii. Olema Bolinas Road Alignment and Creek-Crossing Alternatives

Two potential alignments were evaluated, a western alignment that intersected SR-1 just southeast of the existing intersection, and an eastern alignment that intersected SR-1 approximately 200 feet southeast of the existing intersection. The western alignment resulted in less replacement of Olema Bolinas Road, but required the creek to bend sharply to the east under the creek crossing and would have resulted in a need for either a larger crossing span or longer culvert crossing of the channel. The latter could not be accommodated with surrounding topography without a larger area of disturbance. The skew of the creek to the road was also seen as creating the potential for scour and channel avulsion upstream of the crossing. The eastern alignment was selected as the preferred alternative because it alleviates the skew issue and allows for a shorter span of culvert length, although it creates more short-term impacts to natural resources than the western alignment.

Three crossing types were evaluated: a bottomless arch culvert, a free-span bridge, and a causeway. The arched culvert would not meet the roadway slope requirements for connection with SR-1 while passing the 100-year flow with the required freeboard. The bridge option allowed for passage of the 100-year event while allowing for some degree of lateral channel migration under the road. The causeway would have allowed for maximum channel migration but was determined to be too costly. The bridge was chosen as the preferred crossing alternative.

Two bridge designs were considered: Alternative 1 is a single-span bridge, 60 feet in length and 38.3 feet in width. The bridge is proposed to be a cast-in-place post-tensioned concrete slab on reinforced concrete seat abutments supported by pile caps on 24 24-inch diameter cast-in-drilled-hole concrete piles. Alternative 2 (see Figure 9) is a three-span bridge, 80 feet in length and 38.3 feet in width. This bridge is proposed to be a cast-in-place post-tensioned concrete slab on reinforced concrete 2-column piers founded on four approximately 60-inch diameter cast-in-drilled-hole concrete piles. Based upon the results of the tsunami scour analysis, Alternative 2 was selected for the Project bridge design.

iii. Olema Bolinas Road-Side Elevation Alternative

The elevation of Olema Bolinas Road on fill, versus a causeway as discussed above, required evaluating the design of the side slopes of the improved and relocated areas of Olema Bolinas Road. Alternative 1 called for installing vertical retaining walls at the edge of the road. Alternative 2 called for using a 2:1 outboard slope, involving the use of engineered fill. Alternative 3 called for using a 3:1 slope with no structural elements.

The 2:1 side slope alternative was preferred. Alternative 1 was not selected because of cost and constructability concerns. Alternative 3 was rejected because it would have resulted in excessive impacts to existing wetlands, riparian habitat, and the remaining channel of Lewis Gulch Creek.

XI. MCOSD AUTHORITY, MISSION, AND LEADERSHIP

The MCOSD is an independent legal entity and a special district operating pursuant to the California Public Resources Code. Marin County Parks (MCP) oversees the management of the county parks system and provides public information on behalf of the MCOSD to fulfill the following mission:

> *We are dedicated to educating, inspiring, and engaging the people of Marin in the shared commitment of preserving, protecting, and enriching the natural beauty of Marin's parks and open spaces, and providing recreational opportunities for the enjoyment of all generations.*

A five-member Board of Directors oversees MCOSD operations. A seven-member Parks and Open Space Commission advises the MCOSD Board of Directors on policy matters related to acquisition, development, funding, management, and operation. The MCOSD's Director and General Manager oversee the day-to- day operations.

The MCOSD is subject to the following governing and guidance documents:

- Marin County Strategic Plan, 2001
- Policy Review Initiative, 2005
- Marin Countywide Plan, 2007
- Marin County Department of Parks and Open Space Strategic Plan, 2008
- Marin County Fire Management Plan, 2008
- Marin County Integrated Pest Management Ordinance, 2009
- MCOSD Road and Trail Management Plan, 2014
- MCOSD Vegetation and Biodiversity Management Plan, 2015
- MCOSD Inclusive Access Plan, 2016

Sources: National Geographic, WRA | Prepared By: gillespie, 3/12/2023

Figure 1. Project Site Regional Location Map

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

0 1 2 Miles

N

wra Environmental Consultants

Figure 2.
Project Site and Project Area

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

Project Site: (12.30 ac.)

Project Area/Limit of Disturbance: (4.06 ac.)

Limit of Grade (2.39 ac.)

N

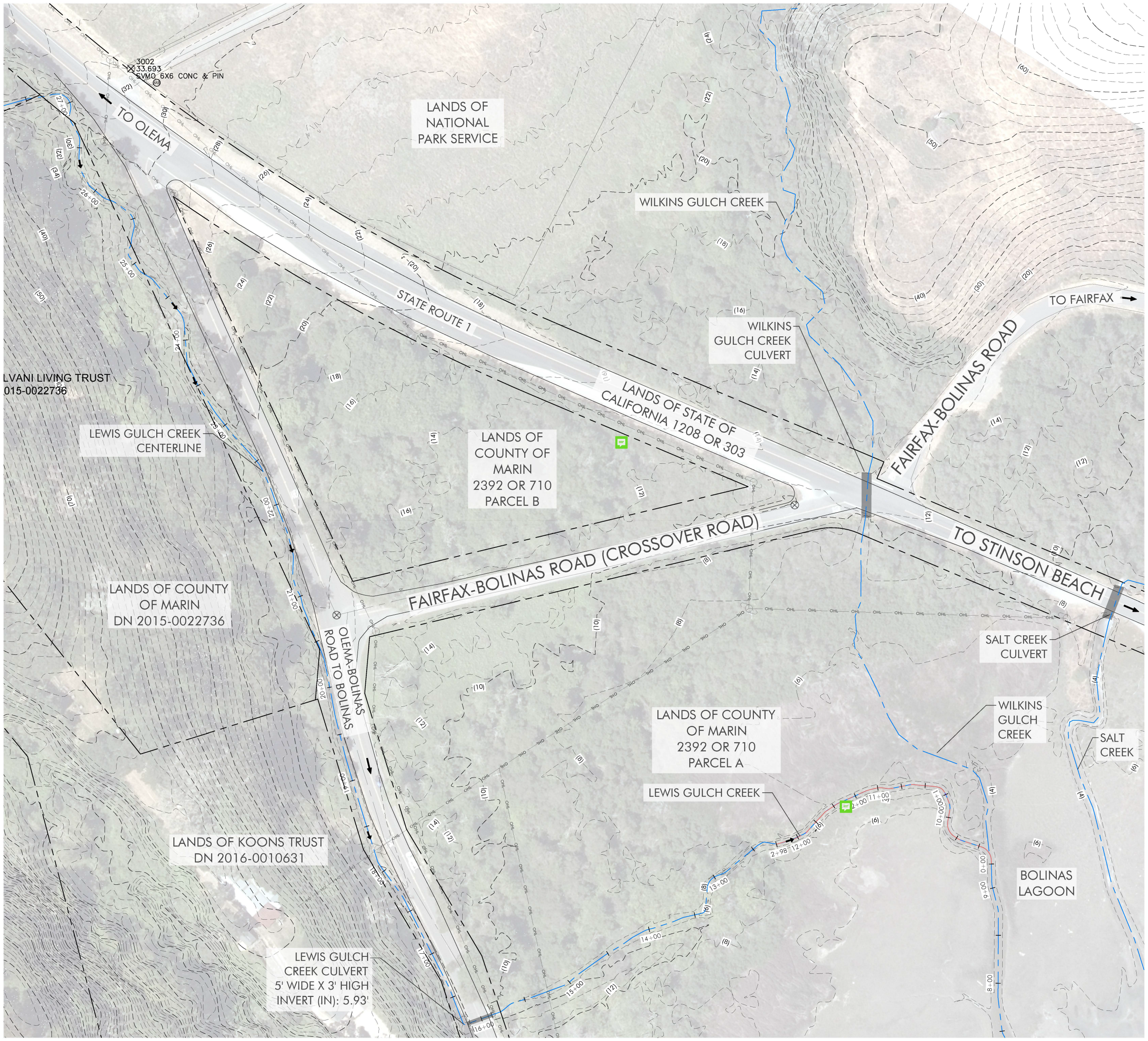
0 100 200

Feet

wra Environmental Consultants

Path: L:\Acad 2000 Files\29000\29244\GIS\ArcMap\Project Description\29244_PDFigures.aprx

Sources: Marin County 2018 Aerial, WRA | Prepared By: gillespie, 6/28/2023



1 PLAN VIEW

SCALE: 1" = 50'

EXISTING CONDITIONS LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
	ROAD RIGHT OF WAY
	EXISTING FENCE
(100)	EXISTING CONTOUR
	EXISTING CHANNEL ALIGNMENT
OHL	OVERHEAD UTILITY LINE
	FLOW DIRECTION
	EXISTING JURISDICTIONAL WETLANDS
	SURVEY CONTROL POINT
	EXISTING UTILITY POLE
	EXISITING MAILBOX

NOTES:
1. FOR CONTROL POINTS, SEE SHEET PC-1

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MARK THOMAS

BOLINAS LAGOON WYE WETLANDS PROJECT
BOLINAS, CALIFORNIA

MARIN COUNTY PARKS

NOT FOR CONSTRUCTION

Date	Issues And Revisions	No.
01/29/2020	CONCEPT PLAN	
07/30/2020	30% DESIGN	
02/14/2022	60% DESIGN	

PROJECT #29244
DRAWN BY: ACS, AMO, BMM
CHECKED BY:RBB
ORIGINAL DRAWING SIZE: 24 X 36

PROPERTY OWNERSHIP
Sheet
V-1.0

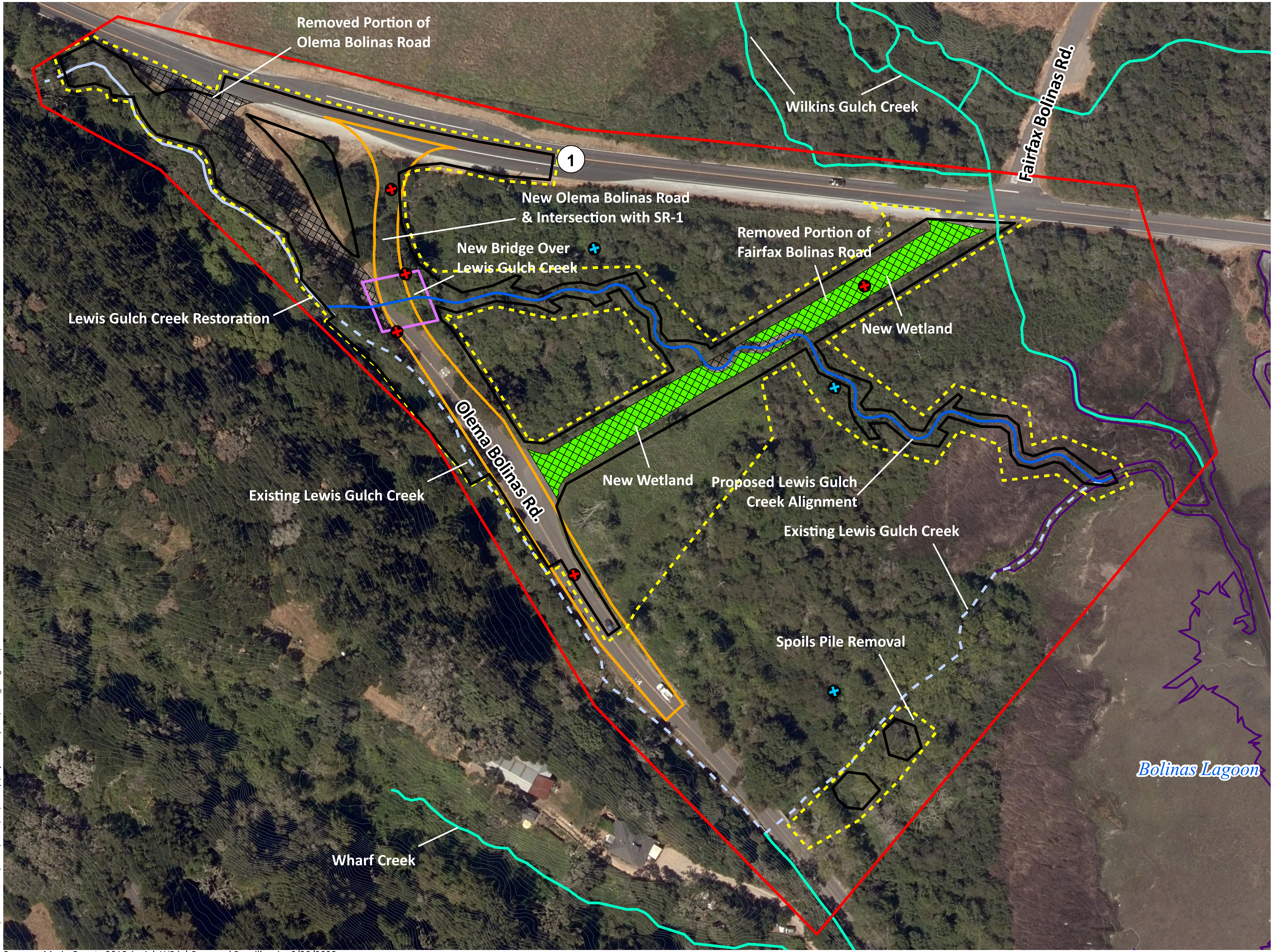
Figure 3. Property Ownership Map

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

wra Environmental Consultants

Figure 4.
Primary Project Components

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California



Project Site: (12.30 ac.)
Project Area/Limit of Disturbance: (4.06 ac.)
Limit of Grade: (2.39 ac.)
2ft. Contours

Primary Project Components

- Lewis Gulch Creek Restoration - 0.15 ac. & 418 LF
- Existing Lewis Gulch Creek - 0.43 ac. & 1,246 LF
- Proposed Lewis Gulch Creek Alignment - 0.30 ac. & 999 LF
- Adjacent Creek (No Project Work)
- Mean High Water 4.99 (NAVD88)
- New Bridge Over Lewis Gulch Creek - 0.07 ac.
- New Olema-Bolinas Road & Intersection with SR-1 - 0.53 ac.
- Removed Portions of Fairfax-Bolinas Road - 0.50 ac.
- New Wetlands - 0.28 ac.
- Existing Geotech Boring Location
- Existing Piezometer

N

0 100 200
Feet

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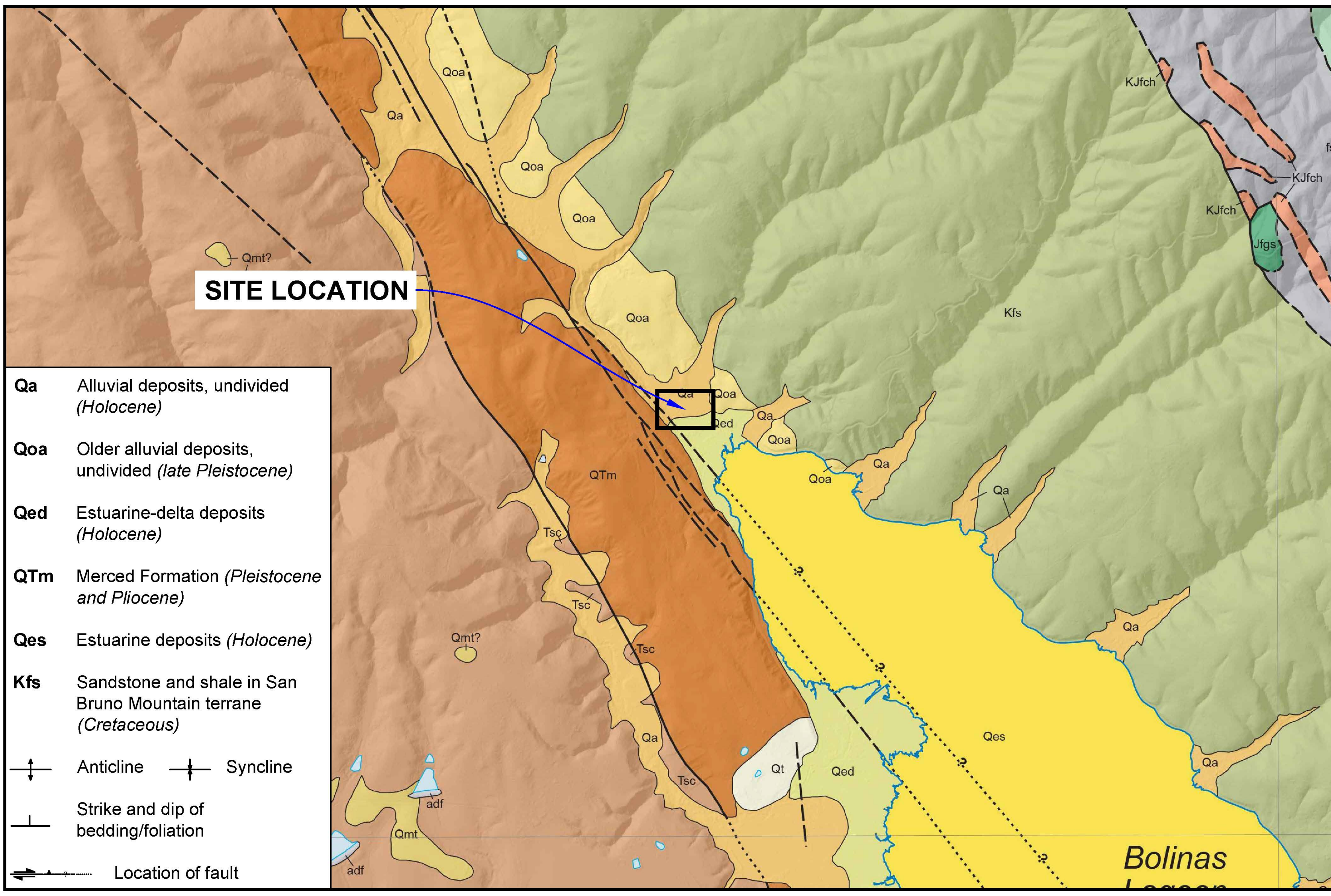
Path: L:\Acad 2000 Files\29000\29244\GIS\ArcMap\Project Description\29244_PDFigures.aprx

Sources: Marin County 2018 Aerial, WRA | Prepared By: gillespie, 6/28/2023



North

Map Source:

-Cochrane, G.R., et al. *California State Waters Map Series: offshore of Bolinas, California*. 1:24,000. Denver, CO: U.S. Geological Survey, 2015.

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MARIN COUNTY OPEN SPACE DISTRICT
BOLINAS LAGOON WYE WETLANDS PROJECT

MARIN COUNTY, CA

Figure 2
Geologic Map

Proj. No: 19-570.1
Scale: 1"=2,000'
Date: 6/16/2020

LEGEND

Quaternary Fault (Age)	Quaternary Fault (Age)	Location
<150 years	<750,000 years	Well Constrained
<15,000 years	<1.6 million years	Moderately Constrained
<130,000 years		Inferred

North

Map and Data Sources:

-Basemap via AutoCAD Civil 3D geolocation tool

-Fault data via CGS Fault Activity Map of California 2010 GIS data

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BOLINAS LAGOON WYE WETLANDS PROJECT

MARIN COUNTY, CA

Figure 3
Fault Map

Proj. No: 19-570.1
Scale: 1"=5,000'
Date: 6/16/2020

Figure 5. Geologic Map and Fault Activity Map

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

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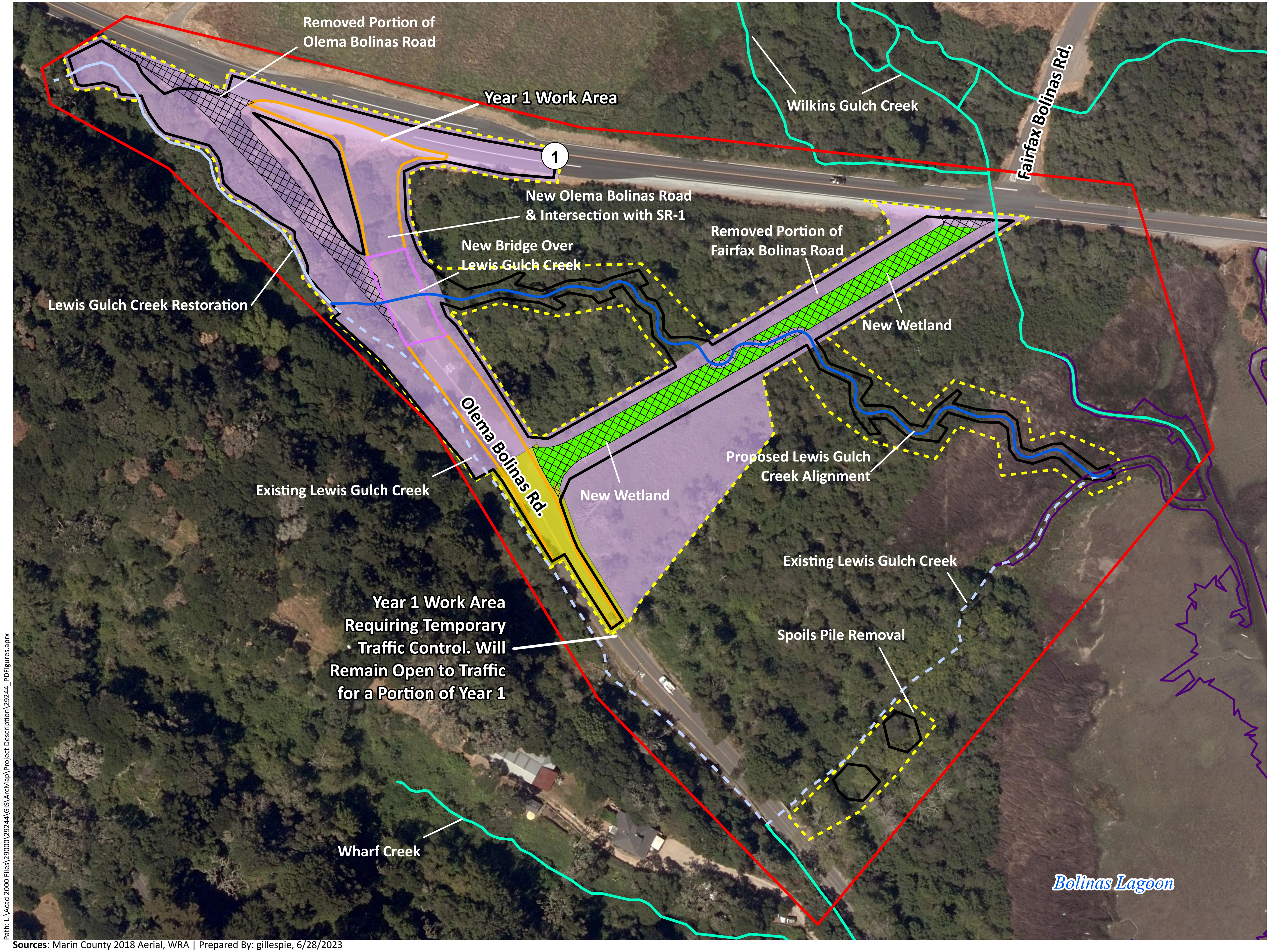
Figure 6.
Work Areas and Temporary Staging/Stockpile Areas Year 1

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California



Project Site: (12.30 ac.)
Project Area: (4.06 ac.)
Limit of Grade: (2.39 ac.)
Year 1 Work Area
Year 1 Work Area - RTTC

Primary Project Components

Lewis Gulch Creek Restoration
Existing Lewis Gulch Creek
Proposed Lewis Gulch Creek Alignment
Adjacent Creek (No Project Work)
Mean High Water 4.99 (NAVD88)
New Bridge Over Lewis Gulch Creek
New Olema-Bolinas Road & Intersection with SR-1
Removed Portions of Fairfax-Bolinas Road
New Wetlands

N
0 100 200
Feet

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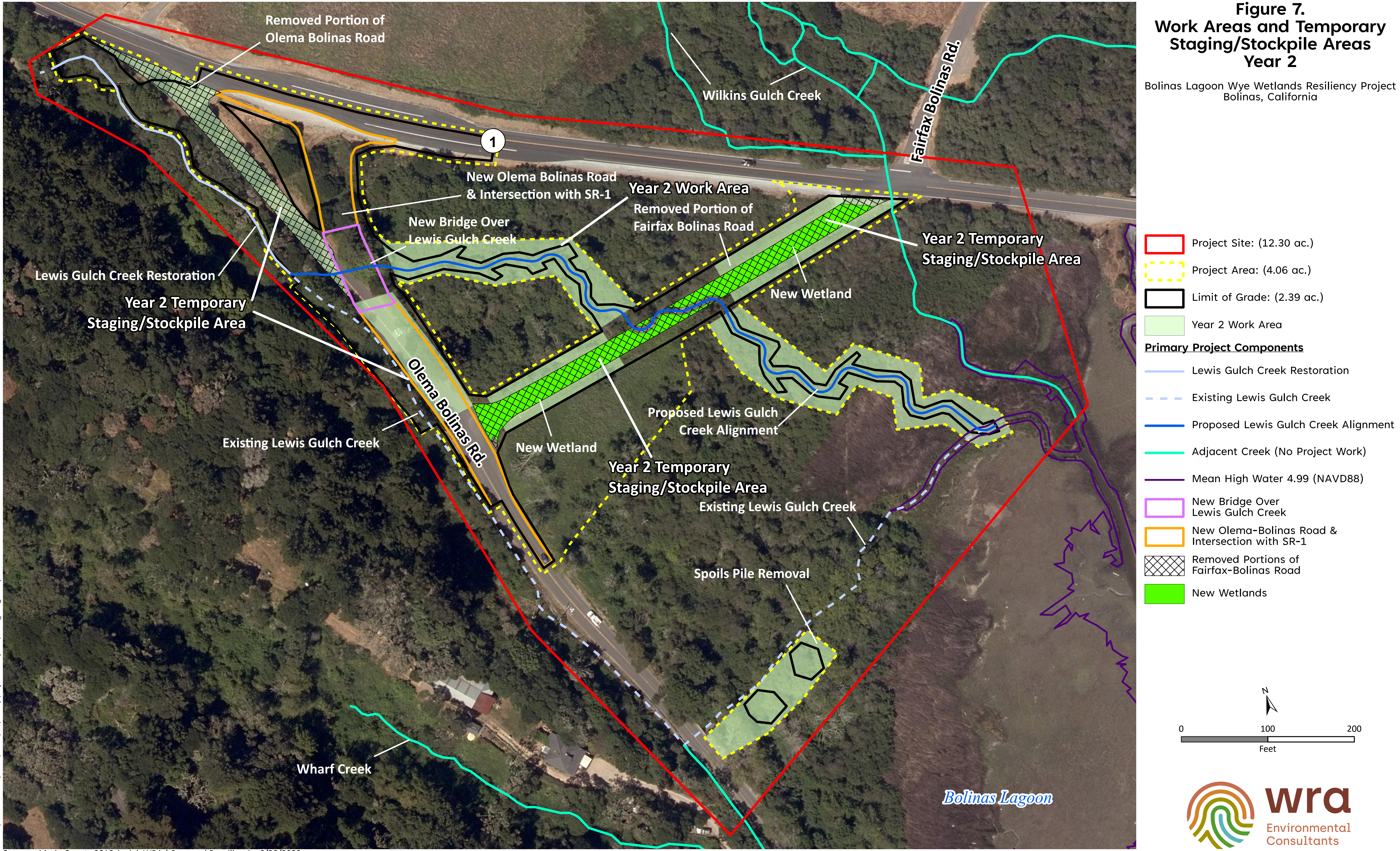
Sources: Marin County 2018 Aerial, WRA | Prepared By: gillespie, 6/28/2023

Figure 7.
Work Areas and Temporary Staging/Stockpile Areas Year 2

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California



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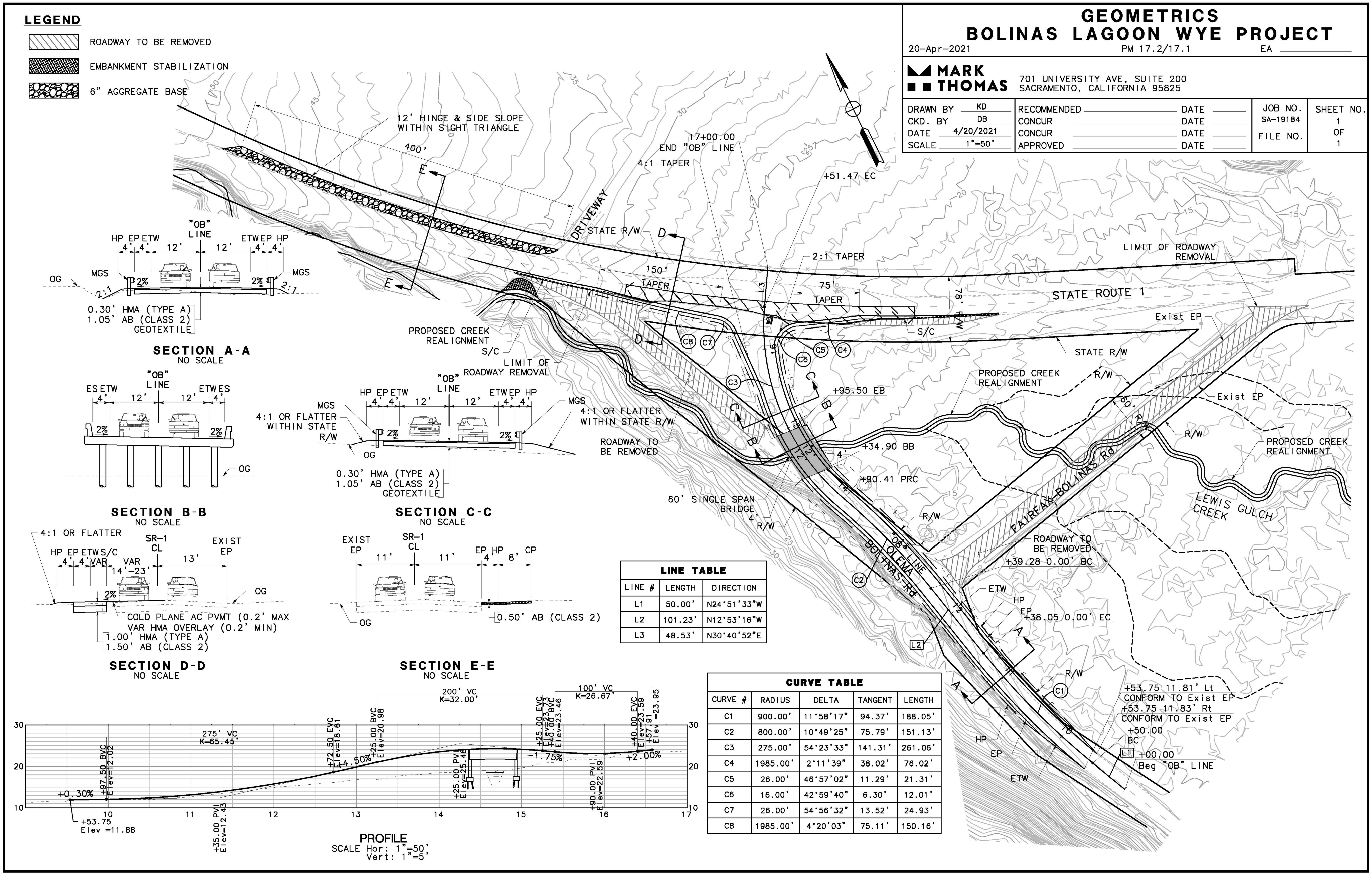
Sources: Marin County 2018 Aerial, WRA | Prepared By: gillespie, 6/28/2023



LINE TABLE

LINE #	LENGTH	DIRECTION
L1	50.00'	N24°51'33"W
L2	101.23'	N12°53'16"W
L3	48.53'	N30°40'52"E

CURVE TABLE

CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	900.00'	11°58'17"	94.37'	188.05'
C2	800.00'	10°49'25"	75.79'	151.13'
C3	275.00'	54°23'33"	141.31'	261.06'
C4	1985.00'	2°11'39"	38.02'	76.02'
C5	26.00'	46°57'02"	11.29'	21.31'
C6	16.00'	42°59'40"	6.30'	12.01'
C7	26.00'	54°56'32"	13.52'	24.93'
C8	1985.00'	4°20'03"	75.11'	150.16'

Figure 8. Geometrics

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

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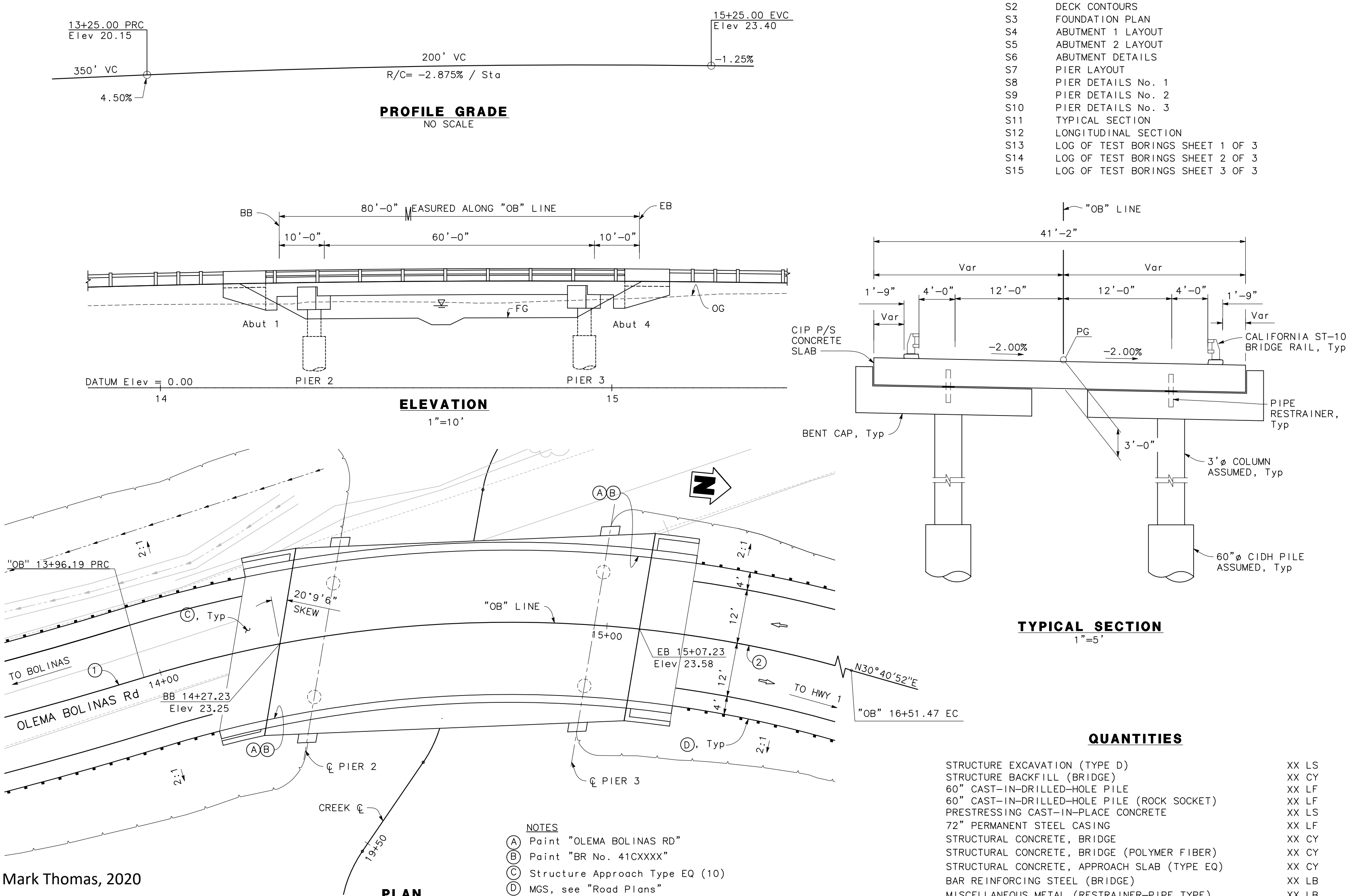

INDEX TO PLANS

NO.	TITLE
S1	GENERAL PLAN
S2	DECK CONTOURS
S3	FOUNDATION PLAN
S4	ABUTMENT 1 LAYOUT
S5	ABUTMENT 2 LAYOUT
S6	ABUTMENT DETAILS
S7	PIER LAYOUT
S8	PIER DETAILS No. 1
S9	PIER DETAILS No. 2
S10	PIER DETAILS No. 3
S11	TYPICAL SECTION
S12	LONGITUDINAL SECTION
S13	LOG OF TEST BORINGS SHEET 1 OF 3
S14	LOG OF TEST BORINGS SHEET 2 OF 3
S15	LOG OF TEST BORINGS SHEET 3 OF 3

QUANTITIES

STRUCTURE EXCAVATION (TYPE D)	XX LS
STRUCTURE BACKFILL (BRIDGE)	XX CY
60" CAST-IN-DRILLED-HOLE PILE	XX LF
60" CAST-IN-DRILLED-HOLE PILE (ROCK SOCKET)	XX LF
PRESTRESSING CAST-IN-PLACE CONCRETE	XX LS
72" PERMANENT STEEL CASING	XX LF
STRUCTURAL CONCRETE, BRIDGE	XX CY
STRUCTURAL CONCRETE, BRIDGE (POLYMER FIBER)	XX CY
STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ)	XX CY
BAR REINFORCING STEEL (BRIDGE)	XX LB
MISCELLANEOUS METAL (RESTRAINER-PIPE TYPE)	XX LB
CALIFORNIA ST-10 BRIDGE RAIL	XX LF

NOTES

Ⓐ Paint "OLEMA BOLINAS RD"
Ⓑ Paint "BR No. 41CXXXX"
Ⓒ Structure Approach Type EQ (10)
Ⓓ MGS, see "Road Plans"

1. For "INDEX TO PLANS" and "GENERAL NOTES", see "DECK CONTOURS" sheet.
2. For "PILE DATA TABLE", "HYDROLOGIC SUMMARY" and "SCOUR DATA TABLE" see "FOUNDATION PLAN" sheet.

CURVE DATA

① R=800.00' △=10°01'45" T=70.20' L=140.03'	② R=275.00' △=53°11'17" T=137.67' L=255.28'

Source: Mark Thomas, 2020

Figure 9. Proposed Bridge Design

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

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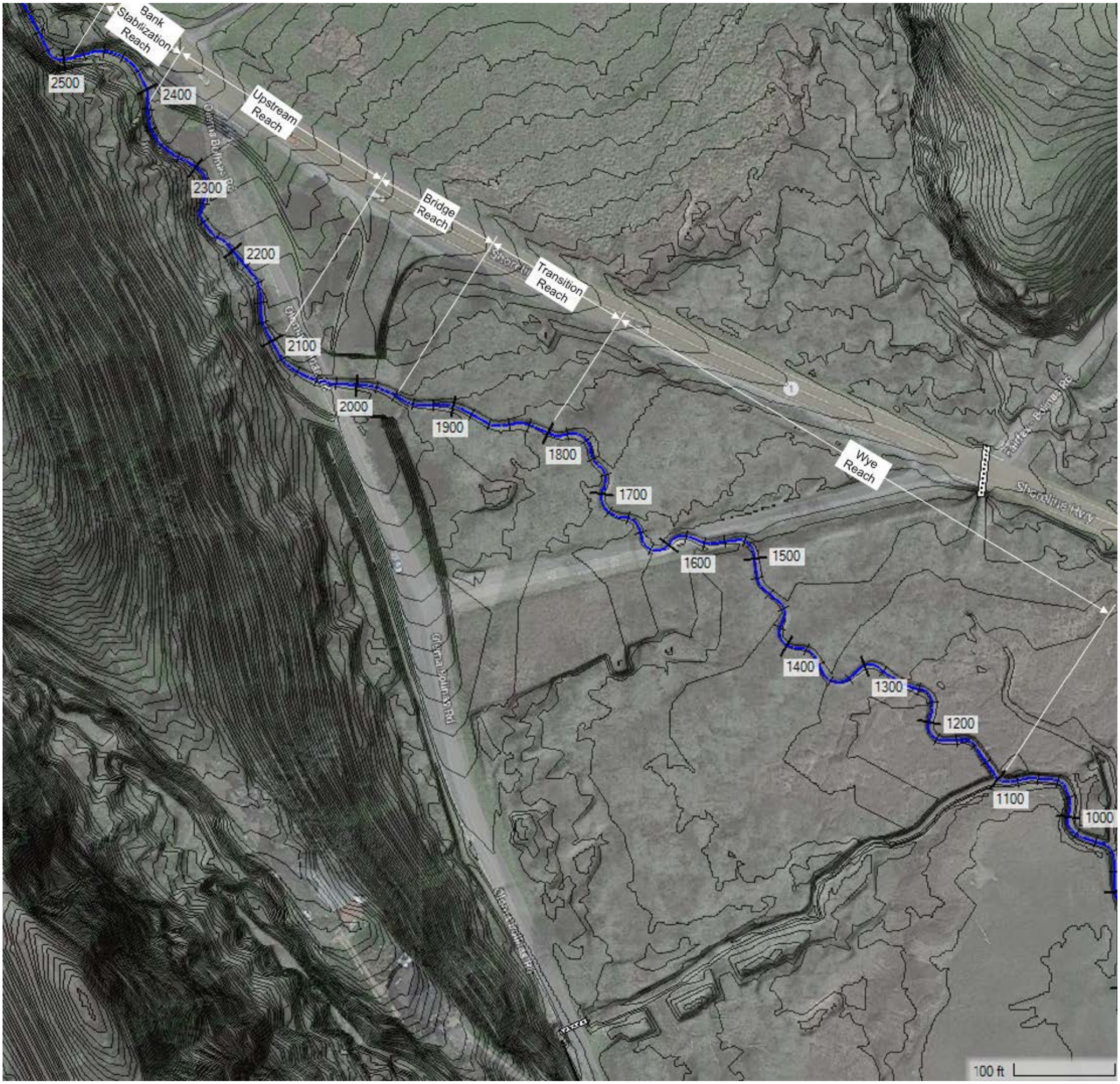

Figure 10. Lewis Gulch Creek Project Reach Areas

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

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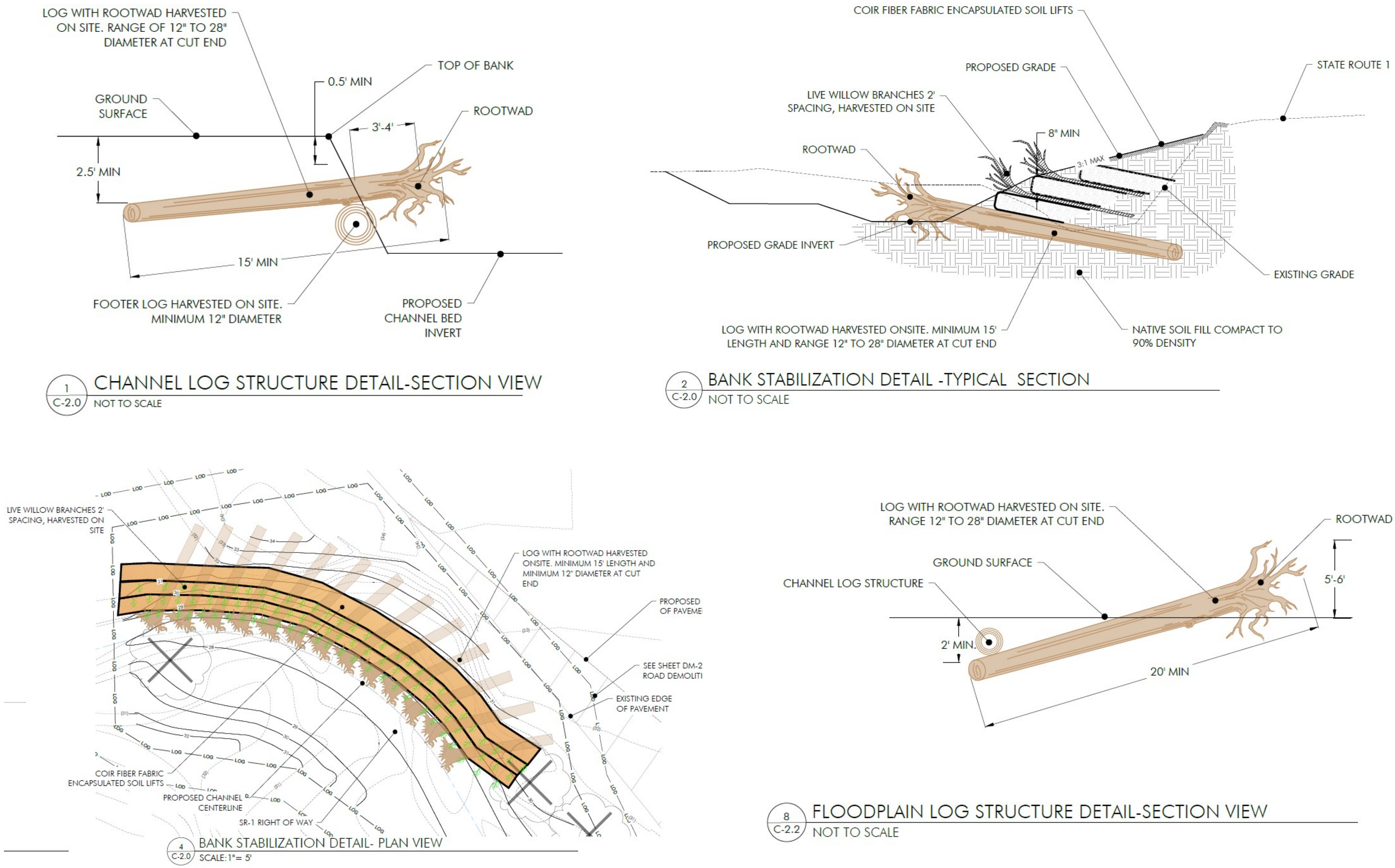
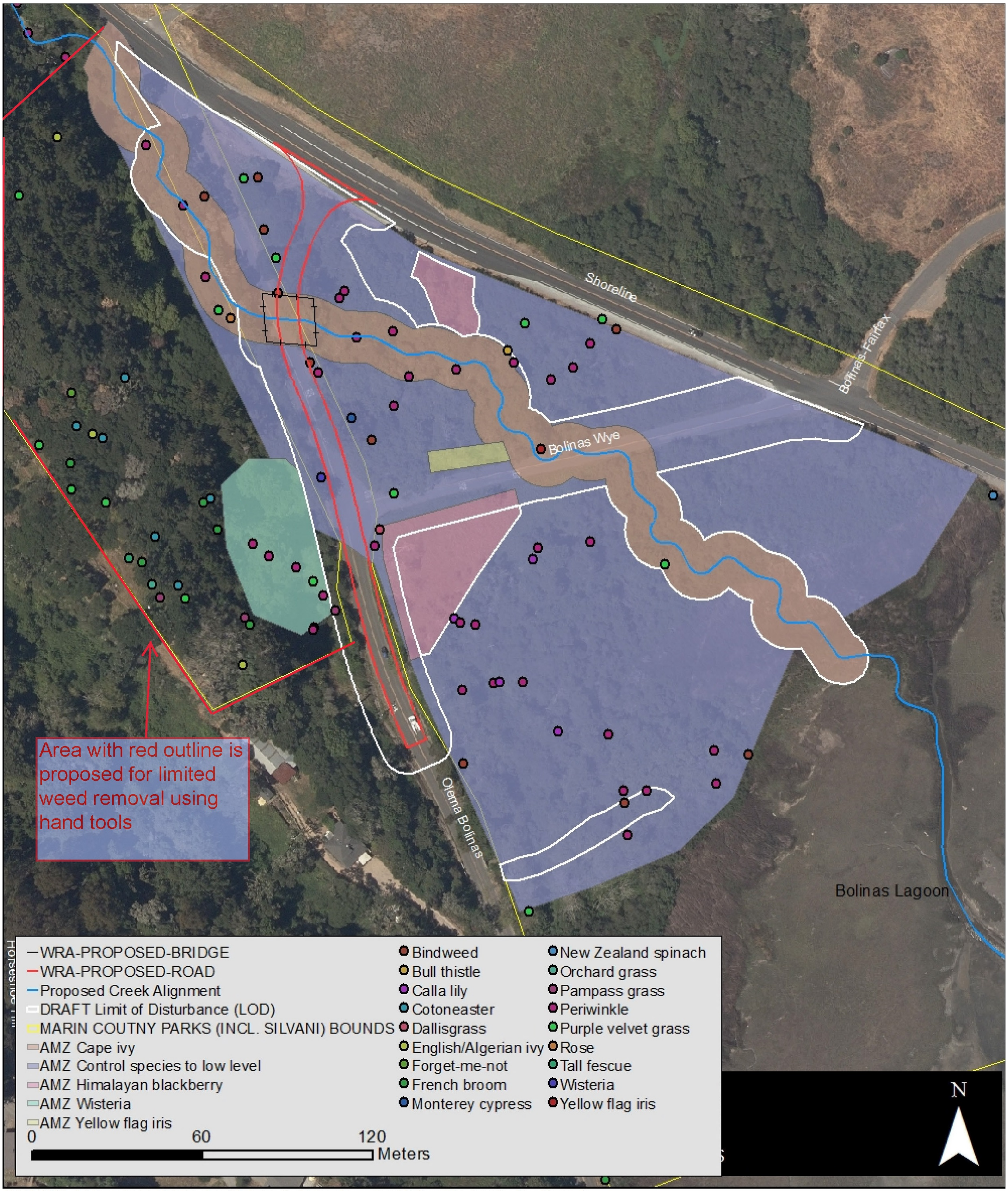


Figure 11. Log Structure and Bank Stabilization Details

Bolinas Wye Wetlands
Resiliency Project Bolinas,
California



S[redacted]

Figure 12. Invasive Vegetation Management Actions

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

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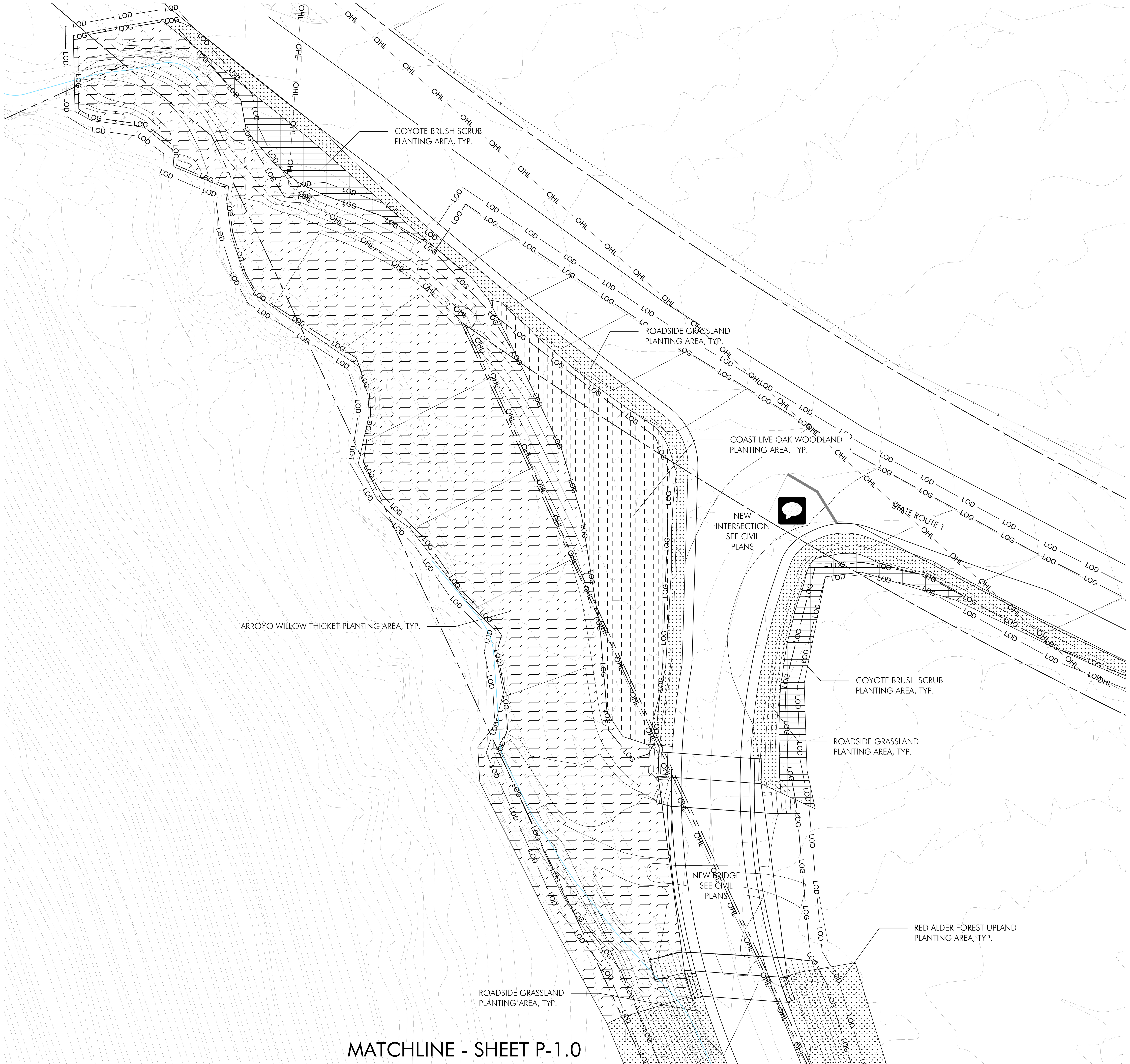

MATCHLINE - SHEET P-1.0

MATCHLINE - SHEET P-1.1

1 PLAN VIEW

N

0 20
SCALE: 1" = 20'

LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
OHL	OVERHEAD UTILITY LINE
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADE
	EXISTING CONTOUR
	PROPOSED CONTOUR
	ARROYO WILLOW THICKET
	COAST LIVE OAK WOODLAND
	COASTAL BRAMBLES
	COYOTE BRUSH SCRUB
	RED ALDER FOREST UPLAND
	RED ALDER FOREST LOWLAND
	RED ALDER FOREST LOWLAND SEEDING
	ROADSIDE GRASSLANDS
	SALT GRASS FLATS
	SALT MARSH BULRUSH MARSH

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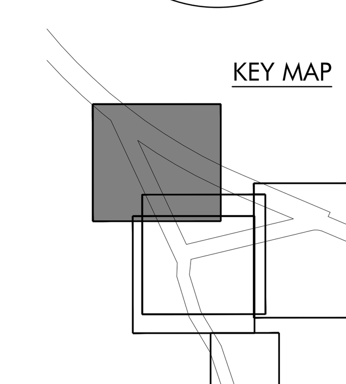
BOLINAS, CALIFORNIA

MARIN COUNTY PARKS
PRESERVATION RECREATION

NOT FOR CONSTRUCTION

LICENSED LANDSCAPE ARCHITECT
RUSSELL F. PRANGE
LIC. NO. 6059
Signature
Renewal Date
Date
STATE OF CALIFORNIA

KEY MAP



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02/14/2022	60% DESIGN	
06/17/2022	60% PERMIT	

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CHECKED BY: BSS, RBB
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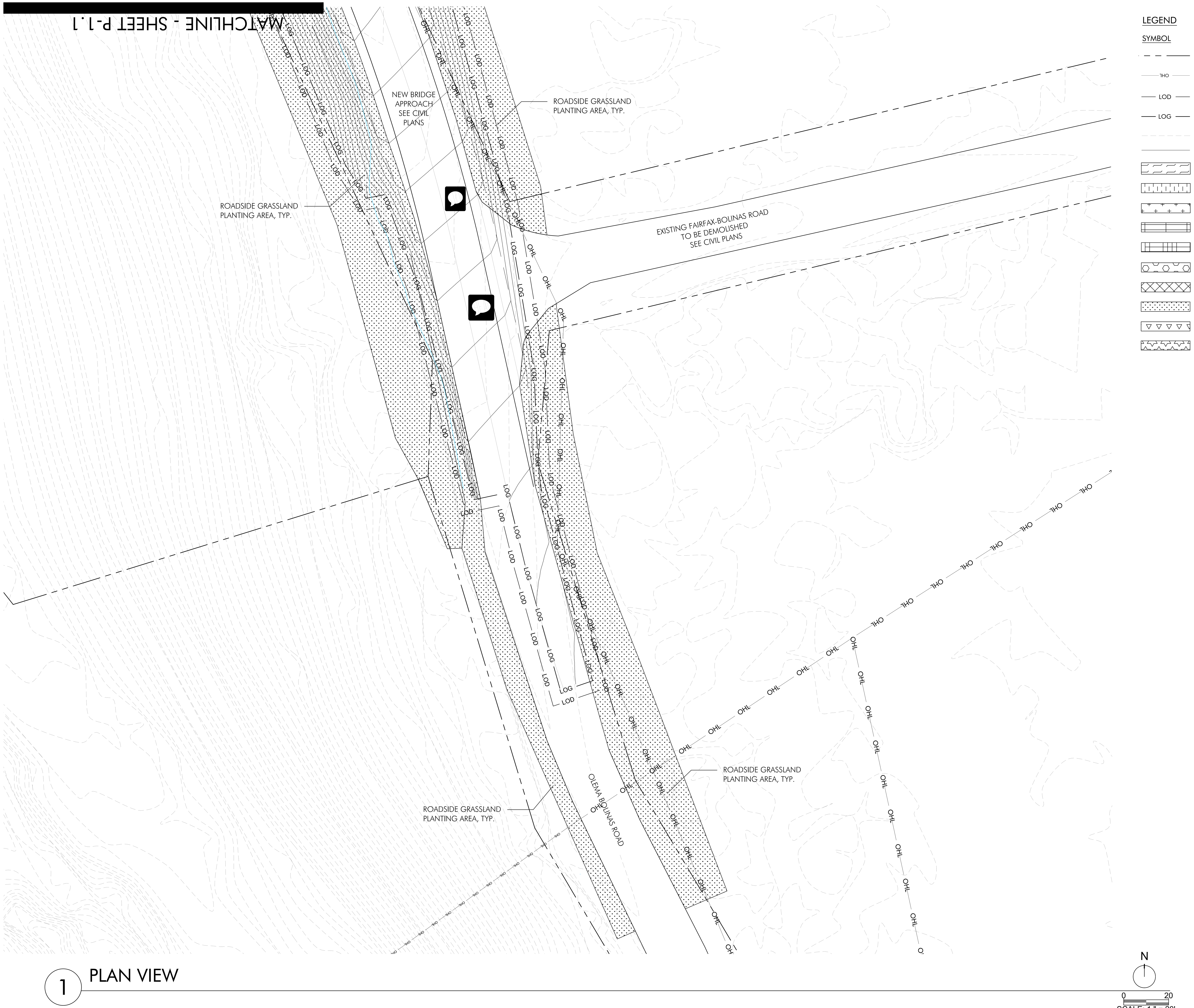
FIGURE 13:
PHASE I
PLANTING AND
SEEDING PLAN (1 of 3)

Sheet

P-1.0

MATCHLINE - SHEET P-1.0



1 PLAN VIEW

LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
OHL	OVERHEAD UTILITY LINE
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADE
	EXISTING CONTOUR
	PROPOSED CONTOUR
	ARROYO WILLOW THICKET
	COAST LIVE OAK WOODLAND
	COASTAL BRAMBLES
	COYOTE BRUSH SCRUB
	RED ALDER FOREST UPLAND
	RED ALDER FOREST LOWLAND
	RED ALDER FOREST LOWLAND SEEDING
	ROADSIDE GRASSLANDS
	SALT GRASS FLATS
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KEY MAP

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06/17/2022	60% PERMIT	

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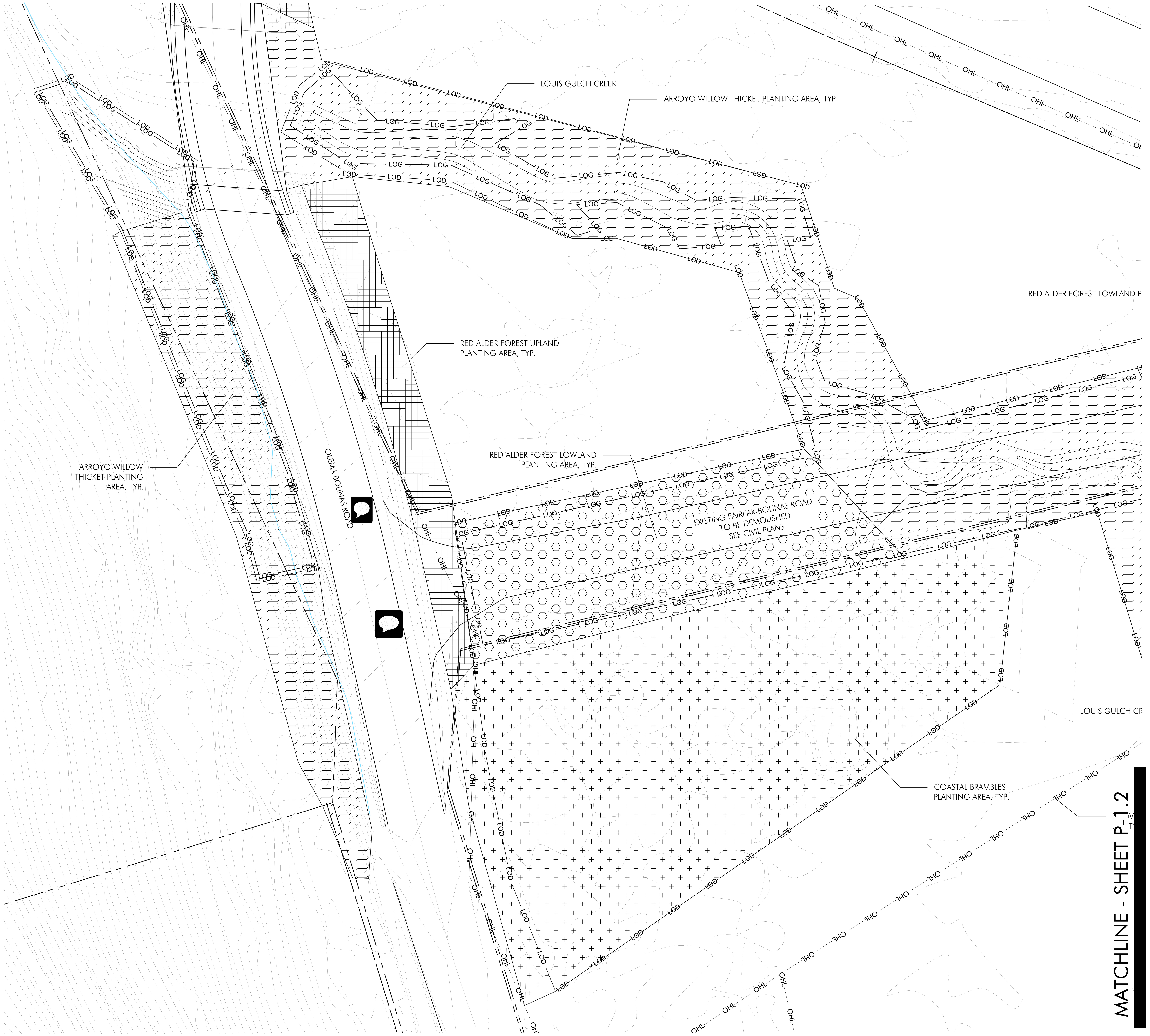
FIGURE 14: PHASE I PLANTING AND SEEDING PLAN (2 of 3)

Sheet

P-1.1



1 PLAN VIEW

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0 20
SCALE: 1 " = 20'

LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
OHL	OVERHEAD UTILITY LINE
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADE
	EXISTING CONTOUR
	PROPOSED CONTOUR
	ARROYO WILLOW THICKET
	COAST LIVE OAK WOODLAND
	COASTAL BRAMBLES
	COYOTE BRUSH SCRUB
	RED ALDER FOREST UPLAND
	RED ALDER FOREST LOWLAND
	RED ALDER FOREST LOWLAND SEEDING
	ROADSIDE GRASSLANDS
	SALT GRASS FLATS
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02/14/2022	60% DESIGN	
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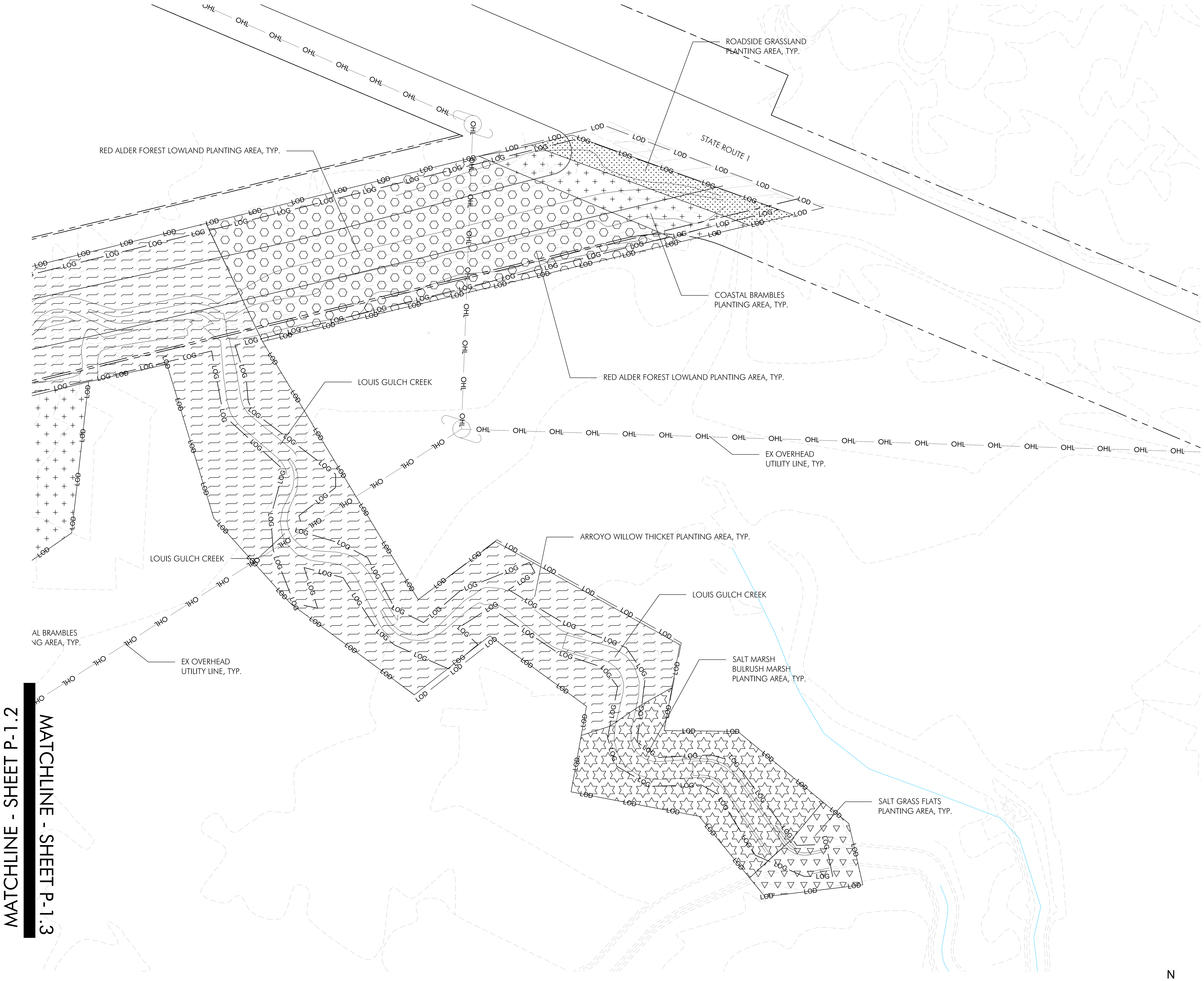
CHECKED BY: BSS, RBB
ORIGINAL DRAWING SIZE: 24 X 36

FIGURE 15:
PHASE I
PLANTING AND
SEEDING PLAN (3 of 3)

Sheet

P-1.2



1 PLAN VIEW

N

0 20
SCALE: 1" = 20'

LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
OHL	OVERHEAD UTILITY LINE
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADE
	EXISTING CONTOUR
	PROPOSED CONTOUR
	ARROYO WILLOW THICKET
	COAST LIVE OAK WOODLAND
	COASTAL BRAMBLES
	COYOTE BRUSH SCRUB
	RED ALDER FOREST UPLAND
	RED ALDER FOREST LOWLAND
	RED ALDER FOREST LOWLAND SEEDING
	ROADSIDE GRASSLANDS
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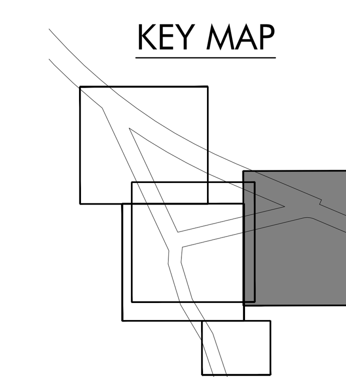
LIC. NO. 6059
Signature
Renewal Date
Date
STATE OF CALIFORNIA

KEY MAP



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02/14/2022	60% DESIGN	
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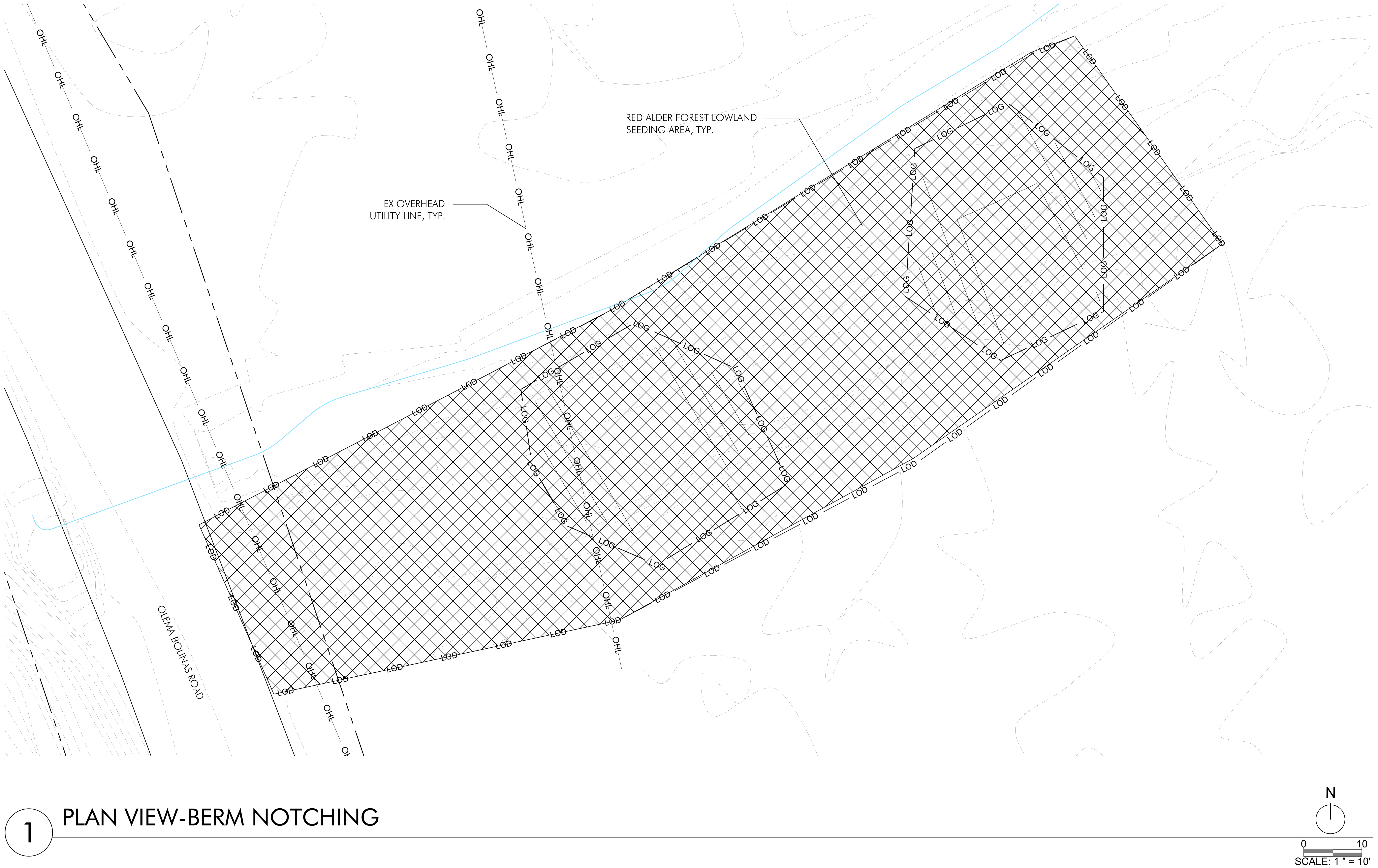
FIGURE 16:
PHASE II
PLANTING AND
SEEDING PLAN (1 of 2)

Sheet

P-1.3



1 PLAN VIEW-BERM NOTCHING

LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
OHL	OVERHEAD UTILITY LINE
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADE
	EXISTING CONTOUR
	PROPOSED CONTOUR
	ARROYO WILLOW THICKET
	COAST LIVE OAK WOODLAND
	COASTAL BRAMBLES
	COYOTE BRUSH SCRUB
	RED ALDER FOREST UPLAND
	RED ALDER FOREST LOWLAND
	RED ALDER FOREST LOWLAND SEEDING
	ROADSIDE GRASSLANDS
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CHECKED BY: BSS, RBB
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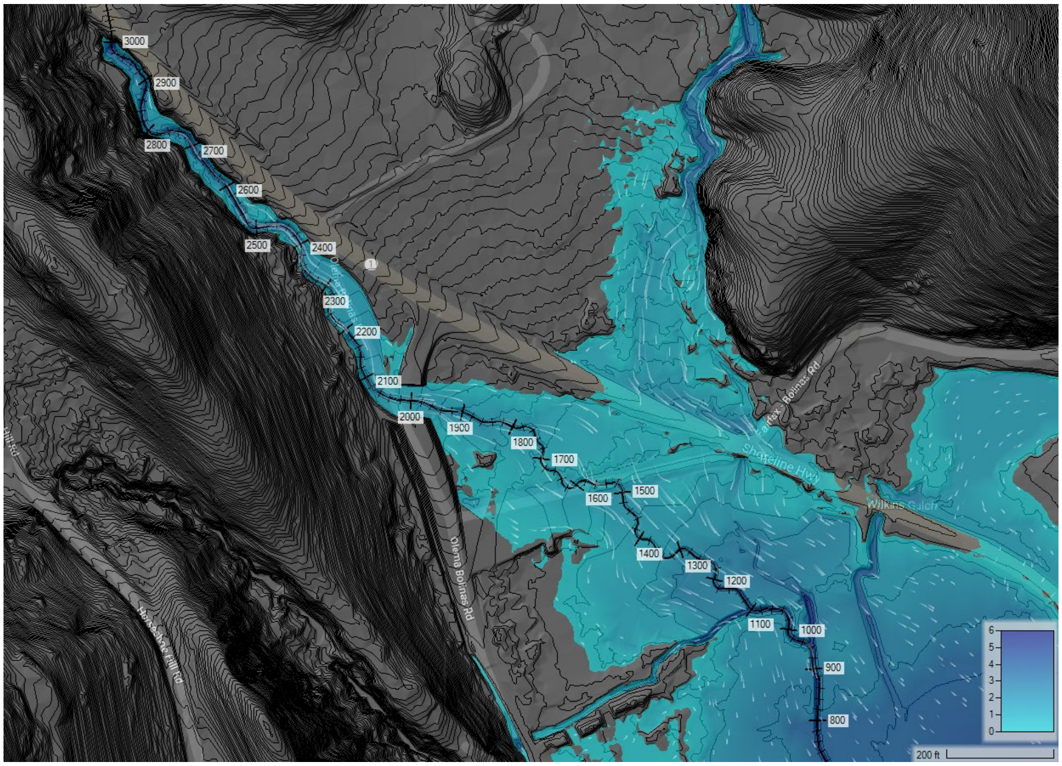
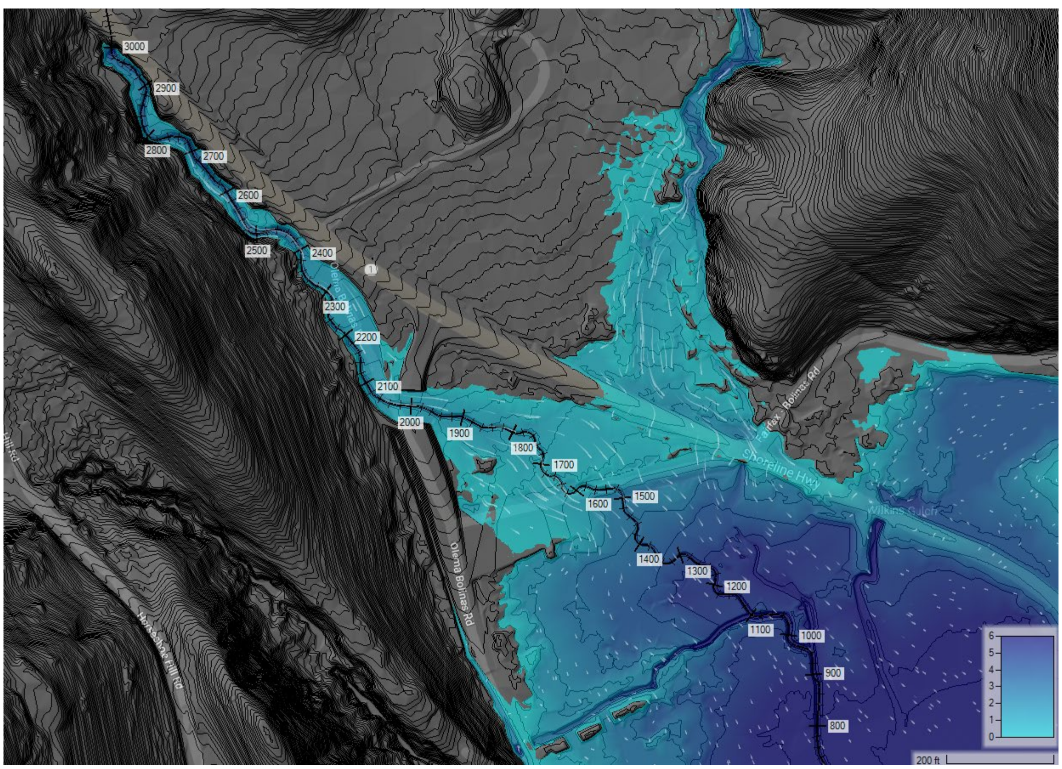
FIGURE 17:
PHASE II
PLANTING AND
SEEDING PLAN (2 of 2)

Sheet

P-1.4



Model Results Showing Depth of Water During The 100-Year Flow Event with Projected 2050 Sea Level Rise.



Model Results Showing Depth of Water During The 100-Year Flow Event with Projected 2100 Sea Level Rise.

Figure 18. Sea Level Rise Scenarios

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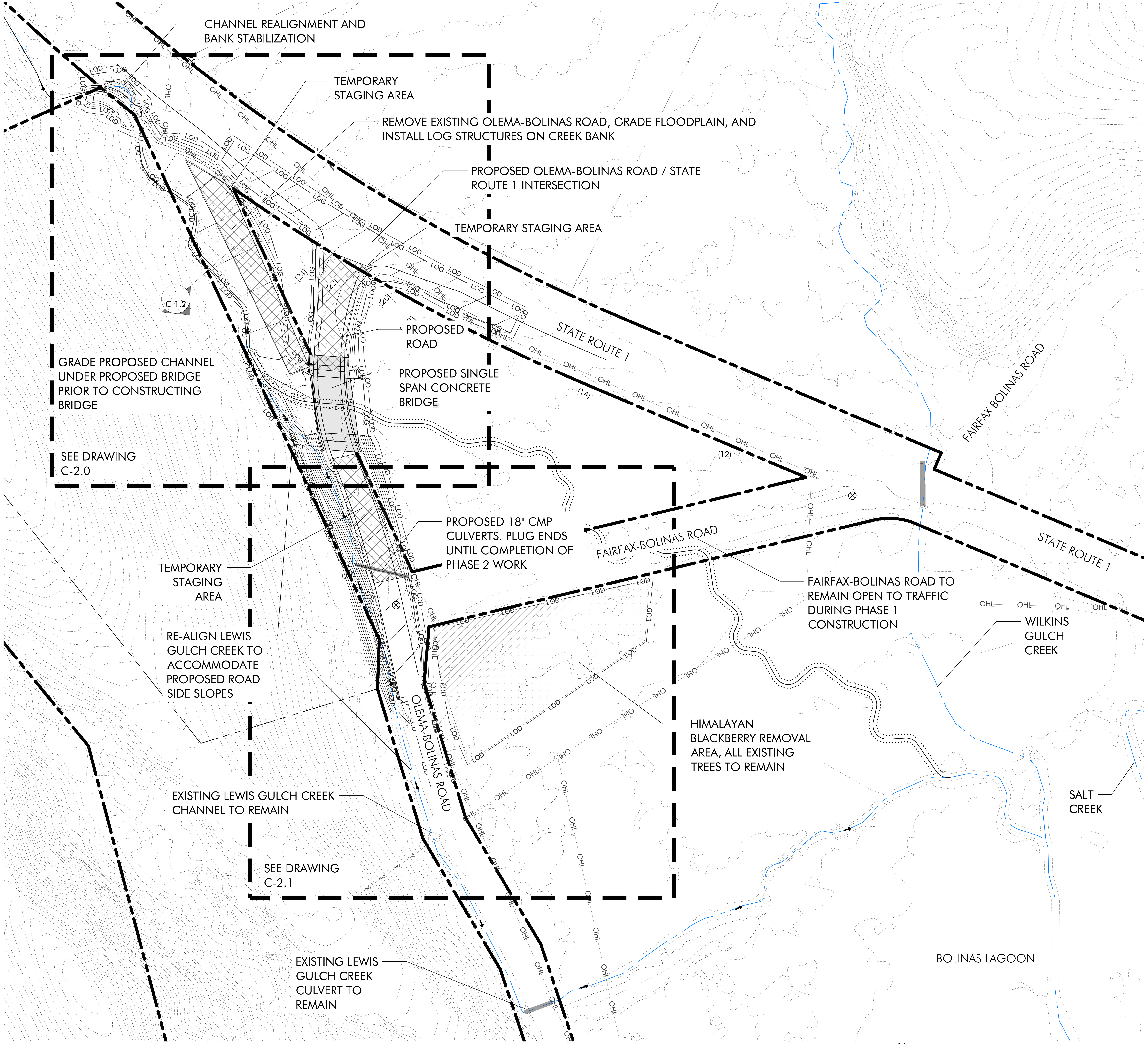

1 PLAN VIEW

N

0 50
SCALE: 1" = 50'

PHASE 1 LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADING
	STAGING AREA
(10)	EXISTING CONTOUR
10	PROPOSED CONTOUR
	EXISTING CHANNEL ALIGNMENT
	PROPOSED CHANNEL ALIGNMENT
x	EXISTING FENCE
OHL	OVERHEAD UTILITY LINE
	FLOW
	SURVEY CONTROL POINT
	HIMALAYAN BLACKBERRY REMOVAL
	CULVERT
	UTILITY POLE

NOTE:
1. THIS SHEET IS INTENDED TO SHOW AN OVERVIEW OF PROJECT ELEMENTS FOR PHASE 1.
2. SEE SHEETS C-2.0 AND C-2.1 FOR DETAILED CREEK CHANNEL TREATMENTS AND FLOODPLAIN GRADING INFORMATION.
3. SEE SHEETS GN-1 THROUGH S-1 FOR ROADWAY AND BRIDGE CONSTRUCTION.

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BOLINAS, CALIFORNIA

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PRESERVATION RECREATION

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LICENSED PROFESSIONAL ENGINEER
ANDREW C. SMITH
C-82643
SIGNATURE
SEPT. 30, 2020
EXP. DATE
DATE
STATE OF CALIFORNIA

Date	Issues And Revisions	No.
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07/01/2022	60% PERMIT	

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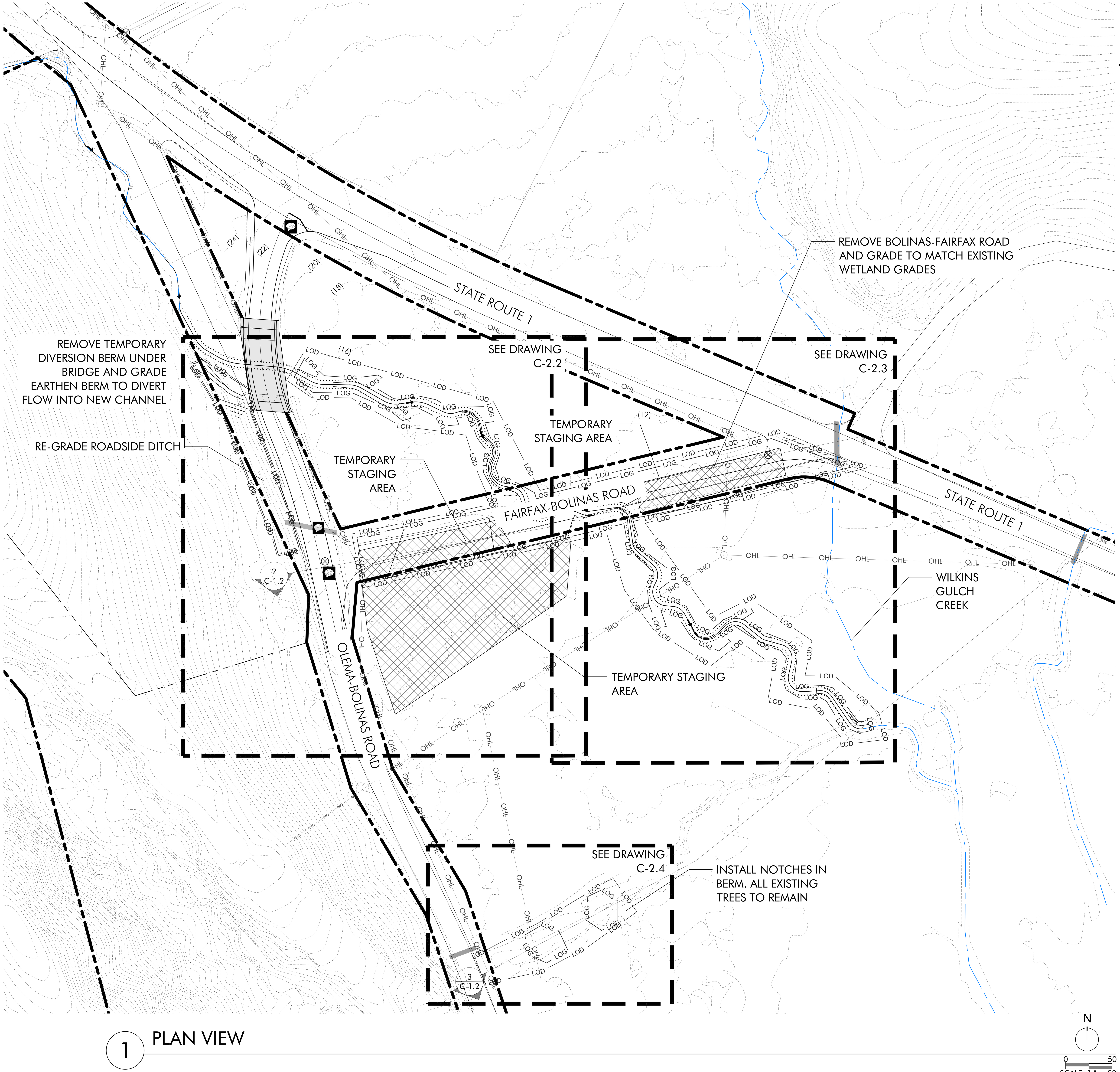
FIGURE 19:
PHASE 1 SITE PLAN

Sheet

C-1.0



1 PLAN VIEW

PHASE 2 LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE (APPROXIMATE)
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADING
	STAGING AREA
(10)	EXISTING CONTOUR
10	PROPOSED CONTOUR
	EXISTING CHANNEL ALIGNMENT
	PROPOSED CHANNEL ALIGNMENT
	EXISTING FENCE
OHL	OVERHEAD UTILITY LINE
→	FLOW
⊗	SURVEY CONTROL POINT
	CULVERT
	UTILITY POLE

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BOLINAS, CALIFORNIA

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LICENSED PROFESSIONAL ENGINEER
ANDREW C. SMITH
C-82643
SIGNATURE
SEPT. 30, 2020
EXP. DATE
DATE
STATE OF CALIFORNIA

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07/01/2022	60% PERMIT	

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DRAWN BY: ACS, BMM
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ORIGINAL DRAWING SIZE: 24 X 36

FIGURE 20:
PHASE 2 SITE PLAN

Sheet

C-1.1

Source: AECOM, Bolinas Lagoon North End Restoration Project - Site Conditions Report, Figure 2A. June 2016.

Figure 21. North End Project Study Area

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

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The Intersection of SR-1 and Olema Bolinas Road, looking south from SR-1.

Fairfax Bolinas Road within the Project site, looking toward SR-1.

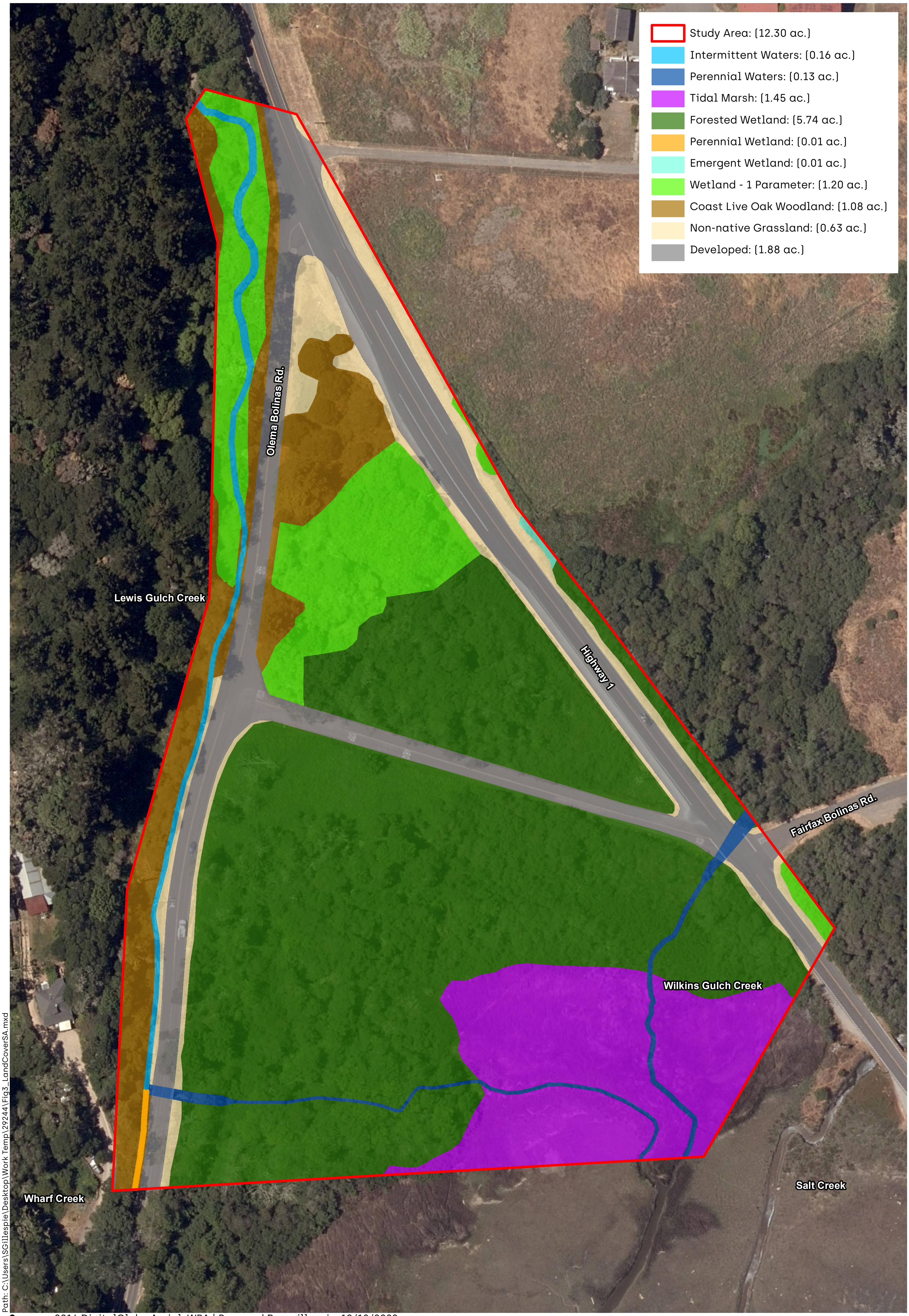
Bolinas Lagoon looking from SR-1.

The Project site looking from above (drone image).

Figure 22. Views of the Existing Setting

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

wra Environmental Consultants



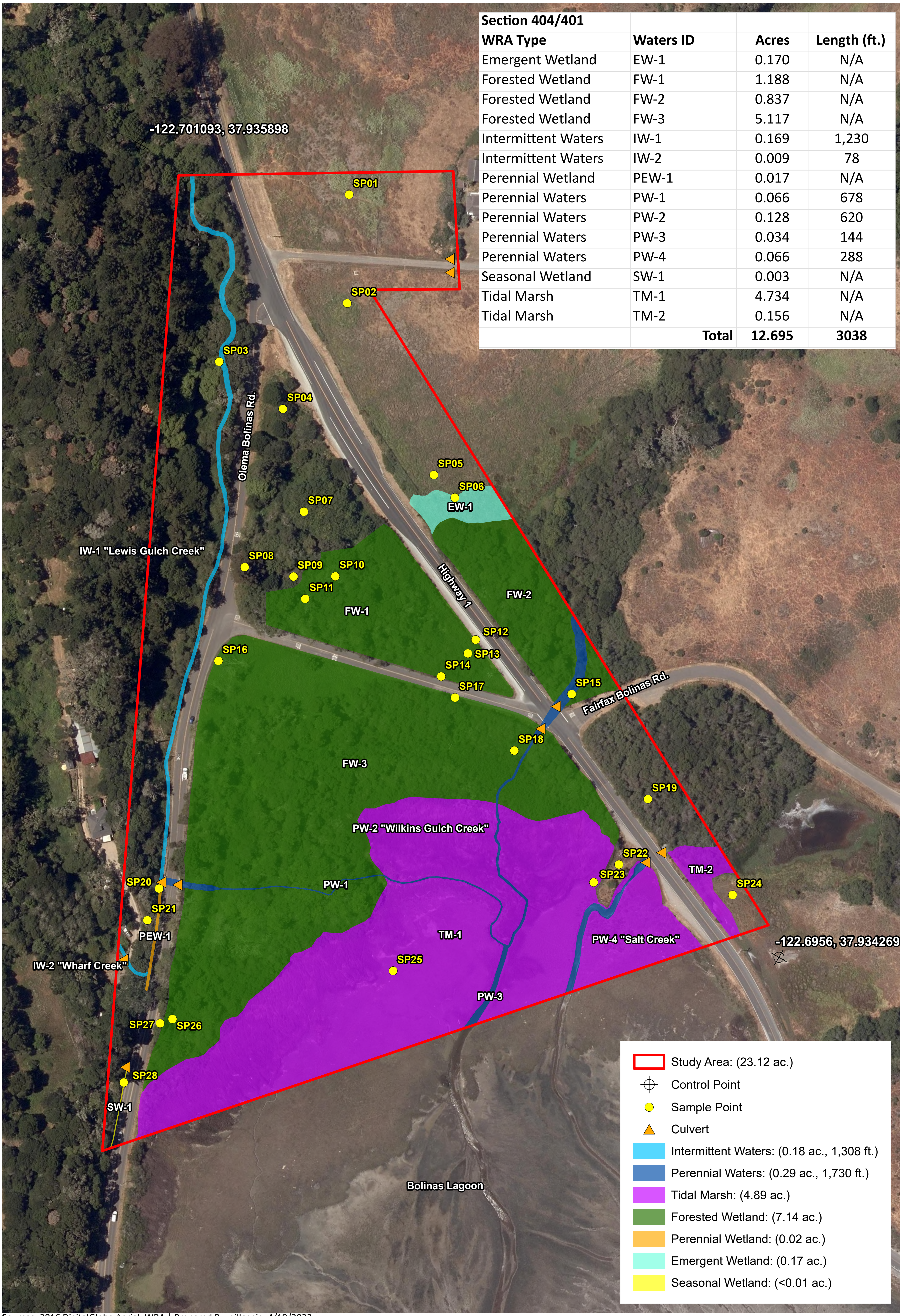
Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: sgillespie, 10/18/2022

Figure 23. Biological Communities within the Project Area Before Restoration

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

0 75 150 Feet

wra Environmental Consultants



Section 404/401			
WRA Type	**Waters ID**	**Acres**	**Length (ft.)**
Emergent Wetland	EW-1	0.170	N/A
Forested Wetland	FW-1	1.188	N/A
Forested Wetland	FW-2	0.837	N/A
Forested Wetland	FW-3	5.117	N/A
Intermittent Waters	IW-1	0.169	1,230
Intermittent Waters	IW-2	0.009	78
Perennial Wetland	PEW-1	0.017	N/A
Perennial Waters	PW-1	0.066	678
Perennial Waters	PW-2	0.128	620
Perennial Waters	PW-3	0.034	144
Perennial Waters	PW-4	0.066	288
Seasonal Wetland	SW-1	0.003	N/A
Tidal Marsh	TM-1	4.734	N/A
Tidal Marsh	TM-2	0.156	N/A
	Total	**12.695**	**3038**

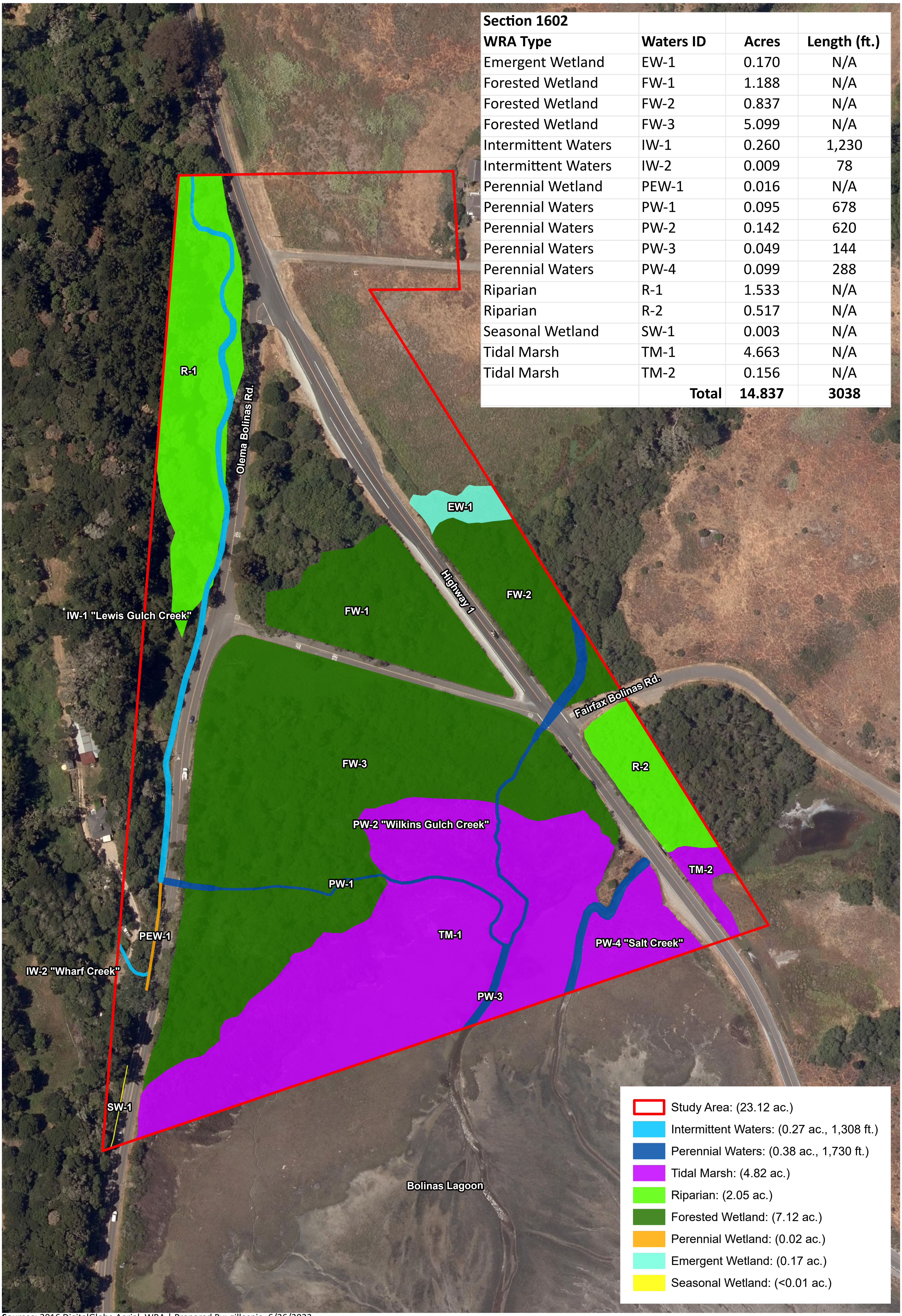
Path: L:\Acad 2000 Files\29000\29244\GIS\ArcMap\Project Description\29244_PDFigures.aprx

Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: gillespie, 4/19/2023

Figure 24. Potential Section 404/401 Jurisdictional Features

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

wra Environmental Consultants



Section 1602			
WRA Type	**Waters ID**	**Acres**	**Length (ft.)**
Emergent Wetland	EW-1	0.170	N/A
Forested Wetland	FW-1	1.188	N/A
Forested Wetland	FW-2	0.837	N/A
Forested Wetland	FW-3	5.099	N/A
Intermittent Waters	IW-1	0.260	1,230
Intermittent Waters	IW-2	0.009	78
Perennial Wetland	PEW-1	0.016	N/A
Perennial Waters	PW-1	0.095	678
Perennial Waters	PW-2	0.142	620
Perennial Waters	PW-3	0.049	144
Perennial Waters	PW-4	0.099	288
Riparian	R-1	1.533	N/A
Riparian	R-2	0.517	N/A
Seasonal Wetland	SW-1	0.003	N/A
Tidal Marsh	TM-1	4.663	N/A
Tidal Marsh	TM-2	0.156	N/A
	Total	**14.837**	**3038**

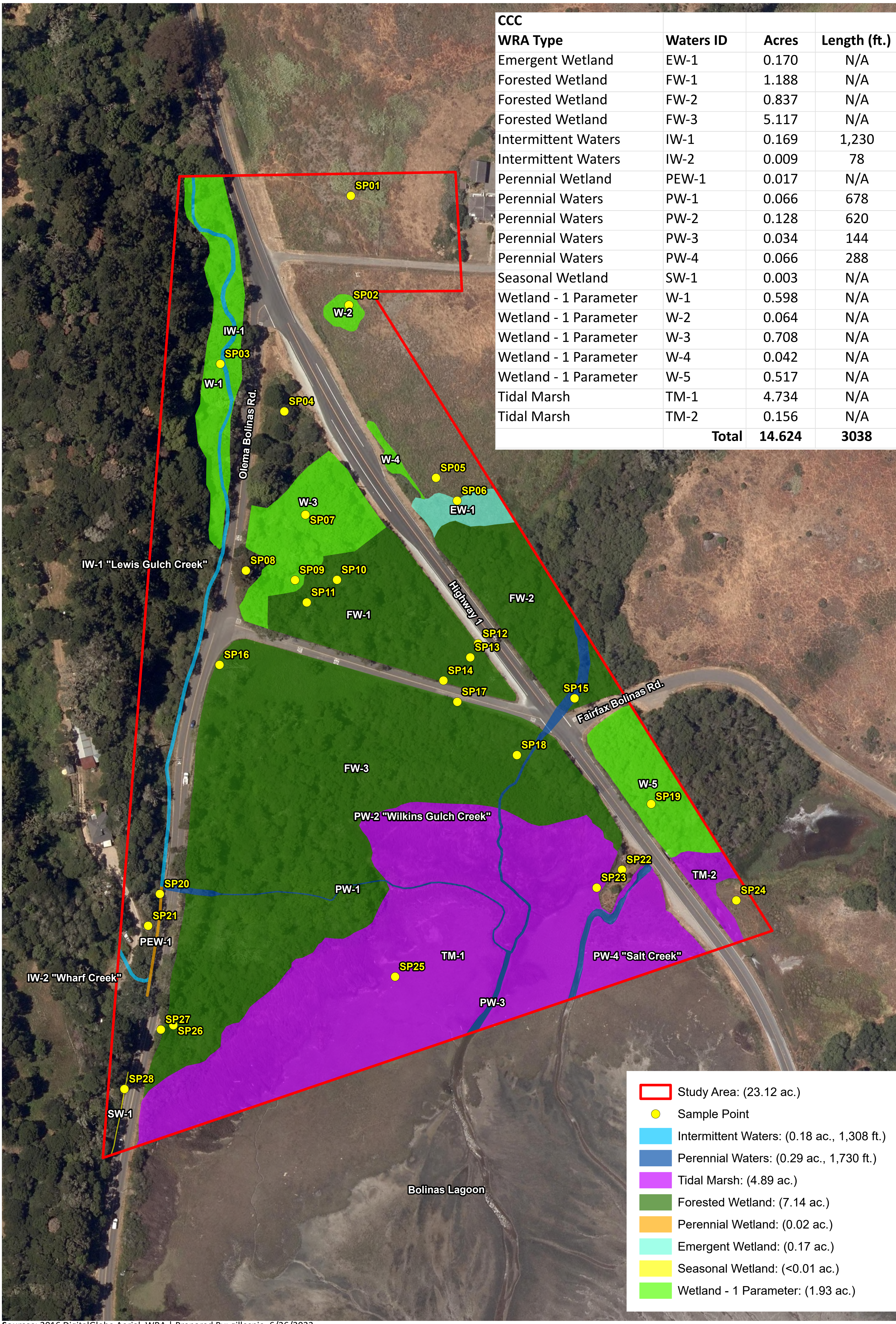
Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: gillespie, 6/26/2023

Figure 25. Potential Section 1602 Jurisdictional Features

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

0 150 300 Feet

wra Environmental Consultants



CCC			
WRA Type	**Waters ID**	**Acres**	**Length (ft.)**
Emergent Wetland	EW-1	0.170	N/A
Forested Wetland	FW-1	1.188	N/A
Forested Wetland	FW-2	0.837	N/A
Forested Wetland	FW-3	5.117	N/A
Intermittent Waters	IW-1	0.169	1,230
Intermittent Waters	IW-2	0.009	78
Perennial Wetland	PEW-1	0.017	N/A
Perennial Waters	PW-1	0.066	678
Perennial Waters	PW-2	0.128	620
Perennial Waters	PW-3	0.034	144
Perennial Waters	PW-4	0.066	288
Seasonal Wetland	SW-1	0.003	N/A
Wetland - 1 Parameter	W-1	0.598	N/A
Wetland - 1 Parameter	W-2	0.064	N/A
Wetland - 1 Parameter	W-3	0.708	N/A
Wetland - 1 Parameter	W-4	0.042	N/A
Wetland - 1 Parameter	W-5	0.517	N/A
Tidal Marsh	TM-1	4.734	N/A
Tidal Marsh	TM-2	0.156	N/A
	Total	**14.624**	**3038**

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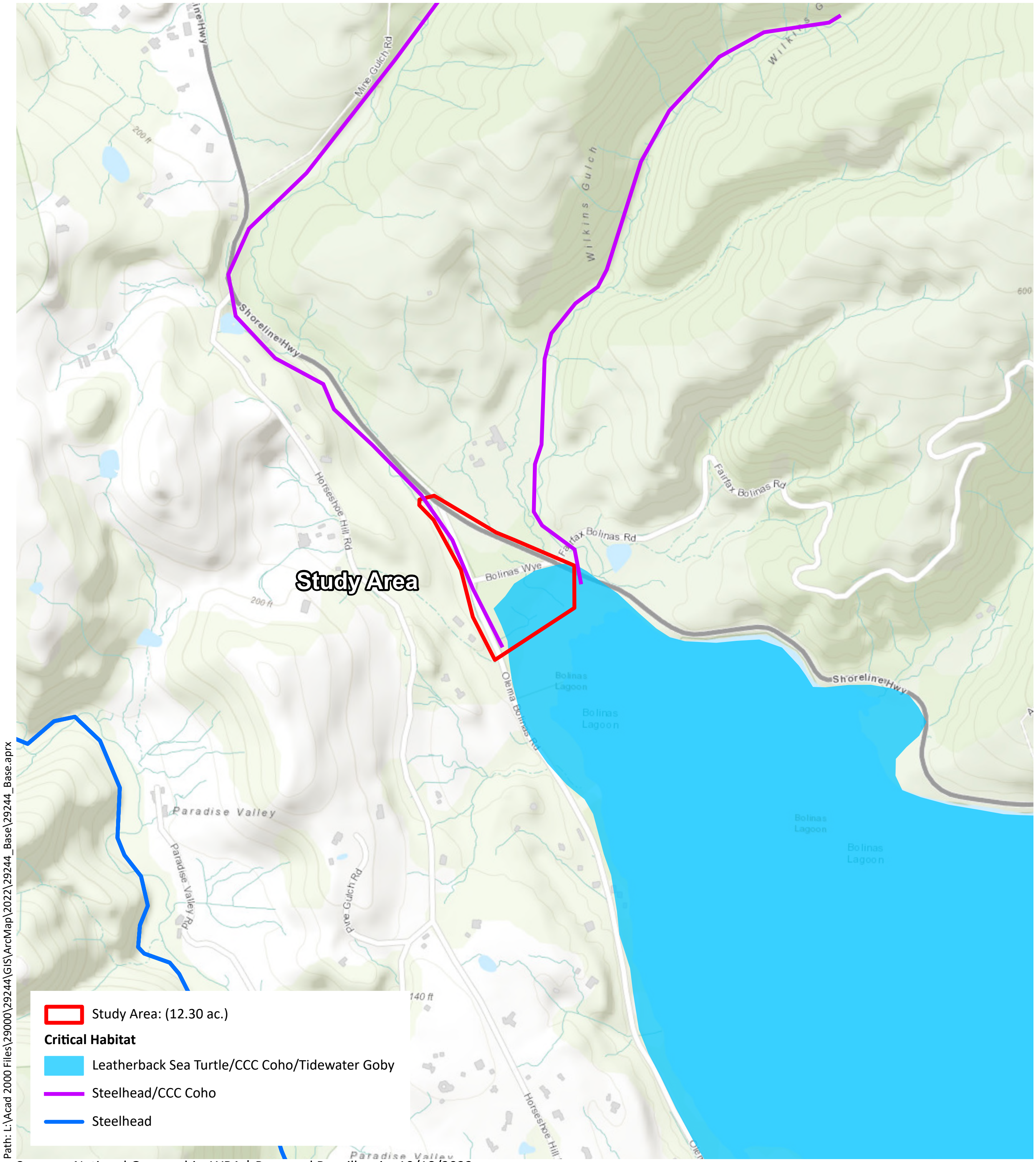
Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: gillespie, 6/26/2023

Figure 26. Potential California Coastal Commission Jurisdictional Features

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

0 150 300 Feet

wra Environmental Consultants



Sources: National Geographic, WRA | Prepared By: gillespie, 10/18/2022

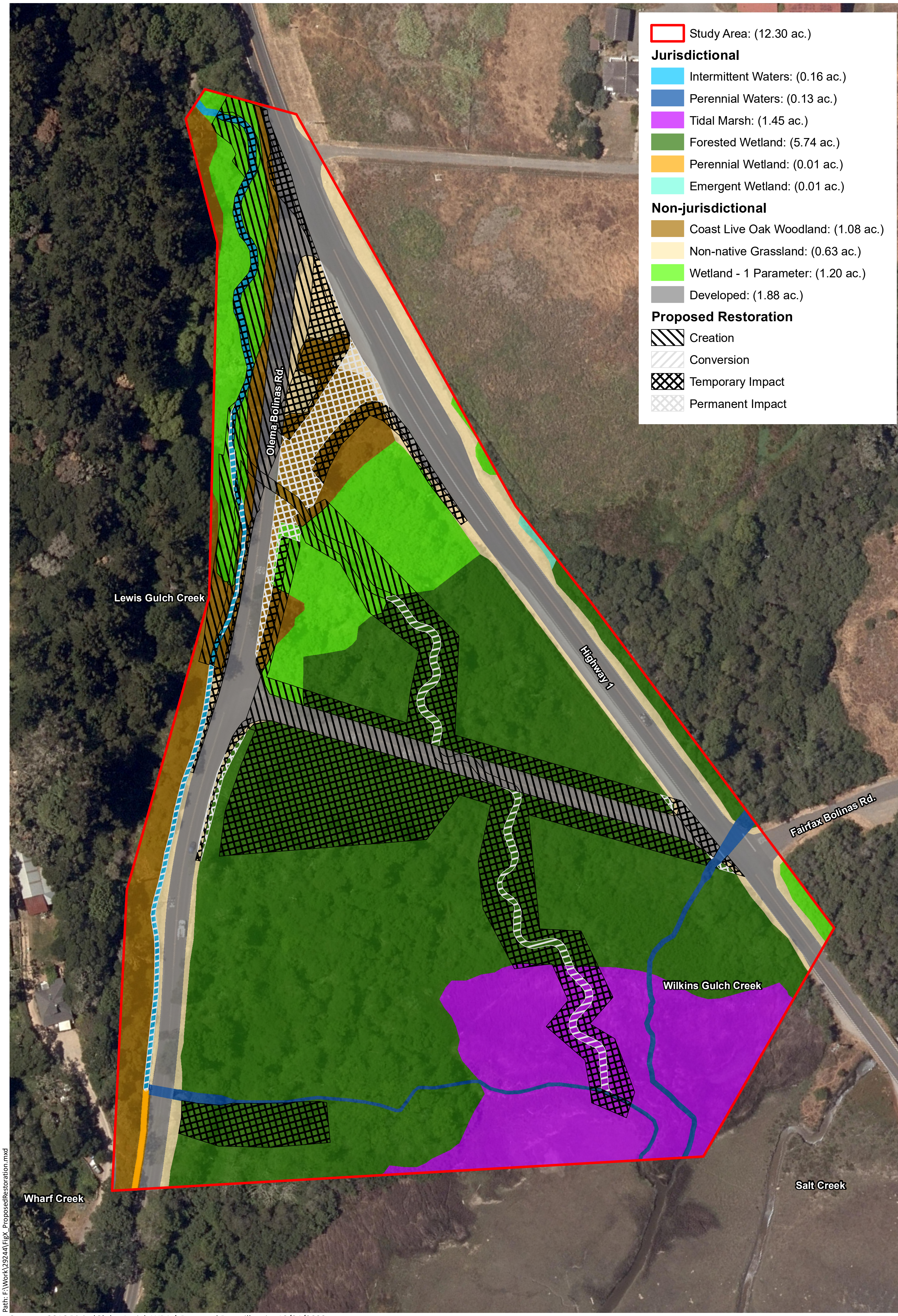
Figure 27. Critical Habitat within Vicinity of Study Area

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

0 500 1,000 Feet

N

wra Environmental Consultants



Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: sgillespie, 10/24/2022

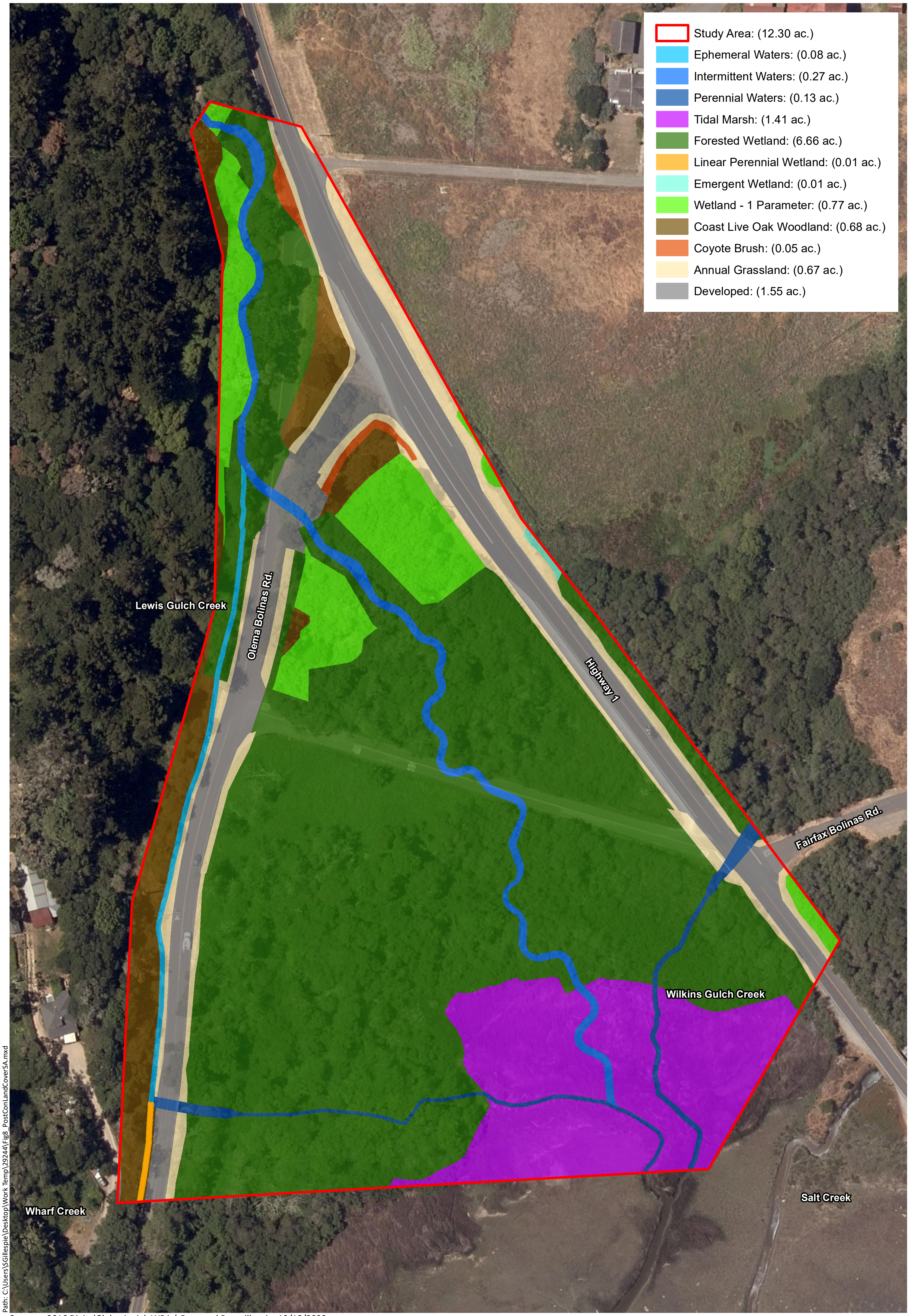
Figure 28. Proposed Restoration

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

0 150 300 Feet

N

wra Environmental Consultants



Path: C:\Users\SGillespie\Desktop\Work Temp\29244\Fig8_PostConLandCoverSA.mxd

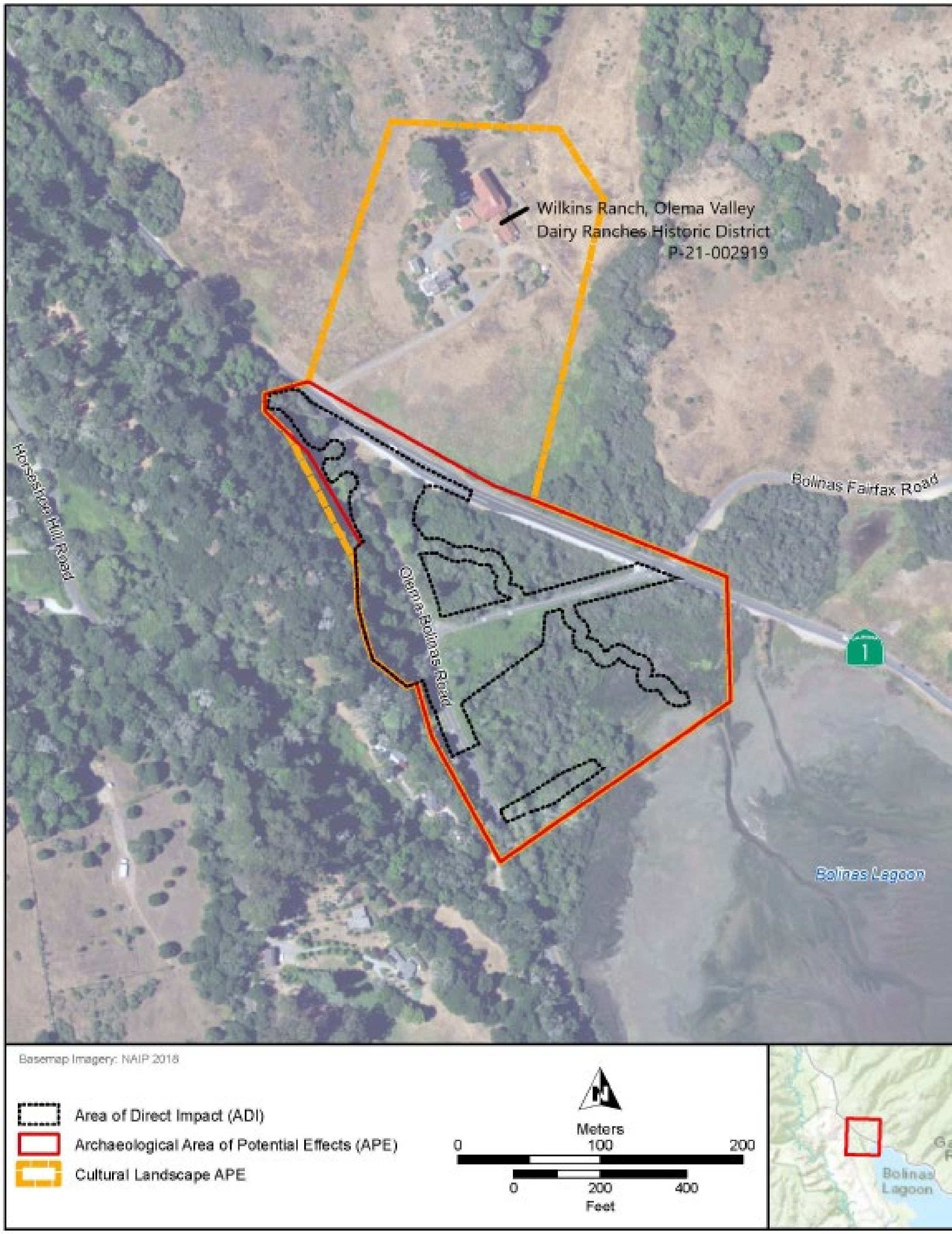
Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: sgillespie, 10/18/2022

Figure 29. Biological Communities within the Study Area After Restoration

Bolinas Wye Wetlands Resiliency Project
Bolinas, California

0 50 100 Feet

wra Environmental Consultants



Source: (Yarbrough, 2023)

Figure 30. Cultural Landscape and Archaeological Areas of Project Effect

Bolinas Lagoon Wye Wetlands Resiliency Project
Bolinas, California

XII. CEQA FRAMEWORK

This Initial Study has been prepared in compliance with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines. The basic purposes of CEQA are to:

1. Inform governmental decision makers and the public about the potential significant environmental effects of proposed activities;
2. Identify ways that environmental damage can be avoided or significantly reduced;
3. Prevent significant, avoidable damage to the environment by requiring changes in projects using alternatives or mitigation measures when the governmental agency finds the changes to be feasible; and
4. Disclose to the public the reasons why a governmental agency approved the Project in the manner the agency chose if significant environmental effects are involved.

The purpose of this Initial Study is to disclose information obtained during the analysis of environmental effects that could result from implementation of the proposed Project, including construction, operation, and maintenance, that has a potential for resulting in a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. The Initial Study utilized the Checklist included as Appendix G of the State CEQA Guidelines. The Checklist topic areas are presented in alphabetical order:

- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Resources
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire
- Mandatory Findings of Significance

For each topic area, the Checklist includes specific questions. Each question is answered by evaluating all phases of the proposed Project, including construction and post-construction use, in consideration of the potentially significant environmental impacts that could occur for any phase of the proposed Project. For each question, one of the four following conclusions is provided with supporting information:

No Impact

The proposed Project would not have the impact described.

Less-than-Significant Impact

The proposed Project may result in the impact described, but at a level that is less than significant. Mitigation is not required, however, may still be included.

Potentially Significant Unless Mitigated

The proposed Project may result in the impact described at a level that is potentially significant. The incorporation of proposed mitigation measures would reduce the potentially significant impact to a less-than-significant level. For these responses, proposed mitigation measures are included after the discussion of the potential impact. To adopt a Mitigated Negative Declaration, the Lead Agency must agree to incorporate all mitigation measures into the Project as approved and a Mitigation Monitoring and Reporting Program must be adopted by the Lead Agency at the time of Project approval.

Potentially Significant Impact

The proposed Project may have the impact described at a level that is potentially significant. The potentially significant impact cannot be reduced to a less-than-significant level even with the incorporation of proposed mitigation measures, requiring preparation of an Environmental Impact Report.

The conclusions of the Initial Study have been utilized to determine whether a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report should be prepared. This determination depends on the conclusions of the Initial Study regarding potentially significant environmental impacts, based on substantial evidence:

Negative Declaration

The Initial Study concludes no potentially significant environmental impacts would occur from implementation of the proposed Project and no mitigation measures are required.

Mitigated Negative Declaration

The Initial Study concludes that potentially significant environmental impacts could occur from implementation of the proposed Project. Mitigation measures are included to reduce potentially significant environmental impacts to a less-than-significant level.

Environmental Impact Report

The Initial Study concludes that potentially significant environmental impacts could occur from implementation of the proposed Project. Mitigation measures are included to reduce potentially significant environmental impacts to a less-than-significant level, but potentially significant environmental impacts could still result.

XIII. SUMMARY OF THE CEQA ANALYSIS

The MCOSD is the CEQA Lead Agency for the proposed Project, meaning that the MCOSD has the principal responsibility for carrying out or approving a project, including the decision of which environmental document should be prepared.

The Initial Study concluded that all potentially significant impacts of the proposed Project can be mitigated to a less-than-significant level. Most questions were answered with a No Impact or Less-than-Significant Impact response. Mitigation Measures have been included to address potentially significant impacts in the Biological Resources, Cultural Resources, Hydrology and Water Quality, Noise, and Transportation topic areas, which are provided beginning on the next page and within the applicable Checklist topic area. With implementation of the mitigation measures, potentially significant environmental impacts resulting from the Project would be reduced to a less-than-significant level.

XIV. PROPOSED MITIGATION MEASURES

Mitigation Measure BIO-1: Steelhead and Coho

1. The proposed Project shall consult with the National Marine Fisheries Service (NMFS) for potential impacts to steelhead (see WRA 2022 NMFS Biological Assessment).
2. All in-channel work shall occur between June 1 and October 31. Work outside of this period shall only occur if authorized by NMFS and CDFW.
3. Prior to working within a stream, a bypass shall be installed to allow flowing water (if any is present) to be bypassed to maintain flows downstream. Fish relocation shall occur within the section of stream to be dewatered before dewatering commences.
4. Fish relocation activities shall be led by a qualified fisheries biologist approved by NMFS. The qualified fisheries biologist shall be assisted by at least one additional biologist if conducting electrofishing.
5. During any initial dewatering efforts, pumps shall be screened with appropriately sized mesh to prevent the entrainment and impingement of fish and amphibians in accordance with CDFW and NMFS fish screening criteria.
6. Prior to capturing fish, the qualified biologist shall determine the most appropriate release location(s). The following shall be considered when selecting release site(s):
    a. Similar water temperature as capture location.
    b. Quantity and quality of habitat available to relocate captured fish.
    c. Relocation area in relation to work activities.
7. All fish relocation equipment shall be cleaned and sanitized before and after use.
8. Any temporary fish exclusion or block nets shall be made of soft mesh and shall have appropriately sized mesh to prevent fish from entering the work area.
9. If electrofishing is used to capture fish, it shall only be conducted by trained personnel following NMFS electrofishing guidelines (NMFS, 2000).
10. Fish holding times shall be minimized to the extent practical and if necessary multiple relocations shall occur to minimize the number of fish being held in buckets or coolers.

Mitigation Measure BIO-2: CRLF

1. The Project shall consult with the USFWS prior to initiating Project activities (see WRA 2022 USFWS Biological Assessment).
2. Within 48 hours prior to the start of construction activities, a biologist approved by USFWS (qualified biologist) shall conduct a pre-construction survey for CRLF in and adjacent to the Project area.
3. If any CRLF or other amphibians are observed in the Project area, the individual(s) shall be captured by the qualified biologist and relocated outside of the Project area. Capture shall proceed as follows:
    a. Prior to handling the animal(s), the biologist shall assure their hands are free of toxins (i.e., sunscreen, bug repellant, etc.) or they may use moistened latex or nitrile gloves to handle/capture the animal(s).
    b. A clean bucket containing moist leaf litter, or a sponge moistened with non-chlorinated water shall be used to hold and transport the animal(s).
    c. The qualified biologist shall capture the animal by hand, or with the use of appropriate tools (e.g., dip net).

   d. The animal shall be relocated outside of the Project area, at least 200 feet from similar riparian or aquatic habitat.
   e. Information regarding the capture including number of individuals, date, time, approximate size, sex (if known), capture location coordinates, and release location coordinates shall be recorded, along with any other relevant information.
   f. Any equipment used for relocation or capture shall be properly decontaminated according to standard protocols for the species before and after use.
4. A qualified biologist shall be present for any initial vegetation removal, initial grading or grubbing and for any relocations. Once initial vegetation removal or grading is complete, a morning pre-construction check may be conducted by a biological monitor, or qualified person who has been trained by the qualified biologist; however, if a CRLF is observed, the biological monitor or qualified person shall stop work and inform the qualified biologist who shall oversee the relocation.
5. The qualified biologist, any biological monitors, and qualified person(s) shall have stop-work authority.
6. Prior to the commencement of work with wheeled or tracked equipment in vegetated areas, vegetation that could conceal amphibians shall be surveyed by a qualified biologist or biological monitor. If vegetation is too dense to be adequately surveyed (e.g., thick blackberry bushes, etc.), a qualified biologist or biological monitor shall observe vegetation removal until vegetation is cleared sufficiently for the qualified biologist to survey the area and verify the presence or absence of amphibians. If no amphibians are found, the vegetation shall be fully removed, and work may continue. If amphibians are observed, they shall be relocated by a qualified biologist according to the procedure outlined above.
7. An exclusion fence cannot be established around the entire site due to the variety of hydrologic conditions in the Project area; therefore, an exclusion fence (such as silt fencing) shall be installed around any staging and storage areas only. The exclusion fence shall stand at least 2 feet high and be buried at least 6 inches deep or shall otherwise be secured along the bottom to prevent wildlife from passing underneath (i.e., with sandbags or similar materials). The fence shall be made of an opaque material (such as silt fencing). Any access gates shall be closed each night and secured to prevent entry by CRLF or other nocturnal amphibians. If no vegetation is present within 25 feet of the exclusion fence, cover boards shall be placed approximately every 100 feet to provide intermittent cover for CRLF or other amphibians. If vegetation is present within 25 feet, no cover boards are necessary.
8. The exclusion fence shall be surveyed daily by a qualified biologist or qualified person to identify and address issues that could allow CRLF or other amphibians to enter the staging area.
9. All construction activities shall cease one half-hour before sunset and shall not begin prior to one half-hour after sunrise.
10. Construction activities shall not occur for 24 hours after rain events that deliver >0.25 inches of rain without the presence of a full-time qualified biologist onsite to monitor activities.
11. Any open holes or trenches greater than 12 inches deep shall be covered or have escape ramps no steeper than 45 degrees installed at the end of each working day to prevent CRLF or other amphibians from becoming entrapped. Holes shall be checked before work begins.
12. All aquatic equipment used for capture shall be decontaminated before and after use in accordance with the fieldwork code of practice developed by the Declining Amphibian Populations Task Force.
13. No monofilament wrapped BMPs shall be used which might entangle CRLF or other amphibians.

Mitigation Measure BIO-3: California Black Rail

1. Prior to initiating construction activities in the spring, protocol surveys shall be performed to determine if black rail territories are present within 330 feet (100 meters) of the Project area.
    a. If a territory is identified, a 165-foot (50 meters) non-disturbance buffer shall be established around the territory, and no work shall occur south of the Fairfax Bolinas crossover road within the buffer until after August 31.
    b. If no specific territories are identified, the Project shall establish a general buffer of 85 feet (25 meters) from the edge of the high tide line. No work of any type shall occur within the buffer until after August 31, when nesting season has completed.
2. Any work such as asphalt grinding, jackhammering, concrete sawing, or similar extreme noise-producing construction activities required to remove the Fairfax Bolinas crossover road shall not occur from March 1–April 30, when black rails are most likely to call in association with the breeding season.
    a. Standard construction activities, such as motorized equipment operation and staging of equipment or materials, vegetation removal, grading, or other general Project activities may occur on, or north of, the Fairfax Bolinas crossover road, from March 1–April 30.
    b. If extreme noise-producing activities are necessary during the period from March 1–April 30, then temporary visual barriers and sound attenuating curtains shall be used to decrease visual and auditory disturbances.
    c. Any general work activities along Fairfax Bolinas Road from March 1–April 30 shall not begin until one hour after sunrise and shall cease no later than one hour before sunset, to avoid periods when rails are most likely to call.
3. Between November and January, no work shall occur within 85 feet (25 meters) of the high tide line from 45 minutes before, until 45 minutes after a high tide event measuring 6.0 feet or higher, to allow rails to use adjacent uplands as refugia during high tide events. Work outside of the 85-foot buffer shall be allowed, weather permitting.

Mitigation Measure BIO-4: Native Nesting Birds

1. To the extent feasible, vegetation removal and initial ground disturbance shall occur from September 1 through January 31, so that initial ground-disturbing work occurs outside of the general nesting bird season.
2. For vegetation removal and ground disturbance within the proposed Project area that is conducted during the general nesting bird season (February 1 through August 31), pre-construction nesting bird surveys shall be conducted within the work area and adjacent habitats seven days prior to the initiation of vegetation removal or grading activities to avoid disturbance to active nests, eggs, and/or young.
3. All active nests of native birds found during the survey shall be protected by a no-disturbance buffer until all young from each nest fledge, or the nest otherwise becomes inactive. The size of each buffer shall be determined by a qualified biologist dependent upon extant conditions and may require consultation with the CDFW. Buffers are typically a minimum of 25 feet for disturbance-adapted non-special-status birds and increase accordingly for large raptors or other special-status species.

Mitigation Measure BIO-5: Roosting Bat Protection

1. Prior to the removal of any large trees (DBH>18 inches) a bat roost assessment shall be conducted by a qualified biologist at least 30 days beforehand to determine if potential roost habitat is present.
    a. If the tree has no potential to support roosting bats (e.g., no large basal cavities, exfoliating bark or interstitial spaces), the tree may be removed with no further measures required to protect roosting bats.
    b. If a potential bat habitat is present, and work is occurring outside the maternity season, the qualified biologist may either 1) Conduct an emergence survey to determine if the roost is occupied; or 2) The tree may be felled using a two-phased cut.
        i) If the emergence survey confirms the roost is inactive, the tree may be felled normally.
        ii) If the roost is confirmed active, or is assumed to be active, a two-phased cut shall be employed to remove the tree. On day one, the qualified biologist shall oversee removal of branches and small limbs not containing potential bat roost habitat using hand tools such as chainsaws or handsaws only. The next day, the rest of the tree may be removed.
    c. If potential bat roosting habitat is present and work is occurring during the maternity season, the qualified biologist may either 1.) Conduct an emergence survey to determine if the roost is occupied; or 2.) Assume the roost is occupied and a buffer shall be implemented.
        i) If the roost assessment does not detect bats, the tree may be removed normally. If roosting bats are detected, or the tree is assumed to be an active roost, the tree shall be given a 100-foot buffer and shall be avoided until after the maternity roosting season is complete.

Mitigation Measure BIO-6: Tree Protection

To minimize damage to existing trees which are not proposed for removal by Project activities, the following shall be implemented:

1. To the extent possible any native trees shall be avoided and retained.
2. Installation of temporary protective fencing around the dripline of existing trees per the direction of a licensed arborist prior to ground disturbance in the area of those trees.
3. Trunk protection with 2x4 wood planks shall be installed around the trunk of a tree that cannot otherwise be protected at the dripline.

Of the trees proposed for removal, new native trees would be planted at ratios established to be commensurate with the stature of the trees to be removed.

4. A total of 1,246 trees shall be planted on-site, in addition to the many shrubs listed in the Project revegetation plan planting palette. This represents a 10:1 replacement ratio for the 123 trees that will be removed (3.5:1 replacement for oaks).
5. On-site planting may occur within the restored floodplain where the crossover section of Fairfax Bolinas Road is removed, increasing habitat continuity within this floodplain.

Mitigation Measure BIO-7: Waters of the U.S. and State

1. The Project shall implement the following measures to avoid and/or minimize and restore potential impacts to aquatic habitats resulting from Project activities:
2. Excavation of the new channel and any work within the existing creek bed and banks shall be completed between June 1 and October 31. Work within the existing channel shall only occur when the work area is dry or dewatered.
3. Prior to construction, the contractor shall be required to prepare an Accidental Spill Prevention and Cleanup Plan.
4. Emergency spill containment and clean-up materials shall be kept on the Project site.
5. A Stormwater Pollution Prevention Plan (SWPPP) shall be developed which would include stormwater best management practices (BMPs) specific to the disturbances occurring as well as inspection procedures to ensure the SWPPP is implemented as described.
6. To minimize fluid leaks, equipment shall be inspected daily. Any equipment found to be leaking shall not be used until it has been fully repaired.
7. If maintenance must occur on-site, it would occur in designated areas located at least 100 feet from drainages and channels and protected with perimeter controls and non-permeable surfaces placed under the equipment. Secondary containment, such as a drain pan or drop cloth, to catch spills or leaks shall be used when performing maintenance or refueling equipment. Fluids shall be stored in appropriate containers with covers, and properly recycled or disposed of off-site.
8. No equipment, including concrete trucks, shall be washed within the channel of the creek, or where wash water could flow into the channel. Prior to initiating construction, the contractor shall establish a concrete washout area for concrete trucks in a location within developed areas where wash water shall not enter the creek or adjacent areas. The washout area shall follow the practices outlined in the San Francisco Bay Regional Water Quality Control Board Erosion and Sediment Control Field Manual (page 107–108, July 1999) or more recent guidelines.
9. All spoils including concrete and asphalt shall be stored in locations where they cannot enter waterbodies and shall be covered or protected as outlined in the SWPPP until they can be hauled offsite for disposal.
10. Debris, soil, silt, excessive bark, rubbish, creosote-treated wood, raw cement/ concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from projected related activities, shall be prevented from contaminating the soil and/or entering the waters of the US or State.
11. All trash and construction debris shall be contained in a covered debris box (or similar) and removed regularly from the Project site and disposed of appropriately off-site.

Mitigation Measure CUL-1: Historical Resources

If the SHPO concludes that the three road segments constitute a historic resource, the Project shall develop a Built Environment Treatment Plan (BETP) to resolve adverse effects and reduce the significance of impacts under CEQA to a less-than-significant level. The BETP should propose public interpretation and recordation measures that find acceptance from the Corps, SHPO, and the Marin County Parks and Open Space District in order to jointly address federal and state mandates to mitigate adverse effects and impacts. The BETP shall be attached to a Memorandum of Agreement between the Corps, the California SHPO, and the Advisory Council for Historic Preservation. The same BETP shall be used to reduce adverse CEQA impacts to a less-than-significant impact to historical resources.

Mitigation Measure CUL-2: Archaeological Resources Monitoring

Prior to Project implementation, a Cultural Resources Monitoring Plan (Plan) will be prepared by a qualified archaeological consultant. The Plan will discuss the monitoring procedures, field methods, communication protocols, and inadvertent discovery actions to be taken in the event archaeological resources are identified during monitoring and/or any Project activities. Periodic spot-check monitoring will occur during the removal/demolition of the Crossover Road and full-time monitoring will occur during vegetation removal at the location of the Oyster House. All monitoring will be carried out by a qualified archaeologist.

Mitigation Measure CUL-3: Archaeological Resources Work Stoppage

Construction crews shall be trained in “basic archaeological identification” and have access to a Cultural Resources Awareness Sheet. The sheet shall photographically depict shell midden and associated indicators of archaeological sites, and clearly outline the procedures in the event of a new archaeological discovery. These procedures include temporary work stoppage (Stop-Work Order) of all ground disturbance, short-term physical protection of artifacts and their context, and immediate advisement of the archaeological team and MCOSD representatives. Any Stop-Work Order would contain a description of the work to be stopped, special instructions or requests for the Contractor, suggestions for efficient mitigation, and a time estimate for the work stoppage. The archaeologist shall examine the findings and assess their significance and offer recommendations for any procedures deemed appropriate to further investigate and/or mitigate adverse impacts to archaeological resources that have been encountered.

Mitigation Measure CUL-4: Discovery of Human Remains

Upon discovery, the Coroner Division of the Marin County Sheriff’s Office will be contacted for identification of human remains. The coroner has 2 working days to examine the remains after being notified. If the remains are Native American, the Coroner must notify the Native American Heritage Commission (NAHC) of the discovery within 24 hours. The NAHC will then identify and contact a Most-Likely Descendant (MLD). The MLD may make recommendations to the owner, or representative, for the treatment or disposition, with proper dignity, of the remains and grave goods. Once proper consultation has occurred, a procedure that may include the preservation, excavation, analysis, and curation of artifacts and/or reburial of those remains and associated artifacts will be formulated and implemented.

If the remains are not Native American, the Coroner will consult with the archaeological research team and the lead agency to develop a procedure for the proper study, documentation, and ultimate disposition of the remains. If a determination can be made as to the likely identity—either as an individual or as a member of a group—of the remains, an attempt should be made to identify and contact any living descendants or representatives of the descendant community. As interested parties, these descendants may make recommendations to the owner, or representative, for the treatment or disposition, with proper dignity, of the remains and grave goods. Final disposition of any human remains or associated funerary objects will be determined in consultation between the MCOSD and FIGR.

Mitigation Measure HYD-1: Water Quality Protection

The following measures shall be implemented during Project-related construction activities:

1. Heavy construction shall be limited to the dry-weather months. Construction within the ordinary high waterline will occur when stream flows are at their lowest (typically July through October). All disturbed soils will be stabilized by October 31.
2. Workers shall receive an erosion, sediment control, and pollution prevention training and would be instructed to avoid conducting activities beyond the construction zone including storage of tools, materials, and soil.
3. Erosion and sediment control measures, such as silt fences and certified weed seed-free rice straw fiber rolls (wattles), shall be installed as needed to eliminate the potential for sediment movement. The use of erosion control measures and mulches that contain non-native plant seeds or non-biodegradable material shall be prohibited. Only rice straw-filled fiber rolls will be permitted, or sterilized seed, to prevent inadvertent introduction of wheat and barley species. The use of erosion control measures that may trap small animals shall be prohibited. Erosion control measures will not contain plastic netting or monofilament.
4. Sites where activities result in exposed soil shall be stabilized to prevent erosion as soon as feasible after Project activities are complete.
5. Excavated materials shall be stockpiled outside of drainages, contained with appropriate sediment controls, and covered with geo-fabrics or plastic sheeting.
6. Soils excavated during ground-disturbing activities shall be reused to the extent that these locally derived materials are found to be clean and weed-free. Any such reuse is subject to applicable County policies and guidance.
7. Regular site inspections shall be conducted during construction to ensure that erosion control measures remain in place and are maintained and functioning properly. Sediment control devices that collect sediment shall be regularly cleaned out and the sediment added to soil stockpiles.
8. Once Project actions are completed, native vegetation that was removed and saved as part of Project activities shall be replanted or used for passive seeding to support revegetation and erosion control activities.
9. Proper storage, use, and disposal of chemicals, fuels, and other toxic materials is required. Soil, silt, bark, rubbish, creosote-treated wood, raw cement, concrete (including washings), asphalt, paint, oil or other petroleum products, or other substances that could affect water quality and be harmful to aquatic biota shall be prevented from entering the soil and/or waters of the State.
10. Any chemicals stored on site (for fueling or equipment maintenance) shall be stored in a locked container with secondary containment in case of leaks.
    a. If maintenance must occur on-site, it shall occur in designated areas located at least 100 feet from drainages and channels and protected with perimeter controls and non-permeable surfaces placed under the equipment. Secondary containment, such as a drain pan or drop cloth, to catch spills or leaks, shall be used when removing or

changing fluids. Fluids shall be stored in appropriate containers with covers, and properly recycled or disposed of off-site.

   b. Emergency spill containment and clean-up materials shall be kept on the Project site.

11. Power tools shall be refueled only in upland areas and away from all surface water zones to prevent fuel spills near sensitive habitats. Tools shall be inspected for oil and gas leaks before being brought on-site and regularly while on-site.
12. Equipment parked on site overnight shall be placed over a non-permeable surface such as a tarp or plastic sheeting to prevent leaks and spills.
13. All trash and construction debris shall be contained in a covered debris box (or similar) and removed regularly from the Project site and disposed of appropriately off-site.
14. For all vehicles and equipment operated in or near Lewis Gulch Creek:
    a. All vehicles and equipment shall be kept clean. Excessive build-up of oil or grease shall be avoided.
    b. All equipment used in the creek channel shall be inspected for leaks each day prior to initiation of work. Action shall be taken to prevent or repair leaks, if necessary.
15. During bridge construction, a sheet of Visqueen® or similar material shall be attached under the bridge to catch wood dust, metal dust, loose hardware, etc., to avoid pollutants entering channels. These materials shall be bagged and removed from the site.
16. All soil and/or rock materials imported to the Project site shall be tested to ensure that they do not contain hazardous materials (such as heavy metals) above applicable screening levels such as those adopted by the State Water Resources Control Board.

Mitigation Measure NOI-1: Noise Buffers

If noise-inducing work occurs during the bird nesting season (February 1–July 31), pre-construction surveys for nesting birds shall be conducted. If nests are found, buffers will be established according to the species detected and state and federal regulations. Otherwise, if no nests are found, then noise-inducing activities will only take place between two hours after sunrise and two hours before sunset. If activities are particularly noisy, meaning louder than applicable county noise thresholds, sound barriers shall be erected around noise-inducing work sites to limit noise impacts to wildlife.

Mitigation Measure TRAN-01: Bicyclist Safety

Bicyclists share the road with vehicles at the Project location under typical conditions, so maintaining an adequate travel way or detour route through the area would be needed for both transportation modes in each direction along SR-1, Olema Bolinas Road, and Fairfax Bolinas Road. To ensure that the route is adequate for bicyclists, a smooth surface shall be provided along with detour and warning signage on the approaches to the Project area to raise awareness for drivers and bicyclists of the temporary conditions.

Mitigation Measure TRAN-02: Construction Signage

Construction and detour warning signs shall be placed on SR-1 in advance of construction activities along the roadway for both northbound and southbound traffic. Additional signage, as well as traffic control personnel, may be required at the intersection based on proximity of construction activities to the roadway and whether any temporary modifications of the travel lanes are required.

During Year 2 construction, to the degree that construction materials are required to be transported across the road to and from the staging area, temporary traffic control shall be required. To the extent that the staging area encroaches upon the roadway, traffic control may be required to maintain adequate clearances. Construction warning signage shall be stationed upstream of active construction and staging areas.

XV. DETERMINATION

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

CEQA Checklist Topic Areas

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology/Soils	☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials
☒ Hydrology/Water Quality	☐ Land Use/Planning	☐ Mineral Resources
☒ Noise	☐ Population/Housing	☐ Public Services
☐ Recreation	☒ Transportation	☐ Tribal Cultural Resources
☐ Utilities/Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed Project COULD NOT have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

☒ I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☐ I find that the proposed Project MAY have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect **1)** has been adequately analyzed in an earlier document pursuant to applicable legal standards, and **2)** has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects **(a)** have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and **(b)** have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION,** including revisions or mitigation measures that are imposed upon the proposed Project, **nothing further is required**.

Rachel Reid

Rachel Reid, Environmental Coordinator June 26, 2023
Marin County Community Development Agency

XVI. CEQA GUIDELINES APPENDIX G CHECKLIST ANALYSIS

A. AESTHETICS

Table 4. Aesthetics Checklist Questions

Except as provided in Public Resources Code Section 20199, would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b)	Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c)	In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? *(Public views are those that are experienced from publicly accessible vantage points)*. If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d)	Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

SETTING

Marin County has a unique visual environment with a diversity of landscapes which include views of open space, ocean vistas and beaches, San Francisco Bay shoreline, hills and ridgelines, agricultural lands, stands of forests, and other natural features. The proposed Project is located on two parcels in Marin County at the north end of Bolinas Lagoon between Olema Bolinas Road and SR-1. The proposed Project site is bounded by SR-1 to the east, Olema Bolinas Road to the west, and Bolinas Lagoon to the south, within the Bolinas Wye wetland. The Project site is primarily vegetated and consists of roadways, trees, wetland, intertidal lagoon, and stream habitats. SR-1 to the east of the Project site is eligible for listing as State Scenic Highway (Caltrans, 2022). The Project site can be seen from SR-1. Views of the existing Project setting are presented in Figure 22.

CEQA CONTEXT

Potentially significant environmental impacts associated with aesthetics can be subjective in nature because the response to aesthetics varies from person to person. In terms of methodology, potentially significant environmental impacts to aesthetics have been determined by identifying whether Project elements would result in the loss or degradation of a scenic attribute or in a demonstrable negative effect to overall visual quality.

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

Less-than-Significant Impact

A scenic vista can be defined as a viewpoint that provides expansive views of a highly valued landscape for the benefit of the general public. There are no officially designated vistas within the Project area. The Bolinas Lagoon Open Space Preserve includes non-designated scenic vistas. Implementation of the proposed Project would include soil disturbing activities such as vegetation and tree removal, grading, roadway demolition/removal, and bridge and roadway reconstruction. Views of construction activities (e.g., removal of the crossover road, construction of the new bridge, and roadway realignment) would be available from Olema Bolinas Road and SR-1, but these activities would be temporary in nature. Upon the completion of Project construction work, the disturbed areas would be revegetated and no long-term substantial adverse change to existing vistas would occur. Project construction also would include removal of 123 trees from the Project site. The loss of the trees would have a local visual effect in the short term; however, the trees would be revegetated at a 10:1 ratio in appropriate locations on-site. Although the removal of mature trees and non-native invasive vegetation would alter the appearance of the site, it would not substantially impact views from non-designated scenic vistas within the Bolinas Lagoon Open Space Preserve as the fundamental visual characteristics of the Project site would not change. Further, the predominant view from non-designated scenic vistas is of the intertidal, low marsh towards the open water of Bolinas Lagoon, which is outside of the project area. Tree and vegetation removal associated with the Project is specifically analyzed in the Biological Resources section of this CEQA Checklist.

The new intersection for Olema Bolinas Road/SR-1 would provide views of the elevated bridge, but with the removal of the existing intersection, this will result in a reduction in the amount of visible infrastructure. In addition, as the replanted trees mature, views of the bridge and road will be obscured. Once the Project is constructed, the Project site would include a large wetland area where the crossover segment of Fairfax Bolinas Road will be removed and restored to wetland habitat. The revegetation of the former crossover segment would utilize wetland vegetation that is within the same vegetation alliance as the adjacent wetlands, as will revegetation of tree removal areas within the historic floodplain that will be disturbed for creation of the new Lewis Gulch Creek channel. The Project would not have a substantial adverse effect on views from any scenic vistas because wetland habitat and vegetation removed on-site would be similar in native species composition and would not represent a change to the fundamental visual characteristics of the site. Furthermore, native trees that are proposed for site revegetation are fast growing and would fill in over the course of 5-10 years. In addition, the entire Project area is heavily vegetated and areas of disturbance below the Crossover Road will largely be concealed. Therefore, the shift in the age and maturity of on-site vegetation that would result from the Project would not result in a substantial adverse effect on a scenic vista.

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

Less-than-Significant Impact

Scenic resources can be defined as those landscape patterns and features that are visually or aesthetically pleasing. These include, but are not limited to trees, rock outcroppings, and historic buildings. Scenic areas, open spaces, rural landscapes, and vistas also contribute to a net visual benefit for the viewer. The California Department of Transportation (Caltrans) manages the California Scenic Highway Program to protect State highways located in areas of outstanding natural beauty. The State legislature created the California's Scenic Highway Program in 1963 to protect and enhance the natural scenic beauty of California highways and adjacent corridors, through special conservation treatment. SR-1 along the eastern edge of the Project site is eligible for listing as State Scenic Highway but has not been so designated to date (Caltrans, 2022). The Project site contains no buildings, historic or otherwise.

The Project would remove the existing crossover segment of Fairfax Bolinas Road within the Project site to reconnect the historic floodplain and construct a new intersection at Olema Bolinas Road and SR-1 with a bridge crossing for Lewis Gulch Creek. Removing Fairfax Bolinas Road would result in an improvement to scenic resources; therefore, it would be a beneficial effect. The new bridge would be aligned with Olema Bolinas Road which would be elevated to reduce flooding risk. Olema Bolinas Road would be elevated higher than under existing conditions, but the new side slopes would be revegetated. The Project would also include removal of non-native species and placement of large woody debris for habitat restoration, resulting in an increase in wetland habitat within the Project site, which would be a beneficial impact for scenic resources. As discussed above, the Project would also remove 123 trees from the Project site, which would result in a change in the visual character of the Project site, including views from SR-1; however, the visual quality of the site would ultimately be improved through revegetation, including the planting of a total of 1,246 trees, in addition to the many shrubs included in the Project's revegetation plan (see the Project Description). This represents a 10:1 replacement ratio for the 123 trees that will be removed. Because an objective of the Project is to restore wetlands to the site, the location of vegetation alliances will change in identified areas of revegetation, and vegetation shifts will occur as wetland characteristics evolve as a result of the Project. This includes replaced trees currently in the drier non-wetland areas of the site that will become subject to periodic inundation and replaced with riparian trees. Thus, although temporary visual impacts would occur during and immediately following Project construction, and the spatial distribution of trees and vegetation alliances on the site would change following Project implementation, the Project would not substantially damage any scenic resources within a designated State Scenic Highway corridor.

c) In non-urbanized areas, would the Project substantially degrade the existing visual character or quality of public views of the site and its surroundings? *(Public views are those that are experienced from publicly accessible vantage points)*. If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?*)*

Less-than-Significant Impact

Visual character can be defined as the perceived contrast between the existing visual elements of an area and how the area will look after the Project is implemented, as a measure of how compatible the Project will be with the existing visual environment after it is implemented. The proposed Project is located within an open space area and is accessed by visitors and residents traveling in vehicles through the area. Publicly accessible vantage points would be from the existing roads: Olema Bolinas Road, the crossover segment of Fairfax Bolinas Road, and SR-1.

Implementation of the proposed Project would result in small-scale visual impacts during and after construction. Changes to the visual environment during construction would include the presence of construction equipment and materials staged at the site, disturbed land, and temporary stormwater protection measures such as waddling and straw. Construction equipment would be stored in a designated staging area and away from the sensitive habitats (e.g., creek and wetland). After construction, the new bridge and modified road would be visible, but as new vegetation grows, it would soften the visibility of these changes.

The most prominent permanent visual change would be associated with the removal of the existing Fairfax Bolinas Road within the Project site and the new intersection at Olema Bolinas Road and SR-1 with a bridge crossing Lewis Gulch Creek, which would be visible from SR-1 and Olema Bolinas Road. Restoration activities, including wetland restoration and site revegetation, would also alter the character of the Project site; however, removal of non-native vegetation is not expected to substantially degrade the existing visual character or quality of public views of the Project area and surroundings, because substantial vegetation would remain, and as described above, the Project design includes substantial replanting of native vegetation. Similarly, the tree removal necessary for Project implementation would not represent a substantial degradation of the existing visual character because the trees would be replaced on-site in ecologically appropriate locations. Restoration of the historic wetland on-site is expected to improve, rather than adversely affect, the visual character of the Project site and surrounding area.

Given the design of the Project components to be generally compatible with natural and semi-natural areas, their location in the visual setting, and their limited scale compared to the overall visual context available from public corridors, implementation of the proposed Project would result in a less-than-significant impact on visual quality and character of public views.

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

No Impact

New sources of light and glare can occur from lighting associated with buildings and from exterior light sources such as street lighting, building illumination, security lighting, and landscape lighting. Glare is an objectionable brightness, the effect usually created by the reflection of sunlight or artificial light from highly polished surfaces, including windows and automobile glass during the daytime. During nighttime, glare is usually the result of the viewer being within the line of sight of a bright source of light, such as from a building or vehicle headlamps that contrast with surrounding low-ambient light conditions. Light pollution is an unwanted consequence of outdoor lighting and includes such effects as sky glow, light trespass, and glare. Light trespass is light cast where it is not wanted or needed, such as light from a streetlight or a floodlight that illuminates a neighbor’s bedroom at night making it difficult to sleep.

The Project site does not contain any stationary sources of light or glare. Minor amounts of off-site lighting from nearby residences may be visible from certain locations at night, as would vehicle headlights passing through the site on the road segments. The proposed Project would not include any new sources of light or glare; therefore, the Project would not create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. No nighttime construction would occur that would require the use of light; therefore, the proposed Project would have no impact on new sources of light or glare.

B. AGRICULTURE AND FORESTRY RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project, and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Table 5. Agriculture and Forestry Resources Checklist Questions

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c)	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code §12220(g)), timberland (as defined by Public Resources Code §4526), or timberland zoned Timberland Production (as defined by Government Code §51104(g))?	☐	☐	☐	☒
d)	Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☒	☐
e)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

SETTING

The California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) provides a classification system based on technical soil ratings and current land use. The FMMP is an informational service only and does not have regulatory authority over local land-use decisions. The minimum land use mapping unit is ten acres unless specified; the map incorporates smaller units of land into the surrounding map classifications. Pursuant to CEQA Guidelines Appendix G, the term "Farmland" refers to FMMP map categories Prime Farmland, Unique Farmland, and Farmland of Statewide Importance (hereafter collectively referred to as "Farmland"). Generally, any conversion of land from one of these categories to a lesser quality category or a non-agricultural use would be an adverse impact. These map categories are as follows:

Prime Farmland: Land which has the best combination of physical and chemical characteristics to produce crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods.

Unique Farmland: Land of lesser quality soils used to produce specific high economic value crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. It is usually irrigated but may also include non-irrigated orchards or vineyards.

Farmland of Statewide Importance: Land that is like Prime Farmland but with minor shortcomings, such as greater slopes or less ability to hold and store moisture.

The Project site does not contain any prime, unique, or important farmland. The California Department of Conservation maps this area as "Other Land" (California Department of Conservation, 2022). The Project site does not contain any parcel that is under a Williamson Act contract (Marin County, 2017).

CEQA CONTEXT

A project would normally result in a significant impact to agriculture and/or forestry resources if the Project will alter existing agricultural land uses or land use designations. Generally, any conversion of land from one of the Farmland categories to a lesser quality category or a non-agricultural use would be a potentially significant impact.

a) Would the Project convert prime farmland, unique farmland, or farmland of statewide importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to a non-agricultural use?

No Impact

As discussed above, the Project site does not contain prime farmland, unique farmland, or farmland of statewide importance; therefore, implementation of the proposed Project would not result in impact to farmland because it would not convert any farmland to a non-agricultural use. No impact would occur.

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

No Impact

As discussed above, the Project site does not contain any parcel that is under a Williamson Act contract. There are no designated agricultural lands or Williamson Act contracted parcels on the site; therefore, implementation of the proposed Project would not result in impact to existing zoning for agricultural use or a Williamson Act contract. No impact would occur.

c) **Would the Project conflict with existing zoning for, or cause rezoning of, forest land *(as defined in Public Resources Code §12220(g)),* timberland *(as defined by Public Resources Code §4526),* or timberland zoned Timberland Production (as defined by Government Code §51104(g))?**

No Impact

In accordance with the definition provided in California Public Resources Code Section 12220(g), “forest land” is land that can support, under natural conditions, 10% native tree cover of any species, including hardwoods, and that allows for the preservation or management of forest-related resources, such as timber, aesthetic value, fish and wildlife, biodiversity, water quality, recreational facilities, and other public benefits. "Timberland" means land, other than land owned by the federal government and land designated as experimental forest land, which is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products, including Christmas trees.

The Project is zoned for Open Area and Agriculture Residential Planned. Currently both parcels within the aforementioned zoning districts are undeveloped, with the exception of the right-of-way for Olema Bolinas Road. Both parcels are managed as open space under Marin County Parks and will remain as open space.

The Project area meets the definition of “forest land”. The Project includes removal of 123 trees that will be revegetated at a 10:1 replacement ratio with species within the vegetation alliances that are currently present on-site. Therefore, no conversion of “forest land” to other uses will occur.

The Project site does not include lands with timberland or timberland production. A majority of the trees proposed for removal are arroyo willows, alders, and coast live oaks. None of these are commercial timber species. The site will be fully restored to a wetland, and is unsuitable to grow commercial timber. Therefore, implementation of the proposed Project would not result in a need to change existing zoning or cause rezoning of forest land, timberland, or timberland zoned Timber Production.

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

Less-Than-Significant Impact

As described above, the Project site is not used for any timber-related activities. Implementation of the proposed Project would require removal of vegetation, including Himalayan blackberry, cape ivy, periwinkle, yellow flag iris, English ivy, and invasive perennial grasses. Approximately 123 trees would be removed from the channel and road realignment areas. The Project would plant appropriate trees and shrubs in all areas of disturbance within the Project area. Therefore, implementation of the proposed Project would result in a less-than-significant impact. Refer to the Biological Resources Section of this CEQA Checklist for additional discussion regarding the potential impacts associated with vegetation removal.

e) **Would the Project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?**

No Impact

The Project site does not include farmland. Implementation of the proposed Project would not convert farmland to a non-agricultural use or convert forest land to a non-forest use; therefore, implementation of the proposed Project would result in no impact associated with farmland or forest land conversion.

C. AIR QUALITY

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

Table 6. Air Quality Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b)	Result in a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c)	Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d)	Result in other emissions *(such as those leading to odors or dust)* adversely affecting a substantial number of people?	☐	☐	☐	☒

SETTING

Air quality can be described by the concentration of pollutants in the atmosphere and/or the pollutant emissions. Poor air quality can be locally problematic when pollutants occur at high densities or when the source is close to a sensitive receptor. Air quality plans and standards set regarding criteria pollutants under applicable federal and state ambient air quality standards are related topics pertaining to ambient air quality and influenced by local, state, and federal regulations. Sensitive receptors to substantial pollutant concentrations refers to those facilities or land uses that include members of the population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. There are no air quality standards for odors.

The Project site is located within the San Francisco Bay Area Air Basin (SFBAAB). Some air basins have natural characteristics that limit the ability of natural processes to either dilute or transport air pollutants. The major determinants of air pollution transport and dilution are climatic and topographic factors such as wind, atmospheric stability, terrain that influences air movement, and sunshine. Wind and terrain can combine to transport pollutants away from upwind areas, while solar energy can chemically transform pollutants in the air to create secondary photochemical pollutants such as ozone. The following discussion provides an overview of the environmental setting regarding air quality in the SFBAAB.

Ambient Air Quality and Climate

The San Francisco Bay Area (Bay Area) has a Mediterranean climate characterized by wet winters and dry summers. During the summer, a high-pressure cell centered over the northeastern Pacific Ocean results in stable meteorological conditions and a steady northwesterly wind flow that generally keeps storms from affecting the California coast. During the winter, the Pacific high-pressure cell weakens, resulting in increased precipitation and the occurrence of storms. The highest air pollutant concentrations in the Bay Area generally occur during inversions, when a surface layer of cooler air becomes trapped beneath a layer of warmer air. An inversion reduces the amount of vertical mixing and dilution of air pollutants in the cooler air near the surface.

The Project site is located in the southern part of Marin County, which is bounded to the west by the Pacific Ocean, to the east by San Pablo Bay, to the south by the Golden Gate, and to the north by the Petaluma Gap. In southern Marin, the distance from the ocean is short and elevations are lower, resulting in higher incidence of maritime air in that area. The prevailing wind directions throughout Marin County are generally from the northwest. The temperatures of cities next to the Bay are moderated by the cooling effect of the Bay in the summer and the warming effect of the Bay in the winter. For example, San Rafael experiences average maximum summer temperatures in the low 80 degrees Fahrenheit and average minimum winter temperatures in the low 40 degrees Fahrenheit.

In the SFBAAB, the primary criteria air pollutants of concern are ground-level ozone formed through reactions of oxides of nitrogen (NOx) and reactive organic gases (ROG), PM10, and PM2.5. Regional air pollutants, such as ozone, PM10, and PM2.5, can be formed and/or transported over long distances and affect ambient air quality far from the emissions source. The magnitude and location of specific health effects from exposure to increased ozone, PM10, and PM2.5 concentrations are the result of emissions generated by numerous sources throughout the SFBAAB, as opposed to a single project.

The BAAQMD and other air districts use regional air dispersion models to correlate the cumulative emissions of regional pollutants to potential community health effects; however, these dispersion models have limited sensitivity to the relatively small (or negligible) changes in criteria air pollutant concentrations associated with an individual project—therefore, it is not feasible to provide reliable estimates of specific health risks associated with the air pollutant emissions from an individual project.

Localized air pollutants generally dissipate with distance from the emission source and can pose a health risk to nearby populations. Toxic air contaminants (TACs), such as diesel particulate matter (DPM), are considered localized pollutants. PM2.5 is also considered a localized air pollutant, in addition to being considered a regional air pollutant. Air dispersion models can be used to reliably quantify the health risks to nearby receptors associated with emissions of localized air pollutants from an individual project.

Applicable Air Quality Regulations

Federal and State Regulations

The Federal Environmental Protection Agency (EPA) is responsible for implementing the programs established under the Federal Clean Air Act, such as establishing and reviewing the National Ambient Air Quality Standards (NAAQS) and judging the adequacy of State Implementation Plans to attain the NAAQS. A State Implementation Plan must integrate federal, State, and local plan components and regulations to identify specific measures to reduce pollution in nonattainment areas using a combination of performance standards and market-based programs. If a state fails to enforce its implementation of approved regulations, or if the EPA determines that a State Implementation Plan is inadequate, the EPA is required to prepare and enforce a Federal Implementation Plan to promulgate comprehensive control measures for a given State Implementation Plan.

The California Air Resources Board (CARB) is responsible for establishing and reviewing the California Ambient Air Quality Standards (CAAQS), developing and managing the California State Implementation Plans, identifying TACs, and overseeing the activities of regional air quality management districts. In California, mobile emissions sources (e.g., construction equipment, trucks, and automobiles) are regulated by CARB, and stationary emissions sources (e.g., industrial facilities) are regulated by the regional air quality management districts.

The CAAQS and NAAQS, which were developed for criteria air pollutants, are intended to incorporate an adequate margin of safety to protect public health and welfare. California also has ambient air quality standards for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. To achieve CAAQS, criteria air pollutant emissions are managed through control measures described in regional air quality plans, as well as emission limitations placed on permitted stationary sources.

Regulation of TACs, referred to as hazardous air pollutants (HAPs) under federal regulations, is achieved through federal, State, and local controls on individual sources. The air toxics provisions of the Federal Clean Air Act require the EPA to identify HAPs that are known or suspected to cause cancer or other serious health effects to protect public health and welfare, and to establish National Emission Standards for Hazardous Air Pollutants. California regulates TACs primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). The Tanner Act created California's program to identify and reduce exposure to TACs. To date, the CARB has identified over 21 TACs and adopted the EPA's list of 188 HAPs as TACs. The Hot Spots Act supplements the Tanner Act by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

Local Regulations

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

The BAAQMD is primarily responsible for ensuring that the NAAQS and CAAQS are attained and maintained in the SFBAAB. The BAAQMD fulfills this responsibility by adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits, inspecting stationary sources of air pollutants, responding to citizen complaints, and monitoring ambient air quality and meteorological conditions. The BAAQMD also awards grants to reduce motor vehicle emissions and conducts public education campaigns and other activities associated with improving air quality within the SFBAAB.

The BAAQMD's CEQA Guidelines include thresholds of significance to assist lead agencies in evaluating and mitigating air quality impacts under CEQA (BAAQMD, 2017a). The BAAQMD's thresholds establish levels at which emissions of ozone precursors (ROG and NOx), PM10, PM2.5, TACs, and odors could cause significant air quality impacts. The scientific soundness of the thresholds is supported by substantial evidence presented in the BAAQMD's Revised Draft Options and Justification Report (BAAQMD, 2009). The thresholds of significance used in this CEQA analysis for Project construction are summarized in Table 7, below.

Table 7: BAAQMD's Project Level Thresholds of Significance for Air Quality

IMPACT ANALYSIS	POLLUTANT	THRESHOLD
Regional Air Quality (Construction)	ROG	54 pounds/day (average daily emission)
	NOx	54 pounds/day (average daily emission)
	Exhaust PM10	82 pounds/day (average daily emission)
	Exhaust PM2.5	54 pounds/day (average daily emission)
	Fugitive dust (PM10 and PM2.5)	Best management practices
Local Community Risks and Hazards (Construction)	Exhaust PM2.5 (project)	0.3 μg/m^3 (annual average)
	TACs (project)	Cancer risk increase > 10 in one million Chronic hazard index > 1.0
	Exhaust PM2.5 (cumulative)	0.8 μg/m^3 (annual average)
	TACs (cumulative)	Cancer risk > 100 in one million Chronic hazard index > 10.0

Note: ROG = reactive organic gases; NOx = oxides of nitrogen; PM10 = coarse particulate matter; PM2.5 = fine particulate matter; μg/m^3 = micrograms per cubic meter
Source: Bay Area Air Quality Management District (BAAQMD), 2017a. California Environmental Quality Act Air Quality Guidelines, May.

BAY AREA CLEAN AIR PLAN

In accordance with the California Clean Air Act, the BAAQMD is required to prepare and update an air quality plan that outlines measures by which both stationary and mobile sources of pollutants can be controlled to achieve the NAAQS and CAAQS in areas designated as nonattainment. In April 2017, the BAAQMD adopted the 2017 Clean Air Plan: *Spare the Air, Cool the Climate* (BAAQMD, 2017b). The 2017 CAP includes 85 control measures to reduce ozone precursors, particulate matter, TACs, and greenhouse gases (GHGs). The 2017 CAP was developed based on a multi-pollutant evaluation method that incorporates well-established studies and methods of quantifying health benefits, air quality regulations, computer modeling and analysis of existing air quality monitoring data and emissions inventories, and traffic and population growth projections prepared by the Metropolitan Transportation Commission and the Association of Bay Area Governments, respectively. The 2017 Plan complements and supports other important regional and state planning efforts, including Plan Bay Area and the State of California's 2030 Scoping Plan.

CEQA CONTEXT

A project would normally result in significant impacts to air quality if changes to existing air quality would result from construction, operation, use, and/or maintenance activities from implementation of the project. The proposed Project has been evaluated to determine if changes to existing air quality would result from construction, public use, operations, and/or maintenance. Operation of the proposed Project would not be expected to generate air pollutant emissions or odors and thus, would not result in any air quality impacts; therefore, the following evaluation focuses on potential air quality impacts related to Project construction.

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

Less-than-Significant Impact

The BAAQMD's 2017 CAP is the applicable air quality plan for projects located in the SFBAAB. Consistency may be determined by evaluating whether the Project supports the primary goals of the

2017 CAP, including applicable control measures contained within the 2017 CAP, and would not conflict with or obstruct implementation of any 2017 CAP control measures. The primary goals of the 2017 CAP are the attainment of ambient air quality standards and reduction of population exposure to air pollutants for the protection of public health in the Bay Area.

The 2017 CAP includes control measures that aim to reduce air pollution and GHGs from stationary, area, and mobile sources. The control measures are organized into nine categories: stationary sources, transportation, buildings, energy, agriculture, natural and working lands, waste, water, and super-GHG pollutants (e.g., methane, black carbon, and fluorinated gases). As described in Table 5, the Project would be consistent with applicable control measures from the 2017 CAP. Because the Project would not result in any significant and unavoidable air quality impacts related to air pollutant emissions, ambient concentrations, or public exposures (see subsections b through d, below, and the Greenhouse Gas Emissions section of this CEQA Checklist), the Project supports the primary goals of the 2017 CAP; therefore, the Project would not conflict with or obstruct implementation of the applicable air quality plan, and the impact would be less than significant.

Table 8: Project Consistency with BAAQMD's 2017 CAP

CONTROL MEASURES	PROPOSED PROJECT CONSISTENCY
Stationary Source	The stationary source measures, which are designed to reduce emissions from stationary sources, are incorporated into rules adopted by the BAAQMD and then enforced by the BAAQMD's Permit and Inspection programs. Since the Project does not include any stationary sources, the stationary source control measures are **not applicable** to the Project.
Transportation	The transportation control measures are designed to reduce vehicle trips, use, miles traveled, idling, or traffic congestion for the purpose of reducing vehicle emissions. On the Project site, clear signage will be provided to direct construction workers to all access points; therefore, the Project design is **consistent** with the transportation measures.
Energy	The energy control measures are designed to reduce emissions of criteria air pollutants, TACs, and GHGs by decreasing the amount of electricity consumed in the Bay Area, as well as decreasing the carbon intensity of the electricity used by switching to less GHG-intensive fuel sources for electricity generation. Since these measures primarily apply to electrical utility providers, the energy control measures are **not applicable** to the Project.
Buildings	The BAAQMD has authority to regulate emissions from certain sources in buildings such as boilers and water heaters but has limited authority to regulate buildings themselves; therefore, the building control measures focus on working with local governments that have authority over local building codes to facilitate adoption of best practices and policies to control GHG emissions. Since the Project does not include any building construction, the building control measures are **not applicable** to the Project.
Agriculture	The agriculture control measures are designed to primarily reduce emissions of methane. Since the Project does not include any agricultural activities, the agriculture control measures are **not applicable** to the Project.

CONTROL MEASURES	PROPOSED PROJECT CONSISTENCY
Natural and Working Lands	The control measures for the natural and working lands sector focus on increasing carbon sequestration on rangelands and wetlands, as well as encouraging local governments to adopt ordinances that promote urban-tree plantings. The Project aims to re-establish and rehabilitate hydrological, geomorphic, and ecologic processes; improve habitat connectivity; increase wetland sea-level rise (SLR) resiliency; improve special-status species' habitat; and protect community safety by moving roads out of flood inundation areas; therefore, the Project would be **consistent** with the natural and working lands measures.
Waste Management	The waste management measures focus on reducing or capturing methane emissions from landfills and composting facilities, diverting organic materials away from landfills, and increasing waste diversion rates through efforts to reduce, reuse, and recycle. The proposed Project does not result in waste production during operation. The proposed Project construction would comply with local requirements for waste management; therefore, the Project would be **consistent** with the waste management control measures.
Water	The water control measures to reduce emissions from the water sector will reduce emissions of criteria pollutants, TACs, and GHGs by encouraging water conservation, limiting GHG emissions from publicly owned treatment works (POTWs), and promoting the use of biogas recovery systems. Since these measures apply to POTWs and local government agencies (and not individual projects), the water control measures are **not applicable** to the Project.
Super GHGs	The super-GHG control measures are designed to facilitate the adoption of best GHG control practices and policies through the BAAQMD and local government agencies. Since these measures do not apply to individual developments, the super-GHG control measures are **not applicable** to the Project.

Source: Bay Area Air Quality Management District (BAAQMD), Clean Air Plan: Spare the Air, Cool the Climate, April 19.

b) Would the Project result in a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard?

Less-than-Significant Impact

Project construction activities would generate criteria air pollutant emissions that could potentially affect regional air quality. During construction, the primary pollutant emissions of concern would be ROG, NOx, PM10, and PM2.5 from the exhaust of off-road construction equipment and on-road construction vehicles related to worker vehicles, vendor trucks, and haul trucks. In addition, fugitive dust emissions of PM10 and PM2.5 would be generated by soil disturbance activities, and fugitive ROG emissions would result from paving.

The generation of fugitive dust PM10 and PM2.5 emissions from soil disturbance and demolition activities could result in a cumulatively considerable net increase in regional PM10 and PM2.5 concentrations. The BAAQMD considers implementation of best management practices (BMPs) to control dust during construction sufficient to reduce potential dust impacts to a less-than-significant level. As described in the Project Description, the Project conservation measures for air quality require implementation of the BAAQMD's BMPs for dust control during construction; therefore, with implementation of these measures, the increase in PM10 and PM2.5 concentrations from dust generated during Project construction activities would not result in a cumulatively considerable net increase in criteria air pollutants for which the region is in nonattainment.

The BAAQMD recommends using the most current version of the California Emissions Estimator Model (CalEEMod Version 2022.1) to estimate construction emissions of pollutants resulting from a proposed Project. CalEEMod uses widely accepted models for emission estimates combined with appropriate default data for a variety of land-use projects that can be used if site-specific information is not available. The primary input data used to estimate emissions associated with construction of the Project were provided by the Project applicant and contain information on construction duration, construction-related vehicle trips, and off-road construction equipment inventory and usage. A summary of the assumptions for estimating construction emissions is provided in Table 9. Construction information provided by the Project applicant, supporting calculations, and a copy of the CalEEMod report for the proposed Project, which summarizes the input parameters, assumptions, and findings, is available for review upon request.

Table 9: Construction Assumptions for CalEEMod

CALEEMOD INPUT CATEGORY	CONSTRUCTION ASSUMPTIONS AND CHANGES TO DEFAULT DATA
Construction Phase	The Project contains three construction phases: Roadway Construction, Bridge Construction, and Restoration.
Construction Equipment	The on-site construction equipment list was modified according to site-specific construction information provided by the Project applicant.
Worker, Vendor, and Hauling Trips	Construction-related vehicle trips and one-way travel distance were provided by the Project applicant. The fleet mix and trip activity are unmodified default values provided by CalEEMod. ▪ Default worker trips for each construction phase were modified based on the weighted-average number of workers trips and trip lengths (worker commute trips and contractor-supplied vans trips). ▪ Default vendor trips were modified according to information provided by the Project applicant. ▪ Default hauling trips for each construction phase were modified based on the weighted-average number of hauling trips and trip lengths for each truck trip activity (e.g., soil haul trips and sheet pile trips).

Notes: Default CalEEMod data used for all other parameters are not described.
Source: Construction information provided by the Project applicant. Supporting calculations and a copy of CalEEMod report are available upon request.

For purposes of modeling the Project's construction emissions, all Project construction was assumed to occur in 2023 rather than spread out over two future construction seasons. This approach was taken for the air quality modeling because fleetwide equipment emissions are expected to decrease over time as older equipment is replaced with newer (and cleaner) equipment with lower emissions. Thus, by assuming that all Project construction occurs in the current year, a "worst-case" pollutant emission scenario is modeled. To analyze daily emission rates, the total emissions estimated during construction were averaged over the total number of working days (218 days) and compared to the

BAAQMD's thresholds of significance. As shown in Table 10, the Project's estimated emissions for ROG, NOx, and exhaust PM10 and PM2.5 during construction would be below the BAAQMD's thresholds of significance and, therefore, would not result in a cumulatively considerable net increase in criteria air pollutants for which the region is in nonattainment.

Overall, construction of the Project would not result in a cumulatively considerable net increase in criteria air pollutants for which the region is in nonattainment with implementation of the Project conservation measures for dust control, and this impact would be less than significant.

Table 10: Estimated Construction Emissions (Pounds per Day)

EMISSIONS SCENARIO	ROG	NOX	EXHAUST PM10	EXHAUST PM2.5
Construction Emissions	0.5	5.6	0.15	0.14
Thresholds of Significance	54	54	82	54
Threshold Exceedance?	**No**	**No**	**No**	**No**

Source: CalEEMod; report is available upon request.

c) Would the Project expose sensitive receptors to substantial pollutant concentrations?

Less-than-Significant Impact

The term "sensitive receptor" refers to a location where individuals are more susceptible to poor air quality. Sensitive receptors include schools, convalescent homes, and hospitals because the very young, the old, and the infirm are more susceptible than the rest of the public to air quality-related health problems. Residential areas are also considered sensitive to poor air quality because people are often at home for extended periods, thereby increasing the duration of exposure to potential air contaminants. The BAAQMD recommends evaluating the potential impacts to sensitive receptors located within 1,000 feet of a project. Existing sensitive receptors near the Project site include single-family residential homes to the north, west, and southwest of the site, the nearest of which is within approximately 200 feet from the nearest portion of the Project site. The Project's potential impacts to sensitive receptors from emissions of TACs are discussed below.

<u>Construction Toxic Air Contaminant Emissions</u>

Project construction would generate DPM and PM2.5 emissions from the exhaust of off-road diesel construction equipment. The annual average concentrations of DPM and exhaust PM2.5 during construction were estimated within 1,000 feet of the Project using the U.S. EPA's Industrial Source Complex Short Term (ISCST3) air dispersion model. For this analysis, emissions of exhaust PM2.5 were used as a surrogate for DPM, which is a reasonable assumption because more than 90% of DPM is less than 1 micron in diameter, and therefore is similar in composition to PM2.5. The input parameters and assumptions used for estimating emission rates of DPM and PM2.5 from off-road diesel construction equipment are available upon request.

In accordance with the Marin County Municipal Code (Section 6.70.030 Enumerated Noises), daily emissions from construction were assumed to occur over the permitted construction hours from Monday through Friday 7 AM–6 PM and Saturday 9 AM–5 PM. The exhaust from off-road equipment was represented in the ISCST3 model as an area source with a release height of 5 meters to represent the mid-range of the expected plume rise from frequently used construction equipment.

A uniform grid of receptors spaced 10 meters apart with receptor heights of 1.8 meters (for ground-level receptors) was encompassed around the Project site as a means of developing isopleths (i.e., concentration contours) that illustrate the air dispersion pattern from the various emission sources to nearby receptors. The ISCST3 model input parameters included three years of BAAQMD meteorological data from Station 3901 located about 6.0 miles west of the Project site.

Based on the annual average concentrations of DPM and PM2.5 estimated using the air dispersion model, potential health risks were evaluated for the maximally exposed individual resident (MEIR) during Project construction. The MEIR is located about 200 feet southwest of the Project site.

In accordance with guidance from the BAAQMD (BAAQMD, 2012) and Office of Environmental Health Hazard Assessment (OEHHA) (OEHHA, 2015) the health risk assessment calculated the incremental increase in cancer risk and chronic hazard index (HI) to sensitive receptors from DPM emissions during construction. The acute HI for DPM was not calculated because an acute reference exposure level for DPM has not been approved by OEHHA and CARB, and the BAAQMD does not recommend analysis of acute non-cancer health hazards from construction activity. The annual average concentration of DPM at the MEIR was used to conservatively assess potential health risks to nearby sensitive receptors.

The incremental increase in cancer risk from on-site DPM emissions during construction was assessed for a young child exposed to DPM starting from infancy. This exposure scenario represents the most sensitive individuals who could be exposed to adverse air quality conditions in the vicinity of the Project site. It was conservatively assumed that the MEIR would be exposed to an annual average DPM concentration over the entire estimated duration of construction, which is about 10 months when not including the break between construction seasons. The input parameters and results of the health risk assessment are available upon request.

Table 11 summarizes the estimated health risks at the MEIRs due to DPM and PM2.5 emissions from Project construction and compares them to the BAAQMD's thresholds of significance. The estimated cancer risks and chronic HI for DPM, and annual average PM2.5 concentration from construction emissions were below the BAAQMD's thresholds of significance at the MEIR; therefore, Project construction would not expose sensitive receptors to substantial pollutant concentrations and the impact would be less than significant.

Table 11: Health Risks at MEIR During Project Construction

Construction Scenario	Diesel Particulate Matter		Exhaust PM2.5
	Cancer Risk (per million)	Chronic Hazard Index	Annual Average Concentration (μg/m^3)
Unmitigated Emissions	7.1	0.01	0.06
Thresholds of Significance	10	1	0.3
Thresholds Exceedance?	No	No	No

Note: μg/m^3 = micrograms per cubic meter
Source: CalEEMod; report is available upon request.

Cumulative Toxic Air Contaminant Emissions

The BAAQMD's online screening tools were used to evaluate potential cumulative health risks to the MEIR from existing sources of TACs. Based on review of the BAAQMD's 2020 stationary source screening map (BAAQMD, 2022), there are no existing stationary sources within 1,000 feet of the MEIR. Based on review of the BAAQMD's modeling of mobile sources, there are no major roadways located within 1,000 feet of the MEIR (BAAQMD, 2019); therefore, Project construction would not have a cumulatively considerable contribution to the exposure of sensitive receptors to substantial pollutant concentrations, and the cumulative impact would be less than significant.

d) Would the Project result in other emissions, such as those leading to odors, adversely affecting a substantial number of people?

No Impact

As a wetland restoration project that includes the reconfiguration of an intersection and addition of a bridge, the Project would not be expected to generate significant odors for a substantial duration; therefore, the Project would have no impact related to odors.

D. BIOLOGICAL RESOURCES

Table 12. Biological Resources Checklist Questions

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c)	Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

SETTING

The Project site is located in unincorporated Marin County (Figure 1). State Route 1 (SR-1) is located to the northeast of the Project area. Fairfax Bolinas Road bisects the Project from Olema Bolinas Road to SR-1 as shown in Figure 2. The roadways within the Project area are asphalt and regularly maintained. Lands to the west of the Project area are largely undeveloped apart from several residences along Olema Bolinas Road. Lands east of the Project area are managed by the National Park Service and are designated as Coastal Open Area. The Project area consists of forested wetlands, coastal wetlands, tidal marsh, coastal brambles, intermittent stream, and upland habitats.

Biological Resource Reports

AECOM prepared a Site Conditions Report for the Bolinas Lagoon North End Restoration Project which included the Project area and a large expanse of the surrounding lands (AECOM, 2016). The Site Conditions Report discussed the biological conditions of the Study Area which remain similar to today. The following studies were also performed to update and supplement findings in the Site Conditions Report:

- Rare Plant Survey Report (WRA, 2021)
- National Marine Fisheries Service (NMFS) Section 7 Biological Assessment (WRA, 2022)
- U.S. Fish and Wildlife Service (USFWS) Section 7 Biological Assessment (WRA, 2022)
- Arborist Survey Report (WRA, 2021)
- Aquatic Resources Delineation Report (WRA, 2020)
- Fish Passage Design Criteria and Guidance Report (WRA, Updated 2022)

The following sections describe the biological resources within the Project area and surrounding lands (Study Area), which are summarized from the reports listed above. Subsequent sections then describe potentially significant impacts and proposed Mitigation Measures that, when implemented, will reduce impacts to a level considered to be less than significant pursuant to CEQA.

Natural Communities

Natural communities are recurring assemblages of biotic elements found in particular physical environments. Three characteristics distinguish natural communities: 1) plant species composition, 2) vegetation structure (e.g., forest, shrubland, or marsh), and 3) a specific combination of physical conditions (e.g., water, light, nutrient levels, and climate). A total of 15 natural communities, 13 of which are considered sensitive natural communities, occur in the Study Area (Sawyer J. , 2009) (Sawyer J. O.-W., 2009). These vegetation communities are described in Table 13 and presented in Figure 23.

Table 13: Natural Communities within the Study Area

Natural Communities within the Study Area		
Natural Community	**Classification**	**Description**
Waters		
INTERMITTENT WATERS **Box-elder forest and woodland** *(Acer negundo)* Forest & Woodland Alliance	G5 S3	The northern reach of Lewis Gulch Creek is located within a densely vegetated area with an overstory of boxelder (*Acer negundo*), Douglas fir (*Pseudotsuga menziesii*), and California bay (*Umbellularia californica*).
California bay forest and woodland (*Umbellularia californica)* Forest & Woodland Alliance	G4 S3	
Red alder forest (*Alnus rubra)* Forest Alliance	G5 S4	Vegetation within Lewis Gulch Creek and Wilkins Gulch Creek include red alder (*Alnus rubra*), arroyo willow (*Salix lasiolepis*), and marsh gumplant (*Grindelia stricta* var. *angustifolia*).
PERENNIAL WATERS **Salt marsh bulrush marshes** (*Bolboschoenus maritimus)* Herbaceous Alliance	G4 S3	The areas south of Wilkins Gulch Creek are lined with saltmarsh bulrush (*Bolboschoenus maritimus* var. *paludosus*) before transitioning to marsh gumplant. On the eastern side of SR-1, the area around Salt Creek is present as a tidal marsh as the channel is undefined and densely vegetated with saltmarsh bulrush and other tidal marsh species.
Gum plant patches (*Grindelia stricta)* Provisional Herbaceous Alliance	G2G3 S2S3	

Natural Communities within the Study Area		
Natural Community	**Classification**	**Description**
FORESTED WETLAND **Red alder forest** (*Alnus rubra)* Forest Alliance	G5 S4	Red alder forest, sometimes referred to as forested wetland, is also present within the Study Area north of the tidal marsh on both sides of Fairfax Bolinas Road, west of SR-1. The dominant species within these areas include arroyo willow and red alder. The herbaceous layer is intermittent to dense. Common plant species observed in the herbaceous layer include cape ivy (*Delairea odorata*), clustered field sedge (*Carex praegracilis*), creeping buttercup (*Ranunculus repens*), giant horsetail (*Equisetum telmateia* ssp*. braunii*), small-fruited bulrush (*Scirpus microcarpus*), narrowleaf cattail (*Typha angustifolia*), rough hedgenettle (*Stachys rigida*), stinging nettle (*Urtica dioica*), and tall flatsedge (*Cyperus eragrostis*).
TIDAL MARSH **California cordgrass marsh** (*Spartina foliosa)* Herbaceous Alliance **Alkali heath marsh** (*Frankenia salina)* Herbaceous Alliance **Pickleweed mats** (*Salicornia pacifica)* Herbaceous Alliance **Salt marsh bulrush marshes** (*Bolboschoenus maritimus)* Herbaceous Alliance	G3 S3.2 G4 S3 G4 S3 G4 S3	Tidal marsh within the Study Area is most similar to pickleweed mats and/or salt marsh bulrush marsh. Tidal marsh is present in the southern portion of the Study Area. Tidal marsh on the western side of SR-1 is directly associated with Bolinas Lagoon and transitions to forested wetland to the north as both salinity and tidal influence decrease. Within the Study Area, tidal marsh begins as unvegetated mud flats that transition into mudflats vegetated with California cordgrass marsh (*Spartina foliosa*), goldenthread (*Cuscuta pacifica*), and marsh jaumea (*Jaumea carnosa*). The upper portions of the marsh are dominated by species such as alkali heath (*Frankenia salina*), marsh gumweed (*Grindelia stricta*), pickleweed (*Salicornia pacifica*), and salt grass (*Distichlis spicata*). As the tidal marsh approaches the southern boundary of the forested wetland, it transitions to a saltmarsh bulrush dominated herbaceous layer.

Natural Communities within the Study Area		
Natural Community	**Classification**	**Description**
PERENNIAL WETLAND **Small-fruited bulrush marsh** (*Scirpus microcarpus)* Herbaceous Alliance	G4 S2	A single perennial wetland is present within a drainage ditch in the southwestern portion of the Study Area. This wetland is confined to a linear drainage ditch that runs along the western side of Olema Bolinas Road surrounding Wharf Creek. Dominant plants observed in the perennial wetland include watercress (*Nasturtium officinale*) and small-fruited bulrush marsh (*Scirpus microcarpus*).
EMERGENT WETLAND **Cattail marshes** *(Typha [angustifolia, domingensis, latifolia]*) Herbaceous Alliance	G5 S5	An emergent wetland is present east of SR-1 and north of the forested wetland within the central portion of the Study Area. The emergent wetland is bordered to the north by non-native annual grassland and to the south by forested wetland. Narrowleaf cattail and giant horsetail dominate the herbaceous layer of the emergent wetland.
Uplands		
Coast live oak woodland and forest (*Quercus agrifolia)* Forest & Woodland Alliance	G5 S4	Coast live oak woodland and forest occurs along the northwestern border of the Study Area. The canopy is intermittent to dense, and coast live oak (*Quercus agrifolia*) is the dominant tree species. Common plants observed in the herbaceous layer include beaked hazelnut (*Corylus cornuta*), Pacific pea (*Lathyrus vestitus*), and upright veldt grass (*Ehrharta erecta*). Coast live oak woodland and forest is not a sensitive natural community.
Non-Native Annual Grasslands (*Bromus [diandrus, hordeaceus]* and *Avena [barbata, fatua]*) Semi-Natural Herbaceous Stands	No Rank	Annual grasslands are known throughout California on all aspects and topographic positions underlain by a variety of substrates. Wild oats and annual brome grasslands occur in the northeastern portion of the Study Area. This vegetation community is often referred to as non-native annual grassland. Dominant grass species observed include various non-native oat grasses (*Avena* sp.), and soft chess (*Bromus hordeaceus*). Non-native annual forbs occur throughout the grassland including fennel (*Foeniculum vulgare*).

Wetlands

Wetlands were delineated in the Study Area during preliminary jurisdictional delineations on July 30 and August 27, 2020 (WRA, 2020). The Corps issued a Preliminary Jurisdictional Determination letter on June 16, 2021. The Study Area contains seven district aquatic resources that receive water from groundwater, precipitation, runoff from surrounding uplands, and/or tidal inundation from the Pacific Ocean. A summary of jurisdictional aquatic resource acreage is provided in Table 14 and is shown in Figures 24–26.

Table 14: Summary of Jurisdictional Features

JURISDICTIONAL FEATURE	WATERS OF THE U.S./STATE (ACRES/LINEAR FEET)	CDFW REGULATED FEATURE (ACRES/LINEAR FEET)	CALIFORNIA COASTAL COMMISSION FEATURE (ACRES/LINEAR FEET)
Tidal Marsh	4.89	4.89	4.89
Forested Wetland	7.14	7.14	7.14
Perennial Wetland	0.02	0.02	0.02
Emergent Wetland	0.17	0.17	0.17
Seasonal Wetland	<0.01	<0.01	<0.01
Intermittent Streams	0.18/1,308	0.27/1,308	0.18/1,308
Perennial Streams	0.29/1,730	0.29/1,730	0.29/1,730
Riparian Habitats	-	2.05	-
Wetland-1 Parameter	-	-	1.93
Total Wetlands	**12.22**	**12.22**	**14.15**
Total Wetlands and non-Wetland Waters in the Study Area	**12.69/3,038**	**14.92/3,038**	**14.62/3,038**

Special-Status Species

The following section explains the regulatory context including laws and regulations that were applied to the field investigations and analysis to determine whether species are considered special status under CEQA.

Endangered and Threatened Plants, Fish, and Wildlife

Specific species of plants, fish, and wildlife species may be designated as threatened or endangered by the Federal Endangered Species Act (ESA), or the California Endangered Species Act (CESA). Specific protections and permitting mechanisms for these species differ under each of these acts, and a species' designation under one law does not automatically provide protection under the other.

The ESA (16 USC 1531 et seq.) is implemented by the USFWS and the National Marine Fisheries Service (NMFS). The USFWS and NMFS maintain lists of endangered and threatened plant and animal species (referred to as "listed species"). "Proposed" or "candidate" species are those that are being considered for listing and are not protected until they are formally listed as threatened or endangered. Under the ESA, authorization must be obtained from the USFWS or NMFS prior to 'take' of any listed species. "Take" under the ESA is defined as, "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." "Take" under the ESA includes direct injury or mortality to individuals, disruptions in normal behavioral patterns resulting from factors such as noise and visual disturbance and impacts to habitat for listed species. Actions that may result in "take" of an ESA-listed species may obtain a permit under ESA Section 10, or via the interagency consultation described in ESA Section 7. Federally listed plant species are only protected when "take" occurs on federal land.

The ESA also provides for designation of critical habitat, which are specific geographic areas containing physical or biological features "essential to the conservation of the species." Protections afforded to designated critical habitat apply only to actions that are funded, permitted, or carried out by federal agencies. Critical habitat designations do not affect activities by private landowners if there is no other federal agency involvement.

The CESA (California Fish and Game Code [CFGC] 2050 et seq.) prohibits the "take" of any plant and animal species that the CFGC determines to be an endangered or threatened species in California. CESA regulations include "take" protection for threatened and endangered plants on private lands, as well as extending this protection to candidate species that are proposed for listing as threatened or endangered under CESA. The definition of a "take" under CESA ("hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") only applies to direct impact to individuals, and does not extend to habitat impacts or harassment. CDFW may issue an Incidental Take Permit under CESA to authorize "take" if it is incidental to otherwise lawful activity and if specific criteria are met. "Take" of these species is also authorized if the geographic area is covered by a Natural Community Conservation Plan (NCCP), if the NCCP covers that activity.

Fully Protected Species and Designated Rare Plant Species

This category includes specific plant and wildlife species that are designated in the CFGC as protected even if not listed under CESA or ESA. Fully Protected Species includes specific lists of birds, mammals, reptiles, amphibians, and fish designated in CFGC. Fully protected species may not be taken or possessed at any time. No licenses or permits may be issued for "take" of fully protected species, except for necessary scientific research and conservation purposes. The definition of "take" is the same under the California Fish and Game Code and the CESA. By law, CDFW may not issue an Incidental Take Permit for Fully Protected Species. Under the California Native Plant Protection Act (NPPA), CDFW has listed 64 “rare” or “endangered” plant species, and prevents “take,” with few exceptions of these species. CDFW may authorize “take” of species protected by the NPPA through the Incidental Take Permit process, or under a NCCP.

Special Protections for Nesting Birds and Bats

The Federal Bald and Golden Eagle Protection Act provides relatively broad protections to both of North America’s eagle species (bald eagle [*Haliaeetus leucocephalus*] and golden eagle [*Aquila chrysaetos*]) that in some regards are similar to those provided by the ESA. In addition to regulations for special-status species, most native birds in the United States, including non-status species, have baseline legal protections under the Migratory Bird Treaty Act of 1918 and CFGC, i.e., sections 3503, 3503.5 and 3513. Under these laws/codes, the intentional harm or collection of adult birds as well as the intentional collection or destruction of active nests, eggs, and young is illegal. For bat species, the Western Bat Working Group (WBWG) designates conservation status for species of bats, and those with a high or medium-high priority are typically given special consideration under CEQA.

Species of Special Concern, Movement Corridors, and Other Special-status Species under CEQA

To address additional species protections afforded under CEQA, CDFW has developed a list of special species as, “a general term that refers to all of the taxa the California Natural Diversity Database (CNDDB) is interested in tracking, regardless of their legal or protection status.” This list includes lists developed by other organizations, including for example, the Audubon Watch List Species, the Bureau of Land Management Sensitive Species, and USFWS Birds of Special Concern. Plant species on the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (Inventory) with California Rare Plant Ranks (Rank) of 1 and 2, as well as some with a Rank of 3, are also considered special-status plant species and must be considered under CEQA. Some Rank 3 species and all Rank 4 species are typically only afforded protection under CEQA when such species are particularly unique to the locale (e.g., range limit, low abundance/low frequency, limited habitat) or are otherwise considered locally rare. Additionally, any species listed as sensitive within local plans, policies and ordinances are likewise considered sensitive. Movement and migratory corridors for native wildlife (including aquatic corridors) as well as wildlife nursery sites are given special consideration under CEQA.

Special-Status Plants

WRA conducted protocol-level, floristic rare plant surveys within the Study Area on March 3, May 26, and July 6, 2021. Prior to the initial survey, WRA reviewed the CNPS Inventory of Rare and Endangered Plants of California, USFWS’s Information for Planning and Consultation (IPaC) resource list, and CDFW’s CNDDB to determine which rare plant species have been documented in the vicinity of the Study Area. Based on a review of occurrence records and a comparison of species habitat requirements with Study Area conditions, it was determined that 12 rare plant species have the potential to occur within the Study Area; however, following protocol-level rare plant surveys, none of those species were documented to occur within the Study Area (WRA, 2021). Because protocol-level surveys have been completed and no rare plants were observed, the proposed Project will not result in impacts to rare plants.

Special-status Wildlife

Table 15 lists the species evaluated in the vicinity of the Study Area. Potentials were assigned according to the following criteria:

- **No Potential:** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

- **Unlikely:** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- **Moderate Potential:** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential:** All the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present:** Species is observed on the site or has been recorded (i.e., CNDDB, other reports) on the site in the recent past.

Table 15: Special-status Wildlife Species Evaluated in the Vicinity of the Study Area

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
Invertebrates				
California freshwater shrimp *(Syncaris pacifica)*	FE, SE	Endemic to Marin, Napa, and Sonoma counties. Found in low elevation, low gradient streams where riparian cover is moderate to heavy. Shallow pools away from main stream flow. Winter: undercut banks with exposed roots. Summer: leafy branches touching water.	**No Potential.** The USFWS does not consider habitat present for this species (USFWS, 2010)..	No additional recommendations.
monarch butterfly *(Danaus plexippus)*	FC, (winter roosts protected by CDFW)	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, Monterey cypress), with nectar and water sources nearby.	**Unlikely.** Winter roosts for this species are tracked by CDFW. Several roosts are known at the south end of the lagoon, but none have been documented within the Study Area.	No additional recommendations.
western bumble bee *(Bombus occidentalis)*	SC	Occurs in a wide variety of habitat types. Nests are constructed annually in pre-existing cavities, usually on the ground (e.g., mammal burrows). Many plant species are visited and pollinated.	**Unlikely.** The Study Area is largely marsh and riparian forest which is unlikely to support suitable conditions for ground-nesting bees.	No additional recommendations.
Fish				

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
Coho salmon - central CA coast ESU *(Oncorhynchus kisutch)*	FE, SE	Federal listing includes populations between Punta Gorda and San Lorenzo River. State listing includes populations south of San Francisco Bay only. Occurs inland and in coastal marine waters. Requires beds of loose, silt-free, coarse gravel for spawning. Also needs cover, cool water, and sufficient dissolved oxygen.	**Unlikely.** Larger watersheds in the vicinity are known to support this species as it requires exceptionally high-quality perennial conditions; however, the limited available habitat within Lewis Gulch and Wilkins Gulch are unlikely to support this species. However, in the unlikely event it is encountered in the Project area, implementation of Mitigation Measure BIO-1 would occur.	This species is covered under the CDFW Consistency Determination with NOAA's RC programmatic coverage for the Bolinas Wye Wetlands Resiliency Project, as requested by CDFW. No further recommendations. Implementation of Mitigation Measure BIO-3 will ensure no impact to this species as a result of the proposed Project.
steelhead – central CA coast DPS *(Oncorhynchus mykiss irideus)*	FT	Occurs from the Russian River south to Soquel Creek and Pajaro River, also in San Francisco and San Pablo Bay Basins. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams. Juveniles remain in fresh water for one or more years before migrating downstream to the ocean.	**Present.** Steelhead are known to occur in Lewis Gulch and Wilkins Creek.	Implement Mitigation Measure BIO-1.
Steelhead – Central California Coast DPS – Critical Habitat	NMFS Designated Critical Habitat	The primary constituent elements (PCEs) for steelhead critical habitat are: (1) freshwater spawning habitat; (2) freshwater rearing sites; (3) freshwater migration corridors; (4) estuarine habitat with brackish water and natural cover; (5) nearshore marine habitats with forage fishes and natural covers; and (6) offshore marine areas.	**Present.** Wilkins Creek is Designated Critical Habitat for this species.	Implement Mitigation Measure BIO-7.
Reptiles and Amphibians				

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
California red-legged frog *(Rana draytonii)*	FT, SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation. Requires 11 to 20 weeks of permanent water for larval development. Associated with quiet perennial to intermittent ponds, stream pools, and wetlands. Prefers shorelines with extensive vegetation. Disperses through upland habitats after rains.	**Present.** This species has been observed within Lewis Gulch Creek and known occurrences in a pond east of SR-1.	Implement Mitigation Measure BIO-2.
Foothill yellow-legged frog *(Rana boylii)*	SC, SSC	Found in or adjacent to rocky streams in a variety of habitats. Prefers partly shaded, shallow streams and riffles with a rocky substrate; requires at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis. Feeds on both aquatic and terrestrial invertebrates.	**Unlikely.** Records of this species exist in the vicinity; however, Lewis Gulch goes dry seasonally and there is not suitable aquatic habitat currently within the Study Area to support a population of this species. There are historic records from Pike County Gulch and environs.	No further recommendations.
Pacific (western) pond turtle *(Actinemys marmorata)*	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites such as partially submerged logs, vegetation mats, or open mud banks, and suitable upland habitat (sandy banks or grassy open fields) for egg-laying.	**No Potential.** The waters of Lewis Gulch and Wilkins Gulch do not provide suitable deep pools and prolonged inundation to support this species.	No further recommendations.

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
		Birds		
American peregrine falcon *(Falco peregrinus anatum)*	FP	Year-round resident and winter visitor. Occurs in a wide variety of habitats, though often associated with coasts, bays, marshes and other bodies of water. Nests on protected cliffs and man-made structures including buildings and bridges. Preys on birds, especially waterbirds. Forages widely.	**Unlikely.** This species has been regularly observed foraging over Bolinas Lagoon; however, no high rocky cliffs or similar structures are present to support nesting. The Study Area is predominantly marsh and riparian forest which is not suitable foraging habitat for the species. This species may perch or fly over the Study Area but is highly unlikely to nest within the Study Area.	No further recommendations.
bald eagle *(Haliaeetus leucocephalus)*	SE, FP	Occurs year-round in California, but primarily a winter visitor; breeding population is growing. Nests in large trees in the vicinity of larger lakes, reservoirs, and rivers. Wintering habitat somewhat more variable but usually features large concentrations of waterfowl or fish.	**Unlikely.** While this species has been observed foraging within Bolinas Lagoon, there are no suitably tall snags, towers, or similar structures to support nesting within the Study Area. The dense riparian forest is too thick for this species to forage within.	No further recommendations.
burrowing owl *(Athene cunicularia)*	SSC	Year-round resident and winter visitor. Occurs in open, dry grasslands and scrub habitats with low-growing vegetation, perches, and abundant mammal burrows. Preys upon insects and small vertebrates. Nests and roosts in old mammal burrows, most commonly those of ground squirrels.	**No Potential.** Open, short-stature grassland is not present within the Study Area to support nesting or foraging by this species. The Project is located within riparian forest and marsh or wetlands which are unsuitable for this species.	No further recommendations.

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
California black rail *(Laterallus jamaicensis coturniculus)*	ST, FP	Year-round resident in marshes (saline to freshwater) with dense vegetation within 4 inches of the ground. Prefers larger, undisturbed marshes that have an extensive upper zone and are close to a major water source. Extremely secretive and cryptic.	**Present.** This species is known to occur within the marshes all around Bolinas Lagoon and is considered present within the marshes of the Study Area.	Implement Mitigation Measure BIO-3.
California brown pelican *(Pelecanus occidentalis californicus)*	FP	(Nesting colony) colonial nester on coastal islands just outside the surf line. Nests on coastal islands of small to moderate size which afford immunity from attack by ground-dwelling predators.	**No Potential.** This species is known to forage within the waters of Bolinas Lagoon, but nests on offshore islands. The Study Area is largely riparian forest and marsh which do not support nesting habitat for this species.	No further recommendations.
California least tern *(Sternula antillarum browni)*	FE, SE, FP	Summer resident along the coast from San Francisco Bay south to northern Baja California; inland breeding also very rarely occurs. Nests colonially on barren or sparsely vegetated areas with sandy or gravelly substrates near water, including beaches, islands, and gravel bars. In San Francisco Bay, has also nested on salt pond margins.	**Unlikely** – There are no sandy beaches to support nesting within the Study Area. This species may forage within adjacent portions of Bolinas Lagoon and may fly over the Study Area.	No further recommendations.
California Ridgway's (clapper) rail *(Rallus obsoletus obsoletus)*	FE, SE, FP	Year-round resident in tidal marshes of the San Francisco Bay estuary. Requires tidal sloughs and intertidal mud flats for foraging, and dense marsh vegetation for nesting and cover. Typical habitat features abundant growth of cordgrass and pickleweed. Feeds primarily on molluscs and crustaceans.	**Unlikely.** This species has not been documented nesting in the Bolinas Lagoon area and even individual accounts of single birds are extremely limited (CDFW, 2022). The species is unlikely to nest or occur within the Study Area.	No further recommendations. Implementation of Mitigation Measure BIO-3 will ensure no impacts to this species.

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
golden eagle *(Aquila chrysaetos)*	FP	Occurs year-round in rolling foothills, mountain areas, sage-juniper flats, and deserts. Cliff-walled canyons provide nesting habitat in most parts of range; also nests in large trees, usually within otherwise open areas.	**No Potential.** This species may forage in the grassland areas outside of the Study Area to the north and may be seen flying over the Study Area; however, no grasslands to support foraging, nor tall rocky cliffs are present to support nesting.	No further recommendations.
San Francisco common yellowthroat *(Geothlypis trichas sinuosa)*	SSC	Resident of the San Francisco Bay region, in fresh and saltwater marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	**Present.** This species has been observed within this section of Bolinas Lagoon. Marsh and wetland habitat within the Study Area may support nesting by this species.	Implement Mitigation Measure BIO-4.
western snowy plover *(Charadrius nivosus [alexandrines] nivosus)*	FT, SSC	Federal listing applies only to the Pacific coastal population. Year-round resident and winter visitor. Occurs on sandy beaches, salt pond levees, and the shores of large alkali lakes. Nests on the ground, requiring sandy, gravelly, or friable soils.	**Unlikely.** There are no sandy beaches to support nesting within the Study Area. This species may forage within adjacent sections of Bolinas Lagoon and may fly over the Study Area.	No further recommendations.

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
white-tailed kite *(Elanus leucurus)*	FP	Year-round resident in coastal and valley lowlands with scattered trees and large shrubs, including grasslands, marshes, and agricultural areas. Nests in trees, of which the type and setting are highly variable. Preys on small mammals and other vertebrates.	**Moderate Potential.** The species may nest within the trees and vegetation of the Study Area but is unlikely to forage within the Study Area as no suitable grasslands are present.	Implement Mitigation Measure BIO-4.
		Mammals		
pallid bat *(Antrozous pallidus)*	SSC, WBWG High	Found in a variety of habitats ranging from grasslands to mixed forests, favoring open and dry, rocky areas. Roost sites include crevices in rock outcrops and cliffs, caves, mines, as well as hollow trees and various manmade structures such as bridges, barns, and buildings (including occupied buildings). Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Moderate Potential.** The Study Area contains numerous trees, some of which may support hollows, crevices or similar features that can be occupied by bats. While thick forested wetlands are unlikely to support maternity roosting which requires significant solar exposure and heat retention, trees with large basal cavities may support non-maternity roosting bats.	Implement Mitigation Measure BIO-5.

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
Ring-tailed cat *(Bassariscus astutus)*	FP	Widely distributed throughout most of California; absent from some portions of the Central Valley and northeastern California. Found in a variety of habitats including riparian areas, semi-arid country, deserts, chaparral, oak woodlands, pinyon pine woodlands, juniper woodlands and montane conifer forests usually under 4,600 ft. elevation. Typically uses cliffs or large trees for shelter.	**No Potential.** This is a wide-ranging species that uses a variety of woodland habitats. This species has never been documented in the vicinity and given that the Study Area is surrounded by roads it is unlikely the species would remain undetected.	No further recommendations.
Townsend's big-eared bat *(Corynorhinus townsendii)*	FC, SSC, WBWG	Associated with a wide variety of habitats from deserts to higher elevation mixed and coniferous forests. Females form maternity colonies in buildings, caves and mines, and males roost singly or in small groups. Foraging typically occurs at edge habitats near wooded areas (e.g., along streams).	**No Potential.** No buildings, mines, caves, or other large structures are present that could support roosting by this species.	No further recommendations.

NOTES:
USFWS and Federal Listing Categories:
FC = Candidate for Federal Listing
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
CDFW Listing Categories:
FP = Fully Protected
SSC = Species of Special Concern
WBWG = Western Bat Working Group

Critical and Essential Fish Habitat

The Study Area includes critical habitat for Central California Coast DPS Steelhead, Central California Coast Evolutionarily Significant Unit coho salmon, and tidewater goby. The Project site is located within an area designated Essential Fish Habitat for the Pacific Salmon Fisheries Management Plan (WRA, 2022). These areas are shown in relation to the Study Area in Figure 27.

Habitat Conservation Plans and Natural Community Conservation Plans

There are no federal habitat conservation plans within Marin County. The only local natural community plan or program which overlaps with the Study Area is the Marin County Local Coastal Program (LCP) (Marin County Community Development Agency, 2019). One of the primary goals of the Marin LCP is:

> *…to preserve the unique environment of the Coastal Zone and to encourage the protection and restoration of its coastal resources, while encouraging public enjoyment of its coastal recreation opportunities.*

The proposed Project supports all goals of the LCP. The restoration of more naturalized stream habitats and removal of anthropogenic impediments to the future evolution allows for natural adaptation of the north end of Bolinas Lagoon. In addition, the Project improves reliability of access to primary roads used to access recreational opportunities, as well as improving reliability of evacuation routes in the event of an emergency. As such, the Project supports the goals of the LCP.

Areas east of the Study Area are managed by the National Park Service and are designated as Coastal Open Area. The removal of infrastructure within the Study Area (Fairfax Bolinas Road) and restoration of wetlands supports the natural evolution and connectivity of habitats in areas adjacent to the Coastal Open Space. Such actions allow for more contiguous habitats that can support larger numbers and varieties of wildlife, plants, and natural communities.

CEQA CONTEXT

A project will normally result in significant impacts to biological resources if it substantially modifies sensitive habitats, adversely affects wetlands, negatively affects endangered plant and/or animal species, or conflicts with established policies, ordinances, or plans associated with the protection of biological resources. The areas of habitat restoration included as part of the proposed Project are shown on Figure 28. The biological communities in the Project study area expected with implementation of the proposed Project are shown on Figure 29.

a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Wildlife species which carry a special-status designation and are likely to occur within the Project area are described above in Table 15. Enacting the Conservation Measures (described in Section VIII.A, Biological Conservation Measures) will help to minimize effects, but various species and habitats require further evaluation and further measures to properly reduce Project effects to less-than-significant levels. Therefore, each section below details specific taxa which require additional protections necessary to reduce Project impacts to less-than-significant levels.

Special-status Plants – Less-than-Significant Impact

WRA conducted protocol-level surveys for special-status plants, and none were found within the Study Area (WRA, 2021). As such, the proposed Project will have no impact on special-status plants and no mitigation measures are required.

Special-status Wildlife: Steelhead and Coho – Less than Significant with Mitigation Incorporated

Steelhead are listed under the FESA and may be impacted by the proposed Project. During construction, impacts may occur including behavioral changes (such as avoidance or altered activity), elevated stress responses, and direct injury or mortality. The proposed Project-associated elements which may result in these harmful impacts include interaction with construction equipment, noise, turbidity, and dewatering.

While impacts may occur to a few individuals, the proposed Project is not anticipated to harm the greater population of steelhead within Lewis Gulch, as the Project will largely occur within uplands to create new channel features. Work within the extant stream channel will only occur during non-migratory periods (June–October) allowing anadromous fish species to complete the migratory stages of their lifecycle unimpeded. In addition, most of the Project area does not support fish habitat as it seasonally dries. The Project will result in a net benefit to steelhead passage by restoring a natural floodplain which can evolve with SLR and provide more natural gradients for fish to immigrate or emigrate from natal streams.

Coho salmon are also listed under the FESA, but this species is not known to occur in Lewis Gulch Creek, Wilkins Gulch Creek, or Wharf Creek; however, in the unlikely event this species was to migrate into the Project area, this species could be impacted by the proposed Project in a similar manner to steelhead.

While the potential for impact to steelhead or other fish is small given that Lewis Gulch Creek is an intermittent stream within the reach upstream of the existing box culvert on Olema Bolinas Road, potential impacts to steelhead and Coho salmon may still occur by the proposed Project if water is present when work occurs. Impacts would be associated with dewatering, turbidity and similar Project related elements. However, these will be reduced to less-than-significant levels through the implementation of the Conservation Measures as well as Mitigation Measure BIO-1. In addition to the measures described below, any agency requirements as stated in Project permits will also be implemented and, in the event they are more protective, will supersede these measures.

Mitigation Measure BIO-1: Steelhead and Coho

1. The proposed Project shall consult with the National Marine Fisheries Service (NMFS) for potential impacts to steelhead (see WRA 2022 NMFS Biological Assessment).
2. All in-channel work shall occur between June 1 and October 31. Work outside of this period shall only occur if authorized by NMFS and CDFW.
3. Prior to working within a stream, a bypass shall be installed to allow flowing water (if any is present) to be bypassed to maintain flows downstream. Fish relocation shall occur within the section of stream to be dewatered before dewatering commences.
4. Fish relocation activities shall be led by a qualified fisheries biologist approved by NMFS. The qualified fisheries biologist shall be assisted by at least one additional biologist if conducting electrofishing.

5. During any initial dewatering efforts, pumps shall be screened with appropriately sized mesh to prevent the entrainment and impingement of fish and amphibians in accordance with CDFW and NMFS fish screening criteria.
6. Prior to capturing fish, the qualified biologist shall determine the most appropriate release location(s). The following shall be considered when selecting release site(s):
    a. Similar water temperature as capture location.
    b. Quantity and quality of habitat available to relocate captured fish.
    c. Relocation area in relation to work activities.
7. All fish relocation equipment shall be cleaned and sanitized before and after use.
8. Any temporary fish exclusion or block nets shall be made of soft mesh and shall have appropriately sized mesh to prevent fish from entering the work area.
9. If electrofishing is used to capture fish, it shall only be conducted by trained personnel following NMFS electrofishing guidelines (NMFS, 2000).
10. Fish holding times shall be minimized to the extent practical and if necessary multiple relocations shall occur to minimize the number of fish being held in buckets or coolers.

Following implementation of the Conservation Measures, as well as Mitigation Measure BIO-1, Project impacts to steelhead and Coho salmon will be reduced to less-than-significant levels.

Special-status Wildlife: California Red-legged Frog (CRLF) – Less than Significant with Mitigation Incorporated

CRLF were identified during previous road maintenance work within Lewis Gulch along Olema Bolinas Road within the Project area; therefore, this species is considered to be present within the Project area (WRA, 2019). Aquatic features within the Project area consist of flowing streams, as well as intermittent pools. Because CRLF do not breed in streams and require still or ponded water with little or no flow during the breeding season, no breeding habitat is present within the Project area; however, the observation of juveniles in the box culvert in late October demonstrates use of the Project area as non-breeding aquatic habitat. In addition, CRLF had to reach waters within the culvert, therefore the uplands are also considered dispersal habitat.

CRLF that are in the uplands surrounding Lewis Gulch may be killed or injured during construction activities such as vegetation removal or initial ground disturbance. CRLF may also be exposed to predation if remnant pools are dewatered, and vegetation removal reduces available cover for individuals during upland dispersal. Such impacts would be considered significant under CEQA. To address these potential impacts, the Conservation Measures and Mitigation Measure BIO-2 shall be implemented. In addition to the measures described below, any permit specific requirements issued by resource agencies for CRLF will also be implemented, maintaining that effects to CRLF would already be reduced to less-than-significant levels with the prescribed Conservation Measures and Mitigation Measure BIO-2.

Mitigation Measure BIO-2: CRLF

1. The Project shall consult with the USFWS prior to initiating Project activities (see WRA 2022 USFWS Biological Assessment).
2. Within 48 hours prior to the start of construction activities, a biologist approved by USFWS (qualified biologist) shall conduct a pre-construction survey for CRLF in and adjacent to the Project area.

3. If any CRLF or other amphibians are observed in the Project area, the individual(s) shall be captured by the qualified biologist and relocated outside of the Project area. Capture shall proceed as follows:
    a. Prior to handling the animal(s), the biologist shall assure their hands are free of toxins (i.e., sunscreen, bug repellant, etc.) or they may use moistened latex or nitrile gloves to handle/capture the animal(s).
    b. A clean bucket containing moist leaf litter, or a sponge moistened with non-chlorinated water shall be used to hold and transport the animal(s).
    c. The qualified biologist shall capture the animal by hand, or with the use of appropriate tools (e.g., dip net).
    d. The animal shall be relocated outside of the Project area, at least 200 feet from similar riparian or aquatic habitat.
    e. Information regarding the capture including number of individuals, date, time, approximate size, sex (if known), capture location coordinates, and release location coordinates shall be recorded, along with any other relevant information.
    f. Any equipment used for relocation or capture shall be properly decontaminated according to standard protocols for the species before and after use.
4. A qualified biologist shall be present for any initial vegetation removal, initial grading or grubbing and for any relocations. Once initial vegetation removal or grading is complete, a morning pre-construction check may be conducted by a biological monitor, or qualified person who has been trained by the qualified biologist; however, if a CRLF is observed, the biological monitor or qualified person shall stop work and inform the qualified biologist who shall oversee the relocation.
5. The qualified biologist, any biological monitors, and qualified person(s) shall have stop-work authority.
6. Prior to the commencement of work with wheeled or tracked equipment in vegetated areas, vegetation that could conceal amphibians shall be surveyed by a qualified biologist or biological monitor. If vegetation is too dense to be adequately surveyed (e.g., thick blackberry bushes, etc.), a qualified biologist or biological monitor shall observe vegetation removal until vegetation is cleared sufficiently for the qualified biologist to survey the area and verify the presence or absence of amphibians. If no amphibians are found, the vegetation shall be fully removed, and work may continue. If amphibians are observed, they shall be relocated by a qualified biologist according to the procedure outlined above.
7. An exclusion fence cannot be established around the entire site due to the variety of hydrologic conditions in the Project area; therefore, an exclusion fence (such as silt fencing) shall be installed around any staging and storage areas only. The exclusion fence shall stand at least 2 feet high and be buried at least 6 inches deep or shall otherwise be secured along the bottom to prevent wildlife from passing underneath (i.e., with sandbags or similar materials). The fence shall be made of an opaque material (such as silt fencing). Any access gates shall be closed each night and secured to prevent entry by CRLF or other nocturnal amphibians. If no vegetation is present within 25 feet of the exclusion fence, cover boards shall be placed approximately every 100 feet to provide intermittent cover for CRLF or other amphibians. If vegetation is present within 25 feet, no cover boards are necessary.
8. The exclusion fence shall be surveyed daily by a qualified biologist or qualified person to identify and address issues that could allow CRLF or other amphibians to enter the staging area.
9. All construction activities shall cease one half-hour before sunset and shall not begin prior to one half-hour after sunrise.

10. Construction activities shall not occur for 24 hours after rain events that deliver >0.25 inches of rain without the presence of a full-time qualified biologist onsite to monitor activities.
11. Any open holes or trenches greater than 12 inches deep shall be covered or have escape ramps no steeper than 45 degrees installed at the end of each working day to prevent CRLF or other amphibians from becoming entrapped. Holes shall be checked before work begins.
12. All aquatic equipment used for capture shall be decontaminated before and after use in accordance with the fieldwork code of practice developed by the Declining Amphibian Populations Task Force.
13. No monofilament wrapped BMPs shall be used which might entangle CRLF or other amphibians.

Special-status Wildlife: California Black Rail – Less than Significant with Mitigation Incorporated

California black rail (CBR) are known to occur throughout the tidal marshes surrounding Bolinas Lagoon (CDFW, 2022).[3] Restoration activities within the tidal marsh and adjacent habitats could injure or kill rails if they are nesting within the footprint of the proposed Project when it occurs. In addition, restoration activities may cause sufficient auditory and visual disturbances resulting in nest abandonment or disruption of seasonal activity periods when calling and mating occurs. These effects would be considered a significant effect under CEQA. To reduce these potential effects to less-than-significant levels, the Conservation Measures and Mitigation Measure BIO-3 shall be implemented. In addition to these measures, any resource-agency specific permit requirements shall also be implemented.

Mitigation Measure BIO-3: California Black Rail

1. Prior to initiating construction activities in the spring, protocol surveys shall be performed to determine if black rail territories are present within 330 feet (100 meters) of the Project area.
    a. If a territory is identified, a 165-foot (50 meters) non-disturbance buffer shall be established around the territory, and no work shall occur south of the Fairfax Bolinas crossover road within the buffer until after August 31.
    b. If no specific territories are identified, the Project shall establish a general buffer of 85 feet (25 meters) from the edge of the high tide line. No work of any type shall occur within the buffer until after August 31, when nesting season has completed.
2. Any work such as asphalt grinding, jackhammering, concrete sawing, or similar extreme noise-producing construction activities required to remove the Fairfax Bolinas crossover road shall not occur from March 1–April 30, when black rails are most likely to call in association with the breeding season.
    a. Standard construction activities, such as motorized equipment operation and staging of equipment or materials, vegetation removal, grading, or other general Project activities may occur on, or north of, the Fairfax Bolinas crossover road, from March 1–April 30.
    b. If extreme noise-producing activities are necessary during the period from March 1–April 30, then temporary visual barriers and sound attenuating curtains shall be used to decrease visual and auditory disturbances.
    c. Any general work activities along Fairfax Bolinas Road from March 1–April 30 shall not begin until one hour after sunrise and shall cease no later than one hour before sunset, to avoid periods when rails are most likely to call.

[3] Personal Communication with Jules Evans of Avocet Research Associates, LLC on July 7, 2022.

3. Between November and January, no work shall occur within 85 feet (25 meters) of the high tide line from 45 minutes before, until 45 minutes after a high tide event measuring 6.0 feet or higher, to allow rails to use adjacent uplands as refugia during high tide events. Work outside of the 85-foot buffer shall be allowed, weather permitting.

Special-status Wildlife: Native Nesting Birds – Less than Significant with Mitigation Incorporated

Trees and vegetation within and surrounding the Project area may provide potential nest sites for several special-status species including San Francisco common yellowthroat and white-tailed kite. In addition, non-special-status bird species protected by the California Fish and Game Code and the Federal Migratory Bird Treaty Act are also likely to nest within the Project area. Removal of active nests (those containing eggs, chicks, or pre-fledged young) would violate these regulations and would be considered a significant impact under CEQA. To reduce these potential impacts to nesting birds to less-than-significant levels, the Conservation Measures and Mitigation Measure BIO-4 will be implemented. In addition to these measures, any resource-agency specific permit requirements shall also be implemented.

Mitigation Measure BIO-4: Native Nesting Birds

1. To the extent feasible, vegetation removal and initial ground disturbance shall occur from September 1 through January 31, so that initial ground-disturbing work occurs outside of the general nesting bird season.
2. For vegetation removal and ground disturbance within the proposed Project area that is conducted during the general nesting bird season (February 1 through August 31), pre-construction nesting bird surveys shall be conducted within the work area and adjacent habitats seven days prior to the initiation of vegetation removal or grading activities to avoid disturbance to active nests, eggs, and/or young.
3. All active nests of native birds found during the survey shall be protected by a no-disturbance buffer until all young from each nest fledge, or the nest otherwise becomes inactive. The size of each buffer shall be determined by a qualified biologist dependent upon extant conditions and may require consultation with the CDFW. Buffers are typically a minimum of 25 feet for disturbance-adapted non-special-status birds and increase accordingly for large raptors or other special-status species.

Special-status Wildlife: Roosting Bats – Less than Significant with Mitigation Incorporated

While there are no buildings, caves, or rocky outcrops with deep crevices to support roosting by larger bats, such as Townsend’s big-eared bat, pallid bat is known to use tree cavities for roosting. While mobile adults could relocate and avoid construction activities, bats roosting during the maternity season (typically May to August) are more vulnerable to disturbance and construction activities could result in impacts when young cannot fly yet, and adults cannot relocate.

Trees within the proposed Project area would be removed in preparation for channel creation and restoration activities. Bats may be disturbed, displaced, and potentially injured or killed, if they do not or are unable to vacate the supporting roosting structure during the removal process. General disruption from construction activities, including audible, vibratory, and visual disturbance, could wake roosting bats, interfere with foraging bats, or cause females to abandon maternity roosts, creating a potentially significant impact. Such effects would be considered significant under CEQA.

The proposed Project would mitigate for the removal of riparian trees with replacement plantings, described below. As such, no permanent loss of roosting habitat will occur; however, effects to individual bats would require addressing. To reduce potential impacts to roosting bats to less-than-significant levels, the Conservation Measures and Mitigation Measure BIO-5 will be implemented.

Mitigation Measure BIO-5: Roosting Bat Protection

1. Prior to the removal of any large trees (DBH>18 inches) a bat roost assessment shall be conducted by a qualified biologist at least 30 days beforehand to determine if potential roost habitat is present.
    a. If the tree has no potential to support roosting bats (e.g., no large basal cavities, exfoliating bark or interstitial spaces), the tree may be removed with no further measures required to protect roosting bats.
    b. If a potential bat habitat is present, and work is occurring outside the maternity season, the qualified biologist may either 1) Conduct an emergence survey to determine if the roost is occupied; or 2) The tree may be felled using a two-phased cut.
        i) If the emergence survey confirms the roost is inactive, the tree may be felled normally.
        ii) If the roost is confirmed active, or is assumed to be active, a two-phased cut shall be employed to remove the tree. On day one, the qualified biologist shall oversee removal of branches and small limbs not containing potential bat roost habitat using hand tools such as chainsaws or handsaws only. The next day, the rest of the tree may be removed.
    c. If potential bat roosting habitat is present and work is occurring during the maternity season, the qualified biologist may either 1.) Conduct an emergence survey to determine if the roost is occupied; or 2.) Assume the roost is occupied and a buffer shall be implemented.
        i) If the roost assessment does not detect bats, the tree may be removed normally. If roosting bats are detected, or the tree is assumed to be an active roost, the tree shall be given a 100-foot buffer and shall be avoided until after the maternity roosting season is complete.

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

Riparian Tree Removal - Less than Significant with Mitigation Incorporated

An arborist report has been prepared to document existing trees on the Project site (WRA, 2021). Because the Project site is located within the Coastal Zone, the Marin County Native Tree Protection and Preservation ordinance does not apply. A total of 214 trees were identified within or directly adjacent to the Project site. Of these, 123 are proposed for removal during implementation of the Project. The proposed Project will require the removal of trees within oak woodland, forested wetlands, riparian, and similar habitats to accommodate grading and restoration of the new channel, relocation of the road at the junction of Olema Bolinas Road and SR-1, as well as construction of the new bridge. Trees within these habitats are subject to regulation by CDFW and RWQCB. These impacts would represent a significant impact to these communities if not mitigated. With the implementation of Mitigation Measure BIO-6, impacts to riparian habitats would be less than significant.

Mitigation Measure BIO-6: Tree Protection

To minimize damage to existing trees which are not proposed for removal by Project activities, the following shall be implemented:

1. To the extent possible any native trees shall be avoided and retained.
2. Installation of temporary protective fencing around the dripline of existing trees per the direction of a licensed arborist prior to ground disturbance in the area of those trees.
3. Trunk protection with 2x4 wood planks shall be installed around the trunk of a tree that cannot otherwise be protected at the dripline.

Of the trees proposed for removal, new native trees would be planted at ratios established to be commensurate with the stature of the trees to be removed.

4. A total of 1,246 trees shall be planted on-site, in addition to the many shrubs listed in the Project revegetation plan planting palette. This represents a 10:1 replacement ratio for the 123 trees that will be removed (3.5:1 replacement for oaks).
5. On-site planting may occur within the restored floodplain where the crossover section of Fairfax Bolinas Road is removed, increasing habitat continuity within this floodplain.

With the implementation of the Conservation Measures, as well as Mitigation Measure BIO-6, impacts to riparian trees would be reduced to less than significant levels.

Critical Habitat – Less than Significant

Critical habitat for three species is designated within the Project area:

- Central California Coast (CCC) steelhead
- CCC coho salmon
- Tidewater goby

Critical habitat within the Project is shown in Figure 27.

Steelhead

Critical habitat for CCC steelhead is designated within Wilkins Gulch Creek (70 FR 52487). The primary constituent elements (PCEs) for steelhead critical habitat are: (1) freshwater spawning habitat; (2) freshwater rearing sites; (3) freshwater migration corridors; (4) estuarine habitat with brackish water and natural cover; (5) nearshore marine habitats with forage fishes and natural covers; and (6) offshore marine areas. PCEs within the Project area include freshwater rearing and migratory habitat in the vicinity of the culvert beneath SR-1, and estuarine habitat with brackish water between the culvert outlet and Bolinas Lagoon. Only a very small portion of Wilkins Gulch Creek lies within the Project area, and the only work proposed to Wilkins Gulch Creek is to tie the terminus of Wilkins Gulch Creek into the new channel for Lewis Gulch. All in-channel work would occur during the non-migratory season for steelhead (June–October) when the function of the portion of Wilkins Gulch Creek is as a migratory corridor, thereby avoiding impacts to the function of critical habitat. The new Lewis Gulch channel shall also allow for an enhanced connection with large woody debris structures to provide cover, an enhanced floodplain to promote rearing, and more reliable channel connection that promotes migratory cues and conditions for steelhead. As such, the net result of the Project is entirely beneficial to steelhead critical habitat.

Coho Salmon

Critical habitat is designated for CCC coho salmon (64 FR 24049). CCC coho salmon critical habitat is designated to include all river reaches accessible to listed coho salmon from Punta Gorda in northern California south to the San Lorenzo River in central California, including Arroyo Corte Madera Del Presidio and Corte Madera Creek, which are tributaries to San Francisco Bay.

Critical habitat for coho salmon consists of the water, substrate, and adjacent riparian zone of estuarine and riverine reaches (including off-channel habitats). Accessible reaches are those within the historical range of the ESU that can still be occupied by any life stage of coho salmon. Inaccessible reaches are those above specific identified dams or above long-standing, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); therefore, CCC coho critical habitat is present within the Project area (64 FR 24049).

CCC coho critical habitat requires all of the following:

1. space for individual and population growth, and for normal behavior;
2. food, water, air, light, minerals, or other nutritional or physiological requirements;
3. cover or shelter;
4. sites for breeding, reproduction, or rearing offspring; and, generally,
5. habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (see 50 CFR 424.12[b]).

In addition to these factors, NMFS also focuses on the known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection. These essential features may include, but are not limited to spawning sites, food resources, water quality and quantity, and riparian vegetation.

The critical habitat designation for CCC coho salmon identifies streams accessible to coho salmon within the Tomales-Drake Bays hydrologic unit of Marin County, which includes the Action Area (64 FR 24049). The Project will be initiated in the dry season when flows are most likely to be naturally discontinuous through the streams in the Action Area, thereby limiting the potential for any direct effects to migratory and rearing habitat. Overall, the Project will also indirectly benefit critical habitat. There are no significant deleterious effects to coho critical habitat.

Tidewater Goby

Tidewater goby critical habitat is composed of five Physical and Biological Features (PBFs) including (USFWS, 2013):

1. Space for individual and population growth and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, or rearing (or development) of offspring; and
5. Habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species.

Tidewater goby is currently absent from Bolinas Lagoon and any modifications to critical habitat as part of the Project would not occur at a time when critical habitat supports any life stage of the species. All PBFs would benefit from the Project as several key elements would be enhanced, including:

1. Increasing the aquatic features within the Project area that would be accessible to goby;

2. Expansion of the floodplain and inclusion of woody debris will promote areas of cover, forage and rearing for the species,
3. Alteration of hydraulics in Lewis Gulch will help move sands to the lagoon, providing spawning substrates where none currently exist, and
4. Removing the crossover section of Fairfax Bolinas Road will remove sources of noise and toxins (e.g., fuels from cars or garbage), and will allow for the natural evolution of habitats in the future.

Overall, the Project would benefit critical habitat for tidewater goby and all other fish species; therefore, as only positive effects are likely, Project impacts would be less than significant.

c) Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Waters of the U.S. and State – Less Than Significant with Mitigation Incorporated

Wetlands, marshes, and permanent and intermittent streams are subject to regulation by the USACE under Section 404 of the Federal Clean Water Act (CWA), and subject to regulation by the RWQCB under Section 401 of the CWA and the State of California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7). CDFW generally has jurisdiction over creeks, streams, and drainages, together with other aquatic features that provide an existing fish and wildlife resource pursuant to Sections 1602-1603 of the California Fish and Game Code. CDFW asserts jurisdiction to the outer edge of vegetation associated with a riparian corridor. The California Coastal Commission regulates some areas that display a single wetland parameter such as hydrophytic vegetation, hydric soil, or wetland hydrology. There were five areas that met the criterion for hydrophytic vegetation, but not hydric soil or wetland hydrology.

Wetlands were delineated in the Project area during preliminary jurisdictional delineations on July 30 and August 27, 2020 (WRA, 2020). The Corps issued a Preliminary Jurisdictional Determination letter on June 16, 2021. The Project area contains seven distinct aquatic resources that receive water from groundwater, precipitation, runoff from surrounding uplands, and/or tidal inundation from the Pacific Ocean. A summary of jurisdictional aquatic resource acreage is provided in Table 14 and are shown in Figures 24–26.

Currently tidal inundation north of the crossover section of Fairfax Bolinas Road is blocked by the roadway. Lewis Gulch is also routed through a confined channel along Olema Bolinas Road where it has no floodplain access. Following the implementation of the proposed Project, Lewis Gulch Creek will be realigned through the center of the Wye, allowing seasonal floodwaters to spread out into the surrounding forest and wetlands, restoring natural conditions of the floodplain. In addition, removal of the crossover section of Fairfax Bolinas Road will allow tidal action via the new Lewis Gulch channel, inundating the wetlands higher in elevation, which will allow for the expansion of the tidal marsh. This will be especially important as sea-level rise continues to raise water levels in Bolinas Lagoon. As such, the proposed Project will have a net benefit by restoring the natural conditions of the floodplain and expanding wetlands throughout the Project area.

The Project will permanently impact 0.046 acres of wetlands and waters (81 ft; Table 16). Permanent impacts are a result of the 2:1 slopes on each side of the new Olema Bolinas Road segment and creation of a berm to divert flows to the new Lewis Gulch Creek alignment. A total of 0.142 acres of existing wetlands would be converted into different wetland types as a result of the new Lewis Gulch Creek alignment. In addition, approximately 1.639 acres of wetland and stream, 312 linear feet, will be either enhanced through invasive species management and native planting, or temporarily graded from channel and road construction and then planted with native vegetation (Table 17). This also includes 84 linear feet of biotechnical bank stabilization within the existing Lewis Gulch alignment. The bank stabilization will include large wood and soil bioengineering. The Project will create 1.091 acres of waters and forested wetland in areas that were previously developed or upland habitat (Table 18). A total net increase of approximately 1.09 acres of restored channel, floodplain and wetland would result from implementation of the proposed Project. As the effect of the Project will be a net benefit to wetlands, the Project is considered self-mitigating, and impacts to waters of the U.S. and State will be less than significant.

Table 16: Proposed Permanent Impacts (Fill) in Waters of the U.S. and Waters of the State

AQUATIC RESOURCE TYPE	ACRES	LINEAR FEET (LF)
Forested Wetland	0.017144	--
Intermittent Waters	0.029065	81
TOTAL:	**0.046209**	**81**

Table 17: Proposed "Temporary Impacts" in Waters of the U.S. and Waters of the State

AQUATIC RESOURCE TYPE	ACRES
Enhancement	
Intermittent Waters	0.073411
Perennial Waters	0.003913
Forested Wetland	1.428937
Tidal Marsh	0.132617
TOTAL:	**1.638878**
Conversion	
Forested Wetland to Intermittent Waters	0.077278
Intermittent Waters to Forested Wetland	0.024292
Tidal Marsh to Intermittent Waters	0.030772
TOTAL:	**0.142**
TOTAL TEMPORARY IMPACTS:	**1.780878**

Table 18: Creation of Waters of the U.S. and Waters of the State

ORIGINAL VEGETATION TYPE	POST CONSTRUCTION VEGETATION TYPE		TOTAL (ACRES)
	Forested Wetland	Intermittent Waters	
Coast Live Oak Woodland	0.179735	0.020723	0.200458
Developed	0.413148	0.026661	0.439809
Non-native grassland	0.049991	-	0.049991
Wetland - 1 Parameter	0.341687	0.059083	0.40077
TOTAL:	**0.984561**	**0.106467**	**1.091028**

The proposed Project will need to work within areas that may contain waters, or that need to have waters temporarily removed to facilitate restoration. When working in such proximity, fluid spills from equipment, runoff, and debris within the Project area can inadvertently enter adjacent waters, thereby impacting the suitability of those habitats. Spills or excessive sedimentation from runoff would be considered a significant impact under CEQA. To negate such potential impacts, Mitigation Measure BIO-7 shall be enacted to reduce the potential impact of the proposed Project to a less-than-significant level.

Mitigation Measure BIO-7 –Waters of the U.S. and State

1. The Project shall implement the following measures to avoid and/or minimize and restore potential impacts to aquatic habitats resulting from Project activities:
2. Excavation of the new channel and any work within the existing creek bed and banks shall be completed between June 1 and October 31. Work within the existing channel shall only occur when the work area is dry or dewatered.
3. Prior to construction, the contractor shall be required to prepare an Accidental Spill Prevention and Cleanup Plan.
4. Emergency spill containment and clean-up materials shall be kept on the Project site.
5. A Stormwater Pollution Prevention Plan (SWPPP) shall be developed which would include stormwater best management practices (BMPs) specific to the disturbances occurring as well as inspection procedures to ensure the SWPPP is implemented as described.
6. To minimize fluid leaks, equipment shall be inspected daily. Any equipment found to be leaking shall not be used until it has been fully repaired.
7. If maintenance must occur on-site, it would occur in designated areas located at least 100 feet from drainages and channels and protected with perimeter controls and non-permeable surfaces placed under the equipment. Secondary containment, such as a drain pan or drop cloth, to catch spills or leaks shall be used when performing maintenance or refueling equipment. Fluids shall be stored in appropriate containers with covers, and properly recycled or disposed of off-site.
8. No equipment, including concrete trucks, shall be washed within the channel of the creek, or where wash water could flow into the channel. Prior to initiating construction, the contractor shall establish a concrete washout area for concrete trucks in a location within developed areas where wash water shall not enter the creek or adjacent areas. The washout area shall follow the practices outlined in the San Francisco Bay Regional Water Quality Control Board Erosion and Sediment Control Field Manual (page 107–108, July 1999) or more recent guidelines.

9. All spoils including concrete and asphalt shall be stored in locations where they cannot enter waterbodies and shall be covered or protected as outlined in the SWPPP until they can be hauled offsite for disposal.
10. Debris, soil, silt, excessive bark, rubbish, creosote-treated wood, raw cement/ concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from projected related activities, shall be prevented from contaminating the soil and/or entering the waters of the US or State.
11. All trash and construction debris shall be contained in a covered debris box (or similar) and removed regularly from the Project site and disposed of appropriately off-site.

With the implementation of Mitigation Measure BIO-7, the potential impacts of the proposed Project construction on waters of the U.S. and State would be reduced to less-than-significant levels.

d) Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Wildlife Movement - Less Than Significant

Wildlife corridors are described as pathways or habitat linkages connecting discrete areas of natural open space otherwise separated or fragmented by topography, changes in vegetation, and other natural or manmade obstacles such as urbanization. They allow for the movement and migration of animals and plants, and are critical for the maintenance of ecological processes and viable populations of plants and animals by promoting (1) the continual exchange of genes between populations, which helps to maintain genetic diversity; (2) access to adjacent habitat areas that provide additional territory for foraging and breeding; (3) greater carrying capacity; and (4) routes for colonization of new habitat following locational population extinctions or habitat recovery from ecological catastrophes.

Habitat linkages are broader stretches of open space that allow for the movement of multiple species and maintenance of ecological processes. These linkages do not have to provide continuous habitat but could also be patches of suitable areas that support movement from one patch to another to allow dispersal and migration. Habitat linkages reduce the adverse effects of habitat fragmentation that can lead to decreased gene flow for small animals, such as amphibians, reptiles, and rodents.

Native wildlife nursery sites are specific areas where certain species return yearly to breed, birth, and raise juveniles. For example, most salmonids require gravel beds in the upper reaches of a stream. There is a distinction between wildlife nursery sites and other breeding sites that do not have specific habitat conditions. In other words, a tree with a bird nest is not necessarily a wildlife nursery site.

The Project area is located in an undeveloped/open area and is surrounded by large expanses of open space. Wildlife is expected to currently use the Project area for local and regional movements, but under current conditions encounter several anthropogenic structures and restrictions to movement. First, fish migrating up Lewis Gulch Creek encounter a partial fish passage barrier at the existing box culvert under Olema Bolinas Road. Fish that can pass through the box culvert must then travel through a constricted roadside ditch before making it back to a more naturalized channel. The proposed Project would allow for unrestricted passage of aquatic life throughout the Project area. Any terrestrial wildlife that occurs within the Project area (e.g., birds or amphibians) that move inland following tidal inundation, or seeking cover encounter the crossover section of Fairfax Bolinas Road, State Highway 1, or Olema Bolinas Road where animals are faced with potential collisions with vehicles.

The proposed Project would realign Lewis Gulch Creek, creating a more naturalized channel through the center of the Wye. Lewis Gulch Creek would pass beneath a new bridge which will span the creek and would no longer restrict streamflow or wildlife movement within or along the water's edge as is currently the case. Additionally, removal of the crossover section of Fairfax Bolinas Road will provide more contiguous habitat from Bolinas Lagoon, with the Bolinas Wye wetlands, under the proposed bridge at the Olema Bolinas Road/SR-1 intersection. This will reduce the potential for vehicular collisions with wildlife within the Project area and will enhance local wildlife movements in response to tides and sea level rise.

The proposed Project has been designed to enhance wildlife movement in the area and would not result in significant adverse impacts on wildlife movement activity in the surrounding area following construction. Construction activities will largely occur at times of the year to avoid migratory events (e.g., working in streams between June and October when steelhead are not migrating through the area) or times of day when species are likely to move through local areas. Therefore, implementation of the Project would result in beneficial effects to movement of native resident or migratory fish or wildlife species, and would have a less-than-significant impact on wildlife movement.

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

Local Policies - Less Than Significant with Mitigation Incorporated

The Project area is within unincorporated Marin County and governed by the Marin Countywide Plan, Local Coastal Plan and Bolinas Lagoon Management Plan. These various local policy plans are discussed below by section.

Marin Countywide Plan

The Marin Countywide Plan includes goals and policies to protect natural resources. Implementation of the proposed Project would conform with the goals and policies of the Marin Countywide Plan, specifically those within the Natural Systems and Agricultural Element section which pertains to protecting biological resources. These policies include the following:

BIO-1.1 Protect wetlands, habitat for special status species, sensitive natural communities and important wildlife nursery areas and movement corridors: See "d" above

BIO-1.3 Protect woodlands, forests and tree resources: See Agricultural and Forest Resources above

BIO-1.4 Support vegetation and wildlife disease management: With the implementation of the Conservation Measures as well as MM BIO-6, introduction and spread of invasive species, plant pathogens and protection to sensitive vegetation will be enacted.

BIO-1.5 Promote Use of Native Plant Species: The project will use locally sourced seeds and plants for revegetation as discussed in the Project description.

BIO-1.6 Control Spread of Invasive Exotic Plants: One of the goals of the Project is to manage and remove invasive species to allow for habitat restoration. The Project includes Conservation Measures that include practices to minimize the spread of invasive plant species and pathogens while elements of the Project description outline removal of invasive species.

BIO-1.7 Remove invasive exotic plants: One of the goals of the Project is to manage and remove invasive species to allow for habitat restoration. The Project includes Conservation Measures and Project elements that include control of invasive plant species and pathogens.

BIO-1.8 Restrict use of herbicides, insecticides, and similar material: As discussed in the Project description, the Marin County Integrated Pest Management Plan (IPM) will be followed and all efforts will be made to remove invasive species using manual and mechanical methods, with herbicides being used as a last resort following protocols of the IPM plan.

BIO-1.9 Control spread of non-native invasive animal species: The proposed Project does not involve activities that could pose a risk to the import on invasive animal species. Conservation Measures state requirements to drain, dry and clean any aquatic based equipment prior to, or after use which would prevent the spread of aquatic invertebrate species.

BIO-2.1 Include resource preservation in environmental review: The Project area is within lands managed by Marin County Parks and MCOSD as Open Space and will continue to remain under the protection of Marin County Parks and Open Space District, with the exception of the rights-of-way for Olema Bolinas Road and Fairfax Bolinas Road, which will be reduced and/or converted to wetlands.

BIO-2.2 Limit Development Impacts: The Project has reduced road development by decommissioning existing sections of Olema Bolinas Road and Fairfax Bolinas Road to be converted to wetlands.

BIO-2.3 Preserve ecotones: The Project will create, enhance and restore lands that are vital for transitional shifts in vegetation communities and that allow for a diversity of habitat for wildlife that are present and will use the site in the future.

BIO-2.4 Protect wildlife nursery areas and movement corridors: The Project will improve the ability for terrestrial and aquatic wildlife that migrate through the project area by elevating and eliminating roads within wetlands providing for increased access and reliability of connection between core habitat areas.

BIO-2.5 Restrict disturbance in sensitive habitat during nesting season: The Project includes measures to protect nesting birds.

BIO-2.6 Identify opportunities for safe wildlife movement: The Project will improve migration corridors for terrestrial and aquatic wildlife through the project area by elevating and eliminating roads within wetlands.

BIO-2.7 Protect sensitive coastal habitat: The Project is designed with the primary goal of improving vital habitat in the coastal region and improving their resiliency to climate change and SLR. Further the Project area is within lands owned and managed by Marin County Parks and MCOSD as a protected Preserve.

BIO-2.8 Coordinate with Trustee Agencies. The Project has been reviewed by all regulatory agencies (California Department of Fish and Wildlife, Regional Water Quality Control Board, Coastal Commission, U.S. Fish and Wildlife Service and National Marine Fisheries Service) throughout the design development process and includes appropriate Conservation and Mitigation Measures approved by these regulatory agencies. The Project is also supported by U.S. Fish and Wildlife Service through funding from the National Coastal Wetlands Conservation Program, and the National Oceanic and Atmospheric Agency that has provided funding from the National Fish and Wildlife Foundation.

BIO-2.9 Promote early consultation with other agencies: See BIO-2.8 above.

BIO-3.1 Protect Wetlands: One of the Project's main goals is to enhance, preserve, and protect wetlands and improve their resiliency to climate change. Work within the wetland is limited to the minimum needed as discussed above in "c" and Table 12, with 0.019 acres of permanent impacts, and 1.09 of created wetlands, greater than a 2:1 replacement.

BIO-4.1 Restrict land use in Stream Conservation Areas: Projects to improve fish and wildlife habitat are an allowed activity in an SCA.

BIO-4.3 Manage SCAs effectively: See BIO-4.1

BIO-4.4 Promote natural stream and channel function: The Projects primary purpose is to restore geomorphic form and function and improve hydrologic connectivity for the enhancement of aquatic and terrestrial wildlife by reconnecting Lewis Gulch Creek to its' alluvial fan and floodplain.

BIO-4.5 Restore and stabilize stream channels: The primary purpose of the Project is to restore Lewis Gulch Creek to its alluvial fan and floodplain and allow space for lateral channel migration, bioengineering for bank stabilization, large woody debris on banks and floodplain, and non-native invasive species removal and revegetation with native plants from within the watershed.

BIO-4.6 Control exotic vegetation: See BIO-1.9 above.

BIO-4.7 Protect riparian vegetation: See Agricultural and Forest Resources section above, and BIO-1.5 and BIO-2.3 above.

BIO-4.8 Reclaim damaged portions of the SCAs: The primary purpose of the project is to restore wetlands and reconnect Lewis Gulch Creek to its former alluvial fan and floodplain.

BIO-4.9: Restore culverted streams: The primary purpose of the project is to restore wetlands and reconnect Lewis Gulch Creek to its former alluvial fan and floodplain, and to improve flow by installing a full span bridge that will allow for natural channel formation and restoring hydrologic and geomorphic processes.

BIO-4.10: Promote interagency cooperation: As discussed in the Project description and BIO-2.8 above, a Technical Advisory Committee was established that included regulatory agencies with oversight over the design of the project. The Department of Public Works is also part of the TAC and has been reviewing the Project plans.

BIO-4.11: Promote riparian protections. See BIO-2.8 and BIO-4.10 above.

BIO-4.12 Support and provide riparian education efforts: Stakeholder engagement has occurred throughout the visioning and design development of the Project as discussed in the Project description.

BIO-4.13: Provide appropriate access in SCAs: The Project site contains sensitive species and habitat, and public access is not appropriate within this area. There are other trails that are maintained by Marin County Parks that provide access along the shoreline of Bolinas Lagoon, such as the Bob Stewart Trail on Olema Bolinas Road.

BIO-4.14 Reduce road impacts in the SCAs: The Project is designed to remove roads and associated infrastructure impacts, to the greatest degree possible, within wetlands and Lewis Gulch Creek.

BIO-4.16 Regulate channel and flow alterations: The project will only temporarily restrict flow during construction. Once constructed, Lewis Gulch Creek will have unrestricted access to its historic alluvial fan and floodplain.

BIO-4.17 Continue collaboration with the Marin Resource Conservation District: Marin County Parks and MCOSD have been discussing with Marin Resource Conservation District opportunities to collaborate on Project activities.

BIO-4.18 Promote the use of permeable surfaces when hardscape is unavoidable in the SCA and WCA: The Project has been designed to minimize the amount of impermeable surface and remove pavement.

BIO-4.19 Maintain channel stability: Hydrology and hydraulic analysis was conducted to evaluate the channel design and to determine the appropriate location and design of bank stabilization and habitat enhancement structures. Draft reports were provided to regulatory agencies for review and updated based on comments received.

BIO-4.20 Minimize runoff: The Project includes Conservation Measures to reduce stormwater runoff and a Storm Water Pollution Prevention Plan will be prepared and implemented prior to construction.

Local Coastal Program (LCP),

The Project is in the Marin County Local Coastal Program (LCP), under the retained jurisdiction of the Coastal Commission.

C-BIO-1 Environmental Sensitive Habitat Areas (ESHAS): A majority of the Project area falls within the definition of an ESHA under LCP C-BIO-1 (wetlands, streams and riparian vegetation, and terrestrial). All work within the ESHA will comply the Biological Resources Section of the LCP as described further below and as mitigated will not adversely impact special status species. The site will remove native and nonnative vegetation in order to restore physical and biological processes to improve the resiliency of the ESHAs.

C-BIO-2 ESHA Protection: The Project is consistent with the policy that allows for uses that are dependent on those resources such as wetlands, coastal streams and riparian vegetation. No alterations will be conducted that will permanently disrupt habitat value, abundance or viability of species populations, because the Project will revegetate and enhance biological and physical processes as described in the Project Description. Further all roads and structures are designed to allow for wildlife movement, and all work has been designed based on recommendations and analysis provided by biological assessments prepared for the project.

C-BIO-3 ESHA Buffers: This policy allows for improvements made for fish and wildlife habitat within an ESHA buffer

C-BIO-5 allows for ecological restoration; C-BIO-6 allows for the removal of invasive plants and replanting with native plants.

C-BIO-6 Invasive Plants: This policy requires the removal of non-native, invasive plant species, and replanting with native plants, which is a part of the Project goals and objectives as described in the Project Description.

C-BIO-7 Coastal Dunes: There are no Coastal Dunes in the proposed Project Area.

C-BIO-8 Stringline Method of Preventing Beach Encroachments: The proposed Project is not within an area of beach development.

C-BIO-9 Stinson Beach Dune and Beach Areas: The proposed Project is not in Stinson Beach.

C-BIO-10 Roosting and Nesting Habitat. Mitigation Measures BIO-3 California Black Rail, BIO-4 Native Nesting Birds, and BIO-5 Roosting Bat Protection will prevent the proposed Project from adversely affecting roosting or nesting birds.

C-BIO-14 Wetlands: The proposed Project is in keeping with this policy and designed to improve wetland and upland habitats for wildlife, water infiltration, and protection of wetlands.

C-BIO-15 Diking, Filling, Draining and Dredging: This policy allows for a new stream channel to be created for Lewis Gulch Creek as part of the restoration of the alluvial fan.

C-BIO-16 Conditions and Standards for Diking, Filling, Draining, and Dredging: This policy allows for these activities provided that the avoid significant disruption to marine and wildlife habitats, fish and bird breeding and migrations, and water circulation. Disruptions will be prevented with Mitigation Measures BIO-1 Steelhead and Coho Salmon, BIO-2 CRLF, BIO-3 California Black Rail, BIO-4 Native Nesting Birds, BIO-5 Roosting Bat Protection, and BIO-6 Tree Protection.

C-BIO-17 Disposal of Dredged Material: All material excavated will be used on site and Parks is consulting with and has applied for a permit by the Regional Water Quality Control Board.

C-BIO-18 Wetland Buffers: Work within the wetlands buffer is allowed by policy C-BIO-2, C-BIO-14, and C-BIO-15, and C-BIO-19.

C-BIO-19 Wetland Buffer Adjustments and Exceptions: This policy allows for work within a buffer because mitigation measures described above will prevent impacts, the project will eliminate on-site invasive species within the Project Area, increase native vegetation cover, and overall improve the ecological integrity of the site.

C-BIO-20 Wetland Impact Mitigation: No net loss will occur as discussed above, with functional uplift provided that will improve habitat conditions as seen in Figure 29. The Project would permanently impact 0.06 acres of California Coastal Commission (CCC) jurisdictional features, result in temporary impacts to 2.19 acres of CCC jurisdictional features, and would create 0.69 acres of CCC jurisdictional features. The site will be monitored for a minimum of 5 years, and the Conservation Measures as well as Mitigation Measures BIO-1 to BIO-6 will ensure protection of vital habitat for special status species and wildlife. The site is already permanently protected, and Parks will continue to steward the site indefinitely.

C-BIO-21 Tomales Bay Shoreline: The proposed Project is not in or near Tomales Bay.

C-BIO-22 Marine Resources: The Proposed project will enhance and restore the health of the estuary.

C-BIO-23 Coastal Streams and Riparian Vegetation: This policy allows for work within a coastal stream and riparian area where the primary function is the improvement of fish and wildlife habitat. Design work that relates to Lewis Gulch Creek have been done in conjunction with staff from the Department of Fish and Wildlife, Regional Water Quality Control Board, and National Marine Fisheries Service to ensure that flows would be sufficient for fish passage and habitat enhancement components were properly located.

C-BIO-26: Diversions Outside the Coastal Zone: This policy is not applicable to the Project Area.

C-BIO-27 Federal Projects: The proposed Project will receive funding and support from the National Oceanic and Atmospheric Administration, and is therefore being reviewed using the Federal Consistency review process.

C-BIO-28 California Parks and Recreation: This project is not within lands owned or managed by the California Department of Parks and Recreation.

C-BIO-29 Marin County Parks: This policy states the LCP support of work by Marin County Parks Department, which includes habitat restoration of lagoons, wetlands, and streams.

As such, the proposed Project would not conflict with any ordinances or policies protecting biological resources and impacts would be less than significant.

Bolinas Lagoon Management Plan (Update, March 1996)

The Project is in keeping with the BLMP Goal 1: Preserve and restore the ecological values of Bolinas Lagoon, Objective 3: Restore water quality and hydraulic functions that will decrease sedimentation and prevent the loss of rich estuarine habitat; and Goal III: Promote land use management in the Lagoon's watershed consistent with preserving and restoring the ecological values of Bolinas Lagoon, Objective 3: Encourage cooperative watershed improvement efforts.

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

No Impact

There are no adopted HCPs in Marin County, and therefore, the proposed Project would not conflict with any such plans. Thus, no impact would occur.

E. CULTURAL RESOURCES

Table 19. Cultural Resources Checklist Questions

Would the project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Cause a substantial adverse change in the significance of a historic resource pursuant to §15064.5?	☐	☒	☒	☐
b)	Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c)	Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

SETTING

Cultural and Historical Resources Studies

Cultural Landscape Report

Yarbrough Architectural Resources (Yarbrough) prepared a Cultural Landscape Report (CLR) for the proposed Project in February 2023 (Yarbrough, 2023). The CLR is a technical study informing Section 106 of the National Historic Preservation Act (NHPA) and National Environmental Policy Act (NEPA) compliance by the Corps, San Francisco District and the CEQA compliance led by Marin County Parks and Open Space District. The CLR's contents follow Part 1. Guidance from A Guide to Cultural Landscape Reports: Contents, Process, and Techniques (USDOI-NPS, 1998).

The CLR included background research and site surveys of areas the Project proposes to affect directly and indirectly. The CLR considers an Area of Potential Effect (APE) of 12.3 acres and an area of direct impact of 4.18 acres as shown on Figure 30. Yarbrough conducted a literature review of previous inventories and evaluations and historical and aerial maps, as well as a field survey within the APE to determine the presence or absence and/or potential presence for historical resources.

Far Western provided Yarbrough with record search results from the Northwest Information Center (NWIC), Sonoma State University and with a graphic representation of archaeological features they recorded within the Area of Potential Effect (APE) as a result of their survey. NWIC record search results identified the National Register Nomination Form for the Olema Valley/Lagunitas Loop Ranches Historic District, referred to as the Olema Valley Dairy Ranches Historic District (District). The District is a National Register of Historic Place (NRHP) listed, federally managed landscape within the Golden Gate National Recreation Area. The Wilkins Ranch is one of the 19 ranches within the District and is included in the Project's Indirect APE (Miller and Caywood, 2008).

In January 2021, Yarbrough inspected, photographed, conducted aerial photography with a drone, and made notes regarding the "wye" intersections at the north end of Bolinas Lagoon within the APE.

Yarbrough revisited the site in February 2023 to provide additional and more current photographic images of the APE.

Based on the literature review and site surveys, Yarbrough identified one known architectural resource and a cultural landscape comprised of three road segments, their setting, and the Wilkins Ranch within the APE. The roads and setting that comprise the cultural landscape features within the APE appeared to be potential historical resources pursuant to CEQA and historic properties subject to NHPA compliance. As a result, Yarbrough recommended the CLR as an analytical format to recommend whether or not the subject resources met the regulatory thresholds for historical significance, namely meeting the criteria of the National and California registers. Specifically, the CLR recommends that the Olema Bolinas Road and SR-1 road segments are eligible for the NRHP and CRHR under criteria A/1 (a resource that is identified with an important event in history) and C/3 (a resource that is identified with important movements in or masters of design and construction) and that the Fairfax Bolinas Road/Crossover Road/Sausalito Road Segment is eligible for the NRHP and CRHR under criteria A/1.

Per 36 CFR Section 800.4(b)(1), the lead federal agency is instructed to make a “reasonable and good faith effort” to identify historic properties within an undertaking’s APE. As the road segments have not been formally evaluated for eligibility for nomination to the NRHP nor the CRHR, the CLR must consider whether or not the cultural landscape and its character-defining features retain sufficient historical integrity to continue to convey significant historical associations. Olema Bolinas Road, SR-1, and Fairfax Bolinas Road are lengthy transportation corridors, and their evaluation is well beyond the scope of the current Project APE boundary. However, these three roads all appear to meet the criteria of CRHR and NRHP. Olema Bolinas Road and SR-1 are shown to be significant largely based on the NRHP listing of the roads as features of the District. The Fairfax Bolinas Road has been the subject of important scholarship by Marin County historian Brian K. Crawford. The Fairfax Bolinas Road/Sausalito Road analysis below recommends this road to also be CRHR- and NRHP-eligible. A detailed analysis and evaluation of the historical significance of each road segment can be found in the CLR. The CLR concludes that all three segments are recommended as “historic properties” under NHPA’s establishing legislation 36 CFR § 800.16 and per 36 CFR § 60.4 and as “historical resources” per CEQA Guidelines’ C PRC Section 5024.1.:

- Olema Bolinas Road Segment is recommended as eligible for the NRHP and CRHR under criteria A/1 and C/3;
- SR-1 Segment is recommended as eligible for the NRHP and CRHR under criteria A/1 and C/3;
- Fairfax Bolinas Road/Crossover Road/Sausalito Road Segment is recommended as eligible for the NRHP and CRHR under criteria A/1;
- All three segments’ Period of Significance is recommended as dating from 1856 through 1961 in concurrence to thematic significances determined for the Olema Valley Dairy Ranches Historic District;
- All three segments are recommended to have retained sufficient integrity to convey their historical significance.

Archaeological Survey Report

Far Western Anthropological Research Group, Inc. (Far Western) prepared an *Archaeological Survey Report* (ASR) for the proposed Project in January 2023. Because the report contains confidential information about the locations and characteristics of archaeological sites and tribal cultural resources, the technical report is not included in this Initial Study for public review but a redacted version with culturally sensitive information removed can be made available to agencies and other professionals for review as necessary for Project-specific planning.

The ASR included a cultural resources records search, consultation with the Federated Indians of Graton Rancheria (FIGR), outreach with the Bolinas Museum and Marin History Museum, buried site sensitivity assessment, and a pedestrian survey of the Project site conducted in 2020 and 2021. As part of the records search, Far Western also consulted the following online inventories:

- Caltrans Online Bridge Inventory
- National Register of Historic Places
- California Register of Historic Resources
- California Inventory of Historic Resources (1976 and updates)
- California State Historical Landmarks (1996 and updates)
- California State Points of Historical Interest (1992 and updates), and
- Office of Historic Preservation’s Historical Property Data File

Following the records search, Far Western conducted a field survey within the APE in November 2020. Away from cleared road margins, survey work was hindered by extremely dense vegetation which prevented a systematic approach to the survey. The surveyors walked the road edges and APE margins and accessed the interior wherever possible by navigating along any paths or other routes through the forest on both sides of the Crossover Road and in the narrow margin along Olema Bolinas Road. Surveyors used metal detector sweeps opportunistically where slope and vegetation allowed, and supplemented with probing when strong metal detector signals were detected. Probing involved using a narrow-blade shovel to probe four to six inches into the forest duff to explore the presence or absence of covered archaeological materials. Soils, were not excavated, but when probes hit an anomaly, enough vegetation/forest duff was removed to adequately identify and record the archaeological element. Far Western archaeologists returned to the APE in 2021 to survey a newly added proposed vegetation removal area on the west side of Olema Bolinas Road. Survey of this area followed the methods used during the initial survey, as described above and resulted in the intensive survey and documentation of the Oyster House site. Probing was also conducted in the immediate vicinity of the Oyster House site. Survey of this site included a close-interval (less than five-meters) pedestrian survey. Still, the heavy vegetation growth inhibited visibility, so survey of the site also employed select metal detection, subsurface probing, and the brushing away and moving of vegetation (non-destructive) to gain better surface visibility. All exposed areas were re-covered with the forest duff upon completion of recording.

Additionally, the report included results of presence/absence archaeological testing which consisted of drilling two deep cores and nine hand augers in accessible areas adjacent to the proposed bridge footings and shallow hand augers along the proposed creek channel. Testing was conducted in September 2022. All fieldwork was completed in coordination with FIGR.

Based on the results of the records search and literature review, no previously identified archaeological sites have been documented within the Project site. Two previously identified historic-era resources intersect with the Project site and were discussed in the *Bolinas Lagoon North End Restoration Project: Biological and Cultural Resources Technical Memorandum* (AECOM, 2015). Of the two resources, only one (the Olema Valley/Lagunitas Loop Ranches Historic District; P-21-002919) has been formally documented with records submitted to the NWIC. The other resource, the Lighter Wharf, is listed as a California State Historical Landmark (#221). No GIS data is available for the Lighter Wharf and, based on historic photos and maps, survey efforts in 2015 did not result in the identification of any visible pilings or associated remains at the estimated wharf location (AECOM, 2015). One additional reported resource, the Oyster House, was noted during archival research in 2016; however, it was not located during the 2015 archaeological survey efforts.

During the archaeological survey and testing efforts conducted for this Project, no precontact sites were identified; however, three historic-era resources (one site and two isolates) were identified during the field survey within the Project site and have been documented in the Archaeological Resources Inventory Report (Far Western, 2023)). One of these identified resources is the remains of the Oyster House Restaurant. There was no evidence of the Lighter Wharf; however, areas in which the wharf is most likely located (lagoon) were not accessible. The two isolates documented within the Project site include a California Division of Highways survey monument (also referred to as C-block) and one complete, colorless-glass Delaware Punch soft drink bottle dating to 1961.

The archaeological study findings and recommendations are summarized below:

- The **survey monument and soft drink bottle** are considered isolated historic finds and thus are not considered historically significant or eligible for listing on the California Register of Historical Resources.

- The **Lighter Wharf** (California State Historical Landmark #221) was historically documented along the western shoreline of Bolinas Lagoon, at the north end of the lagoon near the modern junction of SR-1 and Olema Bolinas Road. The wharf was used to facilitate logging vessel transportation to and from the San Francisco Bay. By 1953, the warehouse and lighter wharf were abandoned (NPS, 2020). Photos from the late 1950s or 1960s show visible remnants of the pilings and well-developed alder forest north of the Crossover Road. No evidence of the Lighter Wharf was identified during the field survey.

- The remains of the **Oyster House** are considered a historic-era archaeological site comprised of foundations, remnant features, and dispersed refuse. The Oyster House was once a locally prominent food and fuel retail establishment on the west side of Olema Bolinas Road, opposite the road's intersection with the Fairfax Bolinas Road/Crossover Road. The Oyster House appears to have operated for some decades between the 1930s and 1960s. The abandonment of the business is thought to have been around 1956 upon construction of the new segment of SR-1, which essentially made the Crossover Road obsolete. The associated buildings and structures appear to have been demolished in the late 1960s or early 1970s, and the site subsequently became almost entirely obscured by soil and dense vegetation as the surrounding hillside filled with forest over the last half-century.

- Historically noted on 1868 and 1873 maps, a road was established in alignment with the Crossover Road, prior to the construction of Fairfax Bolinas Road/Crossover Road at the north end of Bolinas Lagoon. This road, referred to as "Sausalito Road" most likely served as thoroughfare for transporting logging materials to the lighter wharf or other wharfs on Bolinas Lagoon and from San Rafael to Bolinas. It is not known when the Crossover Road subsumed this older road (possibly in the mid-1950s when the current alignment of SR-1 was built) and there is no evidence of the former road, save for the potential alignment itself.

Project Area History

The following sections are summarized from the ASR and the CLR (Far Western, 2023) (Yarbrough, 2023).

At the point of Euro-American contact, Marin County was inhabited and controlled by the Coast Miwok people, who settled in large, permanent villages and used seasonal camps and task-specific locations as well. Their society consisted of many tribelets that were small independent groups of usually related family members occupying a specific territory and speaking the same language or dialect. The Coast Miwoks pursued a subsistence cycle focused on gathering and harvesting seasonally available resources. This group managed their environment to improve and maintain it to suit their needs. Inter-tribelet relationships were socially and economically advantageous, offering marriage partners, information, and materials and services not available locally. In central Marin County, Native American archaeological sites are recorded on terraces adjacent to creeks and springs, along ridgelines and within rock outcroppings.

Between A.D. 1579–1603, contact with native populations likely occurred during the voyages of Drake, Cermeño, and possibly Vizcaino. In this area, Spanish interaction resumed with the local Native Americans, likely somewhat before the establishment of Mission Dolores in San Francisco in 1776. Later, Mission San Rafael Arcángel was founded in December 1817. At that time, most of the land in the San Francisco Bay area belonged to the missions or to the Spanish crown. Mission San Rafael claimed all of today's Marin County, and Dolores, San Jose, and Santa Clara missions held rights to huge tracts along the south and western shores of the bay.

Rancho Las Baulinas and Rancho Briones

After secularization of the missions by the Decree of 1833, large areas of land were opened for land grants. The Project site is located within the Rancho Las Baulines, also called Baulenes, granted to Rafel Garcia in 1834 and then granted to Gregoria Briones in 1846. The 8,911-acre land grant extended around Bolinas Lagoon and encompassed present day Stinson Beach and the town of Bolinas. As soon as Garcia received his grant, he transferred the southern portion to his brother-in-law, Gregorio Briones, then serving as alcalde (major) of San Mateo. In 1843, Gregorio Briones filed a correction deed with the local government declaring that Garcia had transferred the land to him in 1836. Briones received title his 8,911-acre *Rancho las Baulinas* on February 11, 1846 and renamed it *Rancho Briones*. Briones's rancho extended from the coast inland to Arroyo San Geronimo, known today as Lagunitas Creek, incorporating the steep grassy pastures and timbered gulches of Inverness and Bolinas ridges, as well as the entirety of Bolinas Lagoon and the north half of the Bolinas Bay shoreline.

In 1848, after a brief conflict, Mexico ceded California to the United States. With the discovery of gold that same year and the subsequent gold rush of 1849 into the early 1850s, the population of California grew exponentially. Rich in land but with little cash, American bankers and lawyers often took title of rancho lands in exchange for "helping" the Mexicans prove their property ownership. When the first California legislature created Marin County in 1850, the new county government found nothing but confusion where rancho ownership and property boundaries were concerned. The U.S. Congress passed legislation in 1851 determined to "ascertain and settle" land claims in California and created a three-man Board of Land Commissioners, appointed by the president to examine and determine the validity of the Spanish and Mexican land grants in California. By the early 1850s, however, Briones had begun to sell off parts of his land grant to American settlers. On July 4, 1852, he sold Captain Isaac Morgan a tract of land on the east side of Bolinas Bay, bounded by to the south by the adjacent Rancho Sausalito boundary, by the crest of Bolinas Ridge to the east, and by the old San Rafael Trail which dropped west from the ridge to the bay shore. Lands leased earlier for timber harvest he later sold to Charles Correns. Correns cleared fields later formed the pasture lands of the Wilkins and Bourne ranches of the 1870s. The Briones family livestock and residences remained on the western half of the Bolinas Lagoon until, parcel by parcel, Briones's heirs sold the 3,000 acres left to them by Gregorio's will.

Wilkins Ranch

The Wilkins Ranch, a contributing property of the Olema Valley/Lagunitas Loop Historic District, is identified as within the indirect APE boundary. William Wallace Wilkins moved to California from Massachusetts in 1849 and managed Isaac Morgan’s Belvdere Ranch by the early 1850s. Wilkins bought an interest in Morgan's ranch property. Wilkins Ranch operated as a dairy, and by the 1900s, produced 2,250 pounds of butter per month from 64 cows. The Wilkins Ranch benefited from transportation infrastructure that brought dairy products from a district of ranches to the fast-growing market of San Francisco and the greater Bay Area (Livingston, 1995). The dairy remained family owned and operated until the mid-1960s and the ranch was sold in 1970 to Nicholas Charney, who transformed the ranch into "a communal experiment in creative agriculture and living (Livingston, 1995). In 1973 the ranch was sold to the Trust for Public Lands and subsequently transferred to the National Park Service.

Historical Roads

Pioneer dairymen found adequate supplies of feed and water in the Olema Valley, and forests of Douglas fir, oak and other trees, which covered most of the west slope of the valley, supplied their firewood and lumber needs. The roadways between Olema, Bolinas, and Bolinas Bay southward remained undeveloped trails in 1860 (Livingston, 1995). One of these roadways was Olema Bolinas Road and in 1865 Marin County Surveyor Hiram Austin laid out improvements to all for year-round use by horse and oxen drawn cart. The improvements to the alignment and surface were completed in 1867. In 1878, the road at the Wye at the north end of the Lagoon (current APE) was constructed using wood boards to allow for travel between the east side of the Lagoon further north (GFNMS, 2008). The "Wye" was the intersection between Olema Bolinas Road (running east-west) and Fairfax Bolinas Road (also Crossover Road; running north-south), providing the original connection between these transportation corridors. After the completion of a railroad in 1874 to Tomales Bay, access to markets became quicker and more cost-effective. The railroad, improvements to Sausalito Road, and construction of the Fairfax Bolinas Road brought tourists and encouraged the development of a tourist industry centered around Stinson Beach, Bolinas, and up to Tomales Bay.

Tourism and Land Use

The railroad was a powerful incentive for opening up the Olema Valley area to tourism, and made it easy for San Francisco residents to travel to Marin County for weekends and vacations. Tourists began visiting the western Marin County in the early 1870s, after the inauguration of ferry service from San Francisco to Sausalito (Blackmore, 2019)

In the decades following World War II, much of the land in Marin County remained undeveloped. The completion of the Golden Gate Bridge allowed the San Francisco metropolitan area's growth to spread to eastern Marin County and towards the county's agricultural lands. Rural West Marin County increasingly became a contested space, with those who saw the coastal hamlets, pasturelands, and recovering forests as a landscape for recreation and relaxation pitted against developers and their bankers who saw it as prime for tract homes, tourist motels, and shopping malls. The Marin Conservation League had succeeded in preserving part of the Tomales Bay shore, but most of the bay, Point Reyes, Olema Valley, and the Bolinas Lagoon regions remained unprotected and open to development. In 1959, a diverse group of Bay Area citizens and supporting organizations ranging from the Marin Labor Council, the American Forestry Association, and the Wilderness Society, joined forces as the Point Reyes National Seashore Foundation and pushed for passage of supporting legislation to set land aside and to prevent development around the seashore (Blackmore, 2019).

An agreement between the NPS and the ranch owners allowed many to continue dairy operations and to collect market-rate sums as compensation for their properties transfer of ownership. The proposed seashore included a "pastoral zone" that encompassed about one-third of the park, much of it the future lands designated as the Olema Valley Dairy Ranches Historic District. By the mid-1960s, Point Reyes National Seashore had been authorized, and though acquisition was not complete until 1972, the dairy ranches' lands and structures were slated for preservation (Blackmore, 2019).

Politicians saw the rural area as a logical place to site new homes, business, and recreational facilities. In 1966, the county supervisors approved the West Marin General Plan of 1967. In 1973, the Marin County Planning Department adopted a new plan that addressed concerns of rapid population growth, sprawl, and other environmental concerns. In 1972 after passage of the National Environmental Policy Act, Congress also established the Golden Gate National Recreation Area. Changes in zoning between 1972 and 1975 and the passage of the California Environmental Quality Act in 1972 reduced the number of building sites in the watershed from 1.2 million to 3,000 (Blackmore, 2019).

More than 2.5 million people per year visited West Marin County by 2001. Many visitors continue to enjoy hiking, beach combing, swimming, boating and fishing on coast and nearby ridges.

Applicable Regulations

National Historic Preservation Act Context

The proposed Project will require a Section 404 Permit from the USACE, and therefore, would be subject to compliance with Section 106 of the National Historic Preservation Act[4] (NHPA) to address potential impacts to historic properties. This includes resources that are eligible for listing on the National Register of Historic Places (NRHP).

Federal protection of resources is legislated by the NHPA of 1966 as amended by 16 U.S. Code 470, the Archaeological Resource Protection Act of 1979, and the Advisory Council on Historical Preservation. These laws and organizations maintain processes for determination of the effects on historical properties eligible for listing in the NRHP. Prior to implementing an "undertaking" (e.g., federal funding or issuing a federal permit), NHPA requires federal agencies to consider the effects of the undertaking on historic properties (i.e., properties listed in or eligible for listing in the National Register) and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register.

Section 106 of the NHPA and accompanying regulations[5] constitute the main federal regulatory framework guiding cultural resources investigations and require consideration of effects on properties that are listed in or may be eligible for listing in the NRHP. The NRHP is the nation's master inventory of known historic resources. It is administered by the National Park Service and includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, and cultural districts that are considered significant at the national, state, or local level. The formal criteria[6] for determining NRHP eligibility are as follows:

1. The property is at least 50 years old; however, properties under 50 years of age that are of exceptional importance or are contributors to a district can also be included in the NRHP;
2. It retains integrity of location, design, setting, materials, workmanship, feeling, and associations; and
3. It possesses at least one of the following characteristics:
    a. Events: Association with events that have made a significant contribution to the broad patterns of history.
    b. Persons: Association with the lives of persons significant in the past.

[4] 54 USC 306108
[5] 36 Code of Federal Regulations (CFR) Part 800
[6] 36 CFR 60.4

c. Architecture: Distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant, distinguishable entity whose components may lack individual distinction.

d. Has yielded, or may be likely to yield, information important to prehistory or history (information potential).

Listing in the NRHP does not entail specific protection or assistance for a property, but it does guarantee recognition in planning for federal or federally assisted projects, eligibility for federal tax benefits, and qualification for federal historic preservation assistance. The potential effects of a proposed project on properties listed in the NRHP must be evaluated under CEQA.

The National Register Bulletin also provides guidance in the evaluation of archaeological site significance. If a heritage property cannot be placed within a particular theme or time, and thereby lacks "focus," it is considered ineligible for the NRHP. In further expanding upon the generalized National Register criteria, evaluation standards for linear features such as roads, trails, fence lines, railroads, ditches, and flumes are considered in terms of four related criteria that account for specific elements that define engineering and construction methods of linear features: size and length; presence of distinctive engineering features and associated properties; structural integrity; and setting. The highest probability for National Register eligibility exists within the intact, longer segments, where multiple criteria coincide.

Secretary of the Interior's Standards

The *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Secretary's Standards) provide guidance for working with historic properties. The Secretary's Standards are used by CEQA lead agencies to evaluate proposed rehabilitative work on historic properties. They are a useful analytic tool for understanding and describing the potential impacts of proposed changes to historic resources. Projects that comply with the Secretary's Standards benefit from a regulatory presumption that they would not result in a significant impact to a historic resource. Projects that do not comply with the Secretary's Standards may or may not cause a substantial adverse change in the significance of a historic property.

In 1992 the Secretary's Standards were revised so they could be applied to all types of historic resources, including landscapes. They were reduced to four sets of treatments to guide work on historic properties: Preservation, Rehabilitation, Restoration, and Reconstruction. The four distinct treatments are defined as follows:

- **Preservation** is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features, rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.
- **Rehabilitation** is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions, while preserving those portions or features that convey its historical, cultural, or architectural values.
- **Restoration** is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing

systems and other code-required work to make properties functional is appropriate within a restoration project.

- **Reconstruction** is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

AB 52 Consultation

AB 52 amended CEQA to address California Native American tribal concerns regarding how cultural resources of importance to tribes are treated under CEQA. With the addition of AB 52, CEQA now specifies that a project that may cause a substantial adverse change in the significance of a "tribal cultural resource" (as defined in PRC 21074[a]) is a project that may have a significant effect on the environment. According to the AB 52, tribes may have expertise in tribal history and "tribal knowledge about land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources."

Pursuant to CEQA Section 21080.3.1(d), within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project has been made, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification notice that includes a brief description of the proposed project and its location, as well as the lead agency contact information, and a notification statement that the federally recognized California Native American tribe has 30 days to request consultation.

CEQA CONTEXT

Cultural and historical resources are nonrenewable and are easily damaged or destroyed. Potential impacts to cultural and historical resources are determined by analyzing the potential effect of implementing the proposed Project to known and unknown cultural and historical resources.

The CEQA Statutes and Guidelines (14 CCR § 15064.5) include procedures for identifying, analyzing, and disclosing potential adverse impacts to historical resources, which include all resources listed in, or formally determined eligible for, the National Register of Historic Places (National Register), the California Register of Historical Resources (California Register), or local registers. CEQA further defines a "historical resource" as a resource that meets any of the following criteria:

1. A resource listed in, or determined to be eligible for listing in, the National or California Registers.

2. A resource included in a local register of historical resources, as defined in § 5020.1(k) of the Public Resources Code (PRC), unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

3. A resource identified as significant (rated 1–5) in a historical resource survey meeting the requirements of PRC § 5024.1(g) Department of Parks and Recreation Form 523, unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

4. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California,

provided the determination is supported by substantial evidence in light of the whole record. Generally, a resource is considered "historically significant" if it meets the criteria for listing on the California Register.

a) Would the Project cause a substantial adverse change in the significance of a historic resource pursuant to §15064.5?

Less-than-Significant Impact with Mitigation Incorporated

Yarbrough prepared a CLR for the proposed Project and identified a cultural landscape consisting of three road segments, their settings, and a portion of the Wilkins Ranch within the APE. All three road segments were found to be NRHP- and CRHR- eligible, therefore the cultural landscape as a whole is recommended as a historic property per NHPA and as a historical resource pursuant to CEQA. Under CEQA, if a project may cause a substantial adverse change in the characteristics of a resource that convey its significance or justify its eligibility for inclusion in the CRHR or a local register, either through demolition, destruction, relocation, alteration, or other means, then the project is judged to have a significant impact on the environment [CEQA Guidelines, Section 15064.5(b)]. Direct impacts may occur by:

- Physically damaging, destroying, or altering all or part of the resource;
- Altering characteristics of the surrounding environment that contribute to the resource's significance;
- Neglecting the resource to the extent that it deteriorates or is destroyed. Indirect impacts primarily result from the effects of project-induced population growth. Such growth can result in increased construction as well as increased recreational activities that can disturb or destroy cultural resources; or
- The incidental discovery of cultural resources without proper notification.

CEQA provides guidelines for mitigating impacts on significant historical resources in Section 15126.4. For historical architectural resources, maintenance, repair, stabilization, restoration, preservation, conservation, or reconstruction in a manner consistent with the Secretary of the Interior's (SOI) Standards for the Treatment of Historic Properties generally will constitute mitigation of impacts to a less-than-significant level (Grimmer, 2017). The CLR concludes that the Project presents a less-than-significant impact with mitigation on the cultural landscape as a historical resource, comprised of three road segments, their setting, and the Wilkins Ranch within the APE.

With the implementation of Mitigation Measure CUL-1, impacts to historical resources would be less than significant.

Mitigation Measure CUL-1: Historical Resources

If the SHPO concludes that the three road segments constitute a historic resource, the Project shall develop a Built Environment Treatment Plan (BETP) to resolve adverse effects and reduce the significance of impacts under CEQA to a less-than-significant level. The BETP should propose public interpretation and recordation measures that find acceptance from the Corps, SHPO, and the Marin County Parks and Open Space District in order to jointly address federal and state mandates to mitigate adverse effects and impacts. The BETP shall be attached to a Memorandum of Agreement between the Corps, the California SHPO, and the Advisory Council for Historic Preservation. The same BETP shall be used to reduce adverse CEQA impacts to a less-than-significant impact to historical resources.

b) **Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?**

Less-than-Significant Impact with Mitigation Incorporated

An archaeological resource is defined by CEQA §21083.2 as "an archaeological artifact, object, or site, about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
2. Has a special and particular quality, such as being the oldest of its type or the best available example of its type;
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

The remains of the Oyster House are considered a historic-era archaeological site comprised of foundations, remnant features, and dispersed refuse. The remnants of the restaurant buildings and structures are almost entirely obscured by soil and dense vegetation as the surrounding hillside has filled with forest over the last half-century. While the site is located within the Project site, it is not situated within the area of direct impact and would not be subject to ground disturbances. The only proposed activity at this historic-era archaeological site is the removal of invasive, non-native plants. It is recommended that during the removal of vegetation, an archaeologist is present to document any newly exposed features and/or artifacts associated with the site.

Prior to the establishment of the Fairfax Bolinas Road/Crossover Road, the "Sausalito Road" was present within the Project site as early as 1868, if not earlier. It is not known when the Crossover Road subsumed this older road (possibly in the mid-1950s when the current alignment of SR-1 was built) and there is no evidence of the former road, save for the potential alignment itself. It is recommended that during the removal of the Crossover Road, indications of the old "Sausalito Road" are considered and thus an archaeological monitor is present to inspect these activities, as warranted, for evidence of a buried former road surface, roadside features, and/or historic artifacts.

With implementation of Mitigation Measures CUL-2 and CUL-3, impacts to archaeological resources would be less than significant.

Mitigation Measure CUL-2: Archaeological Resources Monitoring

Prior to Project implementation, a Cultural Resources Monitoring Plan (Plan) will be prepared by a qualified archaeological consultant. The Plan will discuss the monitoring procedures, field methods, communication protocols, and inadvertent discovery actions to be taken in the event archaeological resources are identified during monitoring and/or any Project activities. Periodic spot-check monitoring will occur during the removal/demolition of the Crossover Road and full-time monitoring will occur during vegetation removal at the location of the Oyster House. All monitoring will be carried out by a qualified archaeologist.

Mitigation Measure CUL-3: Archaeological Resources Work Stoppage

Construction crews shall be trained in "basic archaeological identification" and have access to a Cultural Resources Awareness Sheet. The sheet shall photographically depict shell midden and associated indicators of archaeological sites, and clearly outline the procedures in the event of a new archaeological discovery. These procedures include temporary work stoppage (Stop-Work Order) of all ground disturbance, short-term physical protection of artifacts and their context, and immediate advisement of the archaeological team and MCOSD representatives. Any Stop-Work Order would contain a description of the work to be stopped, special instructions or requests for the Contractor, suggestions for efficient mitigation, and a time estimate for the work stoppage. The archaeologist shall examine the findings and assess their significance and offer recommendations for any procedures deemed appropriate to further investigate and/or mitigate adverse impacts to archaeological resources that have been encountered.

c) Would the Project disturb any human remains, including those interred outside of formal cemeteries?

Less-than-Significant Impact with Mitigation Incorporated

Section 7050.5 of the California Health and Safety Code states that it is a misdemeanor to knowingly disturb a human burial and Section 5097.99 of the Public Resources Code defines the obtaining or possession of Native American remains or grave goods to be a felony. Buried human remains, by law, must be reported to the County Coroner. The disposition of Native American burials is within the jurisdiction of the Native American Heritage Commission (NAHC), who has the statutory authority to mediate agreements regarding the disposition of Native American remains. In cases in which human remains are known or believed to be likely, consultation with the NAHC is initiated early in the planning process so that consultations with the appropriate Native American most-likely descendant occurs, and agreement regarding the disposition of the remains can be reached. Additionally, MCOSD would directly contact the Federated Indians of Graton Rancheria (FIGR) if human remains are inadvertently discovered. Although the discovery of human remains at the Project site is not expected to occur, Mitigation Measure CUL-4 prescribes a procedure for addressing them should any be encountered. With implementation of Mitigation Measure CUL-4, impacts to cultural resources would be less than significant.

Mitigation Measure CUL-4: Discovery of Human Remains

Upon discovery, the Coroner Division of the Marin County Sheriff's Office will be contacted for identification of human remains. The coroner has 2 working days to examine the remains after being notified. If the remains are Native American, the Coroner must notify the Native American Heritage Commission (NAHC) of the discovery within 24 hours. The NAHC will then identify and contact a Most-Likely Descendant (MLD). The MLD may make recommendations to the owner, or representative, for the treatment or disposition, with proper dignity, of the remains and grave goods. Once proper consultation has occurred, a procedure that may include the preservation, excavation, analysis, and curation of artifacts and/or reburial of those remains and associated artifacts will be formulated and implemented.

If the remains are not Native American, the Coroner will consult with the archaeological research team and the lead agency to develop a procedure for the proper study, documentation, and ultimate disposition of the remains. If a determination can be made as to the likely identity—either as an individual or as a member of a group—of the remains, an attempt should be made to identify and contact any living descendants or representatives of the descendant community. As interested parties, these descendants may make recommendations to the owner, or representative, for the treatment or disposition, with proper dignity, of the remains and grave goods. Final disposition of any human remains or associated funerary objects will be determined in consultation between the MCOSD and FIGR.

F. ENERGY

Table 20. Energy Checklist Questions

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation?	☐	☐	☐	☒
b)	Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

SETTING

Current energy use within the vicinity of the Project is very minimal. Vehicles traveling through the Project site likely use gasoline, but there is no current electrical or natural gas use at the Project site.

CEQA CONTEXT

To assure that energy implications are considered in Project decisions, CEQA Section 21100(b)(3) requires that the potential energy impacts of a proposed Project be considered, with emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy. Appendix F of the CEQA Guidelines provides guidance for assessing the significance of potential energy impacts.

a) **Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation?**

No Impact

Implementation of the Project would require the use of energy resources during construction. Construction activities would be temporary and occur over two construction seasons, during which time equipment and vehicles would be operating to construct the Project. Energy use would primarily be in the form of petroleum products (e.g., gasoline and diesel) used to operate construction equipment and transport materials/supplies and workers to and from the Project area. The precise amount of fuel required for Project construction is uncertain; however, it is expected that gasoline and diesel consumption for construction equipment and worker and haul vehicles would be comparable to that required for construction projects of a similar size and magnitude, and that this consumption would not have a measurable effect on demand for local and regional energy sources. Fuel use for construction workers' commute trips would be minor in comparison to the fuel used by construction equipment and for hauling. Fuel consumption would be temporary and limited to the construction phase of the Project. Construction would not require a large amount of energy, oil, or natural gas use due to the short duration of construction and limited amount of equipment and associated fuel required.

Indirect energy use would also occur and include the extraction, production, and transportation of goods and materials needed for construction. Section 2485 of the California Code of Regulations limits idling of heavy trucks traveling to and from the Project area delivering and off-hauling materials, thereby limiting potential wasteful use of fuel during idling; therefore, fuel used during construction would be conserved to the maximum extent feasible.

Following Project construction, energy consumption during Project operation would be very minimal and essentially the same as under existing conditions. The Project is not projected to result in any increase in traffic passing through the site. Energy consumed on-site would be limited to gasoline used by vehicles traveling through the Project site. Operation and maintenance activities at the Project site would be expected to be somewhat reduced as compared to existing conditions following Project implementation due to the increased flooding resiliency that the Project would create.

For these reasons, implementation of the proposed Project would result in no impact associated with wasteful, inefficient, or unnecessary consumption of energy resources during either Project construction or operation.

b) Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact

The Marin Countywide Plan includes several goals and policies to promote energy conservation and reduce energy demand. The goals and policies identified do not apply to wetland restoration, bridge construction, or roadway realignment projects; therefore, the Project would not conflict with the Marin Countywide Plan.

In December 2020, Marin County adopted the Climate Action Plan 2030 (CAP) (Marin County Community Development Agency, 2020), which identifies greenhouse gas (GHG) reduction targets and measures for unincorporated Marin County. The goals of the CAP, which align with the statewide long-term climate action goals, are to reduce GHG emissions 60% below 2005 levels by 2030 and reduce GHG emissions to below zero by 2045. The CAP provides a range of strategies and actions for achieving GHG emission reduction targets, including low-carbon transportation, renewable energy and electrification, energy efficiency, waste reduction, and water conservation. The CAP does not identify measures to be implemented during construction activities. Development of the Project would support CAP measure *AG-C5: Blue Carbon,* which aims to expand terrestrial carbon sequestration efforts to aquatic environments and identify opportunities to enhance aquatic sequestration as the County develops sea-level rise mitigation projects such as coastal wetland restoration; therefore, the Project would not conflict with the Marin County CAP, and no impact would occur.

As discussed in item (a), the proposed Project would use small amounts of energy during construction, including the use of heavy equipment to grade the new stream channel, construct the new road segment and bridge, and decommission and remove the crossover road segment, as well as from truck hauling trips and vehicle trips associated with employees driving to and from the site and from material deliveries. Operation and maintenance activities would be similar to existing conditions, and energy use during Project operation would not increase compared to baseline conditions; therefore, the proposed Project would not conflict with renewable energy or energy efficiency plans, including goals set forth in AB 32 and the 39 Recommended Actions identified by the California Air Resources Board (CARB) in its Climate Change Scoping Plan. For these reasons, implementation of the proposed Project would result in no impact associated with conflict or obstruct with a state or local plan for renewable energy or energy efficiency.

G. GEOLOGY AND SOILS

Table 21. Geology and Soils Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i)	Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii)	Strong seismic ground shaking?	☐	☐	☒	☐
iii)	Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv)	Landslides?	☐	☐	☐	☒
b)	Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c)	Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f)	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

SETTING

Marin County is located in the central portion of the Coast Ranges Geomorphic Province.[7] The Coast Range Geomorphic Province is generally characterized as a series of northwest trending, elongated ridges and valleys that are a result of folding and faulting. The Coast Ranges province extends about 600 miles along the western edge of California and is bounded on the south by the Transverse Ranges, on the north by the Klamath Mountains, and on the east by the Great Valley. This province is marked by northwest-trending elongated ranges and narrow valleys that roughly parallel the coast and the San Andreas Fault Zone. The province includes many separate ranges, coalescing mountain masses, and several major structural valleys. The regional structure of the Coast Range is considered to be a number of independent fault blocks with different stratigraphic and structural histories. Ridges in this region are generally composed of resistant sandstones or marine volcanics, and the valleys are characterized as deep alluvial deposits.

Basement rocks underlying the Point Reyes Peninsula to the west of the San Andreas Fault System are composed of granitic rock types. Along the east side of the Fault Zone, basement rocks primarily consist of the Franciscan Assemblage. Bedrock underlying the Project site area consists of older marine and alluvial deposits of late Pliocene to Pleistocene age. Surficial deposits in the Project site vicinity consist of Quaternary Estuarine deposits.

Three major faults (the Golden Gate, San Andreas, and San Gregorio Faults) merge together forming the San Andreas Fault System located beneath the Bolinas Lagoon and Project site. The Fault Zone is 1.25 miles wide near the mouth of Bolinas Lagoon and narrows to approximately 1,500 feet wide along the rift zone between Bolinas Lagoon and Tomales Bay. The Golden Gate Fault runs along the eastern shore of Bolinas Lagoon, the San Andreas Fault comes onshore near the east end of Stinson Beach and runs through the approximate center of Bolinas Lagoon, and the San Gregorio Fault extends onshore between the town of Bolinas and Duxbury Point and runs along the western side of Bolinas Lagoon. These three faults merge into a narrow fault zone that extends to the north through Olema Valley and beneath Tomales Bay. The San Andreas Fault traverses the Project area and is responsible for the formation of the lagoon. A 2006 study prepared by PWA and WRA (Philip Williams & Associates, Ltd (PWA), 2006) concluded that seismic activity in the region has resulted in significant changes in ground surface elevations, including a drop in the lagoon of approximately two feet and lateral movement of the fault by 12 feet during the 1906 San Francisco earthquake.

The Project site is located within a mapped Alquist-Priolo Earthquake Fault Zone. Figure 5 provides an overview of the fault locations within the Project site vicinity and illustrates the primary geologic units underlying the area. The Working Group on California Earthquake Probabilities reported a 12% probability for a magnitude 6.7 quake in the next 30 years along the North Coast South segment of the San Andreas Fault (the segment that crosses Bolinas Lagoon) (AECOM, 2017). The Project site is in a mapped liquefaction zone associated with the San Andreas Fault.

Ground shaking is one of the key geologic hazards associated with seismic activity, with some areas more susceptible to strong shaking and potential damage due to their proximity to the fault zone or their underlying soil composition. Soils most susceptible to seismic shaking amplification tend to be younger alluvial deposits, bay mud, and artificial fill found in the lower lying areas around open water including Bolinas, San Pablo, and Richardson Bays. Road and bridge stability are also influenced by the underlying soils and how easily they are compacted and eroded, and how stable they are on slopes.

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[7] A geomorphic province is a regional area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces.

A database search of the USDA's Web Soil Survey indicates that there are two soil units surrounding the proposed Project site: the Blucher-Cole complex and the Palomarin-Wittenberg complex (USDA Natural Resources Conservation Service, 2019). The Blucher-Cole complex is characterized by 2 to 5 percent slopes and comprised of 40 Blucher soils, 30 percent Cole soils, and 30 percent minor components. Blucher soils are typically composed of somewhat poorly drained silt loams and clay loams. Cole soils are typically composed of somewhat poorly drained clay loams, silty clay loams, and silty clays. Both Blucher and Cole soils have hydric soil ratings. The Palomarin-Wittenberg complex is characterized by 50 to 75 percent slopes and comprised of 40 percent Palomarin soils, 30 Wittenberg soils, and 27 percent minor components. Palomarin soils are typically composed of well drained loams and gravelly loams. Wittenberg soils are typically composed of well drained very gravelly loams. As these soils on and near the project site are not composed of younger alluvial deposits, bay mud, or artificial fill, susceptibility to strong seismic ground shaking that may pose risk of risk, loss, or death associated with seismic activity is not expected at the Project site.

Published geologic mapping shows the proposed bridge crossing underlain by undivided Holocene aged Alluvial deposits (Qa), comprised of gravel, sand, silt and clay. The mapping shows that the existing Fairfax Bolinas Road is underlain by Holocene aged Estuarine-delta deposits (Qed), characterized by a mixture of coarse/fine estuarine sediment deposited in delta at the mouths of tidally influenced coastal streams where fresh water mixes with seawater. At the Project location, Olema Bolinas Road is mapped within both Qa and Qed deposits (Crawford, 2023).

Geologic and Geotechnical Review

Seven geotechnical borings were completed by Pitcher Drilling Company in March/April 2017 to a maximum depth of 66.5 feet below ground surface (bgs). Borings 1 and 6 are located closest to the proposed bridge. Generally, the upper 20 feet bgs within Borings 1 and 6 consisted of very soft to soft clay/silty clay. Between 20 to 30 feet bgs, medium to very stiff clay was encountered, which were underlain by medium dense to dense clayey sand, clayey sand with gravel, and silty sand. At Boring 1, sandy claystone was encountered at 46 feet bgs, and at Boring 6, shale was encountered at 55 feet bgs (AECOM, 2017).

Crawford & Associates, Inc. (CA Inc) prepared a Draft Foundation Report for the Project in 2023. The report provides geologic, seismic, and foundation information to be used for the project bridge design (Crawford & Associates, Inc., 2020). CA Inc retained Taber Drilling to drill and sample five test borings at the Project site, along the proposed bridge approaches and at the proposed bridge location. The borings were drilled in October 2021 to depths ranging from 6.5 feet to 91 feet bgs. The materials encountered in the borings were separated into three general soil units as follows:

- Unit 1 consisted of very soft to hard lean clay, fat clay, and silty clay and loose clayey sand. Unit 1 was penetrated from the ground surface to a depth of about 15 feet bgs at the proposed bridge abutments. Unit 1 was concluded to consist of alluvium and estuarine deposits (Qes, Qed, and Qa).
- Unit 2 consisted of stiff to hard clay and loose to very dense clayey sand, silty sand, and poorly-graded sand with clay. Materials of this unit were encountered below Unit 1 to approximately 46 to 55 feet.
- Unit 3 consisted of variably weathered/fractured sedimentary bedrock (claystone, sandstone, and shale interpreted as Kfs) and was encountered below Unit 2 soils to the maximum depth explored

(91 feet). Unit 3 bedrock consisted of claystone and sandstone. Shale was encountered in AECOM boring B6, located south of the San Andreas fault trace.

Slate Geotechnical Consultants Inc. (Slate) prepared a Surface Fault Rupture Displacement Hazard Analysis (SFRDHA) for the Project for a magnitude 8.1 (M8.1) earthquake on the main trace of the San Andreas Fault. This magnitude of the event was selected to represent an earthquake that passes within 2 kilometers of the site and has a 975-year return period from the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF 3) source characterization. The SFRDHA is required by Caltrans for any portion of a structure that falls within an Alquist-Priolo Earthquake Fault Zone (APEFZ) (Slate Geotechnical Consultants, 2022).

CEQA CONTEXT

A project would normally result in a significant impact to geology and soils if it would result in substantial erosion, expose people to major geologic hazards, or a permanent loss of natural geologic resources created by a substantial change in topography or land subsidence.

a) Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Less-than-Significant Impact

The Project site lies within an APEFZ map. A nearby section of the San Andreas Fault Zone is mapped approximately 400 feet east of the Project area and a secondary fault trace lies east of the main trace (San Andreas Fault), approximately 55 feet from the Project area (Slate Geotechnical Consultants, 2022). A SFRDHA was prepared by Slate in 2022 and, during field surveys, no direct evidence of an exposed fault trace was observed in the Project area. The SFRDHA calculated a potential displacement at the proposed bridge location of 0.34 meters based on a seismic event with a 975-year return period (Slate Geotechnical Consultants, 2022). This potential offset from such an event has been included in the engineering of the proposed bridge to prevent its potential collapse, and the bridge would be designed to meet current California seismic structural codes, American Association of State Highway and Transportation Officials (AASHTO) LRFD (Load-and-Resistance Factor Design) Bridge Design Specifications and California amendments, and seismic loading in accordance with the current Caltrans Memo To Designers. Therefore, infrastructure improvements within the Project area would not directly or indirectly cause potential or substantial adverse effects from a fault rupture in the APEFZ, including the risk of loss of life, injury, or death.

ii) Strong seismic ground shaking?

Less-than-Significant Impact

Seismic activity has the potential to cause strong ground shaking which may pose a geologic hazard in susceptible areas as discussed in “I” above. The Project includes infrastructure improvements that will meet applicable bridge design standards; therefore, impacts from seismic ground shaking would be less than significant.

iii) Seismic-related ground failure, including liquefaction?

Less-than-Significant Impact

Seismic-related ground failure, including soil liquefaction, can occur when saturated, relatively loose sand and specific soft, fine-grained saturated soils are subject to ground shaking strong enough to separate soil particles by increasing pore pressure. This separation and subsequent pore pressure dissipation can cause decreased soil shear strength and settlement. Liquefaction is known to occur in soils ranging from low-plasticity silts to gravels generally up to 50 feet bgs. Soils most susceptible to liquefaction are clean sands to silty sands and non-plastic silts (Crawford & Associates, Inc., 2020). Based on the CA Inc analysis and review of the AECOM Borings 1 and 6, liquefaction settlement is possible but probably low due to the cohesive nature of the nearby soils. Impacts would be less than significant.

iv) Landslides?

No Impact

Landslides are the downslope movement of a mass of materials such as earth, rock, or fill. The County of Marin uses GIS to display spatial data including property boundaries, hazards, jurisdictions, and natural features in MarinMap Map Viewer. MarinMap was used to assess the areas on and near the Project site for potential hazards relating to landslides. MarinMap's Landslide layer presents selected original maps by Nilson, Wright, and others (1979) and modifies and improves the 1970s maps to show generalized landslide distributions. The majority of the Project site and surrounding areas to the north and east are mapped as surficial deposits (unconsolidated and residual, alluvial, glacial deposits, lying on bedrock or occurring on or near the earth's surface), with the exception of the southern portion of the Project site, which is mapped as water. Areas from approximately 150-550 feet west and southwest of the Project site are mapped as "few landslides", and areas extending from approximately 550 feet west and southwest of the Project site are mapped as "mostly landslide" (Marin County, 2022).

The proposed Project area is not located near a "Principal predicted debris-flow source area" (Marin County, 2005). Landslides can be triggered by adding weight, removing mass from the toe slope, increasing the volume of water, and vibration from earthquakes. The proposed Project is located within the area of the alluvial fan, with no incursion into areas of slope instability or the toe of a slope. The proposed Project would be designed to allow the Lewis Gulch Creek to reconnect to its former floodplain by diverting the creek from the edge of the hillside and address existing areas of channel erosion. This would reduce the volume of water that is within the edges of the hillslope and improve drainage. Landslides in surficial deposits could occur; however, the implementation of the Project would not result in a risk to property or public safety because the Project would improve the potential for impacts from a landslide by elevating the road off of the alluvial fan and relocating Lewis Gulch Creek away from the hillslope. Further there are no habitable structures within the proposed Project site. Therefore, the proposed Project would not expose the public to new landslide potential and implementation of the Project would result in no impact associated with risk of loss, injury, or death involving landslides.

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

Less-than-Significant Impact

Erosion is the geological process in which soil and weathered rock materials are worn away and transported by natural forces such as wind or water. Although erosion is a natural process, it can become problematic when human intervention causes excessive degradation which may result in substantial losses of topsoil. Excessive erosion caused by human disturbance may also lead to the development of erosional features which undermine facilities such as roads, buildings, or utilities. Activities associated with construction, such as earth-moving, vegetation clearing, and the movement of heavy machinery, can result in abnormally high rates of erosion, referred to as accelerated erosion. Natural rates of erosion may be influenced by many factors such as soil composition, climate, slope, region, and vegetative cover. Soils that are typically more easily eroded are those that contain high amounts of silt, whereas course-grained sand and gravelly soils are usually less susceptible (Marin County Open Space District, 2021).

The USDA Web Soil Survey rates soils as not fragile, slightly fragile, moderately fragile, fragile, very fragile, and extremely fragile by the “Fragile Soil Index” interpretation. Fragility in soils means that the soil unit is more susceptible to degradation and erosion and can also have a low capacity to recover after degradation has occurred (USDA Natural Resources Conservation Service, 2019). The Blucher-Cole complex soil unit that the Project site is located on is rated as slightly fragile and the Palomarin-Wittenberg complex that underlies areas west of the Project site is rated as moderately fragile. These ratings mean that these soil units have a moderate to high potential to resist degradation and be resilient.

USDA Web Soil Survey also displays ratings of soil erosion K factors, which indicate the susceptibility of a soil to sheet and rill erosion by water. Factor K is primarily based on estimates of the percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity. Values of K range from 0.02 to 0.69 with higher values meaning that the soil is more susceptible to sheet and rill erosion by water (USDA Natural Resources Conservation Service, 2019). The Blucher-Cole complex and Palomarin-Wittenberg complex are given K factor ratings of 0.37 and 0.28, respectively, meaning that these soils are not expected to be highly susceptible to sheet and rill erosion; however, construction-related ground disturbance could increase the potential for soil erosion in the area of ground disturbance.

During Project construction activities, soil would be disturbed, and there would be an increased potential for soil erosion and sedimentation compared to existing conditions. The release of sediments and other pollutants during construction could adversely affect water quality in receiving waters. Because construction of the proposed Project would disturb greater than 1 acre of land, the Project would be subject to the requirements of the State Water Board’s National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002, as amended by Orders No. 2010-0014-DWQ and 2012-0006-DWQ) (Construction General Permit). In compliance with the requirements of the Construction General Permit, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared, and construction Best Management Practices (BMPs) detailed in the SWPPP would be implemented during construction activities. A SWPPP identifies all potential pollutants and their sources, including erosion, sediments and constructions materials and includes a list of BMPs to reduce discharge of construction-related stormwater pollutants. The SWPPP also requires a construction site monitoring program.

Heavy construction activities would be limited to dry-weather months to ensure construction within the ordinary high waterline will occur when stream flows are at their lowest (typically July through October). The Project would use bioengineering methods along Lewis Gulch Creek to protect areas experiencing accelerated erosion that impacts infrastructure. Bioengineering is a method of construction combining live plants with dead plants or inorganic materials, to produce living, functioning systems to prevent erosion, control sediment and other pollutants and provide habitat (USEPA, 2022).

The project would include implementation of the Erosion and Sediment Control Conservation Measures listed in the Project Description section of this document in accordance with NPDES permit requirements, including incorporation of standard construction stormwater BMPs to reduce pollutants of concern in stormwater runoff and protect water quality.

Compliance with regulatory permit requirements, the Project SWPPP, and the conservation measures would ensure that implementation of the proposed Project would result in a less-than-significant impact associated with substantial soil erosion or the loss of topsoil.

c) **Would the Project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?**

Less-than-Significant Impact

The geologic units within the Project site are primarily undivided Holocene-aged Alluvial deposit (Qa) and Holocene-aged Estuarine-delta deposit (Qed) (Crawford & Associates, Inc., 2020). Qa comprises of gravel, sand, silt, and clay. Qed is characterized by a mixture coarse/fine estuarine sediment deposited in delta at mouths of tidally influenced coastal streams where fresh water mixes with seawater. The Olema Bolinas Road is mapped within both Qa and Qed deposits. These deposits contain soft/compressible soils near the surface. Geotextile materials would be utilized to stabilize the subgrade and embankment and reduce the potential for differential settlement during construction for the realignment of Olema Bolinas Road (Crawford & Associates, Inc., 2020). The Olema Bolinas Road shoulder roadway widening on wetland area would cause differential settlement, and a settlement waiting period of 6 to 12 months would be needed to reduce the impact resulting from differential settlement (Crawford & Associates, Inc., 2020).

The Preliminary Foundation Report considers the Project site adequately stable with support available for new bridge foundations established within the underlying rock; however, due to the presence of thick clay layers and potential for long-term static (consolidation) settlement, liquefaction settlement is a key geotechnical consideration associated with the Project (Crawford & Associates, Inc., 2020). The proposed bridge would be supported on either driven or drilled pile foundations to accommodate downdrag from consolidation and/or liquefaction settlement. The Project would adopt the recommended special installation measures in the Preliminary Foundation Report for using cast-in-drilled-hole (CIDH) piles, including temporary casing, slurry drilling methods, and the use of minimum 24-inch diameter CIDH piles for tremie concrete placement.

Project impacts related to unstable geologic units or soil would be less than significant because the road and bridge design have included recommendations provided by CA Inc and described in the Preliminary Foundation Report and do not constitute recommended mitigation for Project impacts. Therefore, the proposed Project would not result in or increase the potential for in or on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

d) **Would the Project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?**

Less-than-Significant Impact

Most of the Project site is located on soil with high expansion potential (Marin County, 2020).The Project would include construction of a bridge and realignment of the Olema Bolinas Road. These two structures would be constructed per the recommendations provided by CA Inc, as discussed in above under Impact c). This is a habitat restoration project and would not include any habitable structures which would result in direct or indirect risks to life or property. Impacts related to expansive soils would be less than significant with implementation of geotechnical recommendations provided by CA Inc. These recommendations have been incorporated into the Project design and therefore do not constitute recommended mitigation for Project impacts.

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

No Impact

The proposed Project does not include installation or use of septic tanks or alternative wastewater disposal systems; therefore, implementation of the Project would result in no impact associated with septic tanks and alternative wastewater disposal systems.

f) **Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?**

No Impact

Paleontological resources include fossils of life that existed prior to the start of the Holocene Epoch, approximately 11,700 years ago. The geologic units within the Project site are primarily undivided Holocene-aged Alluvial deposit (Qa) and Holocene-aged Estuarine-delta deposit (Qed).

The Records Search completed as part of the Archaeological Survey Report for the proposed Project showed that no recorded fossil sites are located within Marin County, although there are multiple records of invertebrate and plant fossils assigned to the Holocene Epoch. The Franciscan complex, widespread in coastal California, has produced only small collections of significant fossils, none of which occurred in Marin County. For these reasons, implementation of the proposed Project would not directly or indirectly destroy unique paleontological resources or site, or unique geologic features and therefore would result in no impact.

H. GREENHOUSE GAS EMISSIONS

Table 22. Greenhouse Gas Emissions Checklist Questions

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b)	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

SETTING

Climate change refers to change in the Earth's weather patterns, including the rise in temperature due to an increase in heat-trapping greenhouse gases (GHGs) in the atmosphere. According to the Bay Area Air Quality Management District (BAAQMD), some of the potential effects of increased GHG emissions and associated climate change may include loss of snowpack (affecting water supply), more frequent extreme weather events, more large forest fires, more drought years, and sea-level rise. In addition, climate change may increase electricity demand for cooling, decrease the availability of hydroelectric power, and affect regional air quality and public health (BAAQMD, 2017).

California has established the following long-term climate action goals:

- **Assembly Bill (AB) 32:** Reduce GHG emissions to 1990 levels by 2020.
- **Senate Bill (SB) 32:** Reduce GHG emissions to 40% below 1990 levels by 2030.
- **Executive Order B-55-18:** Carbon neutrality as soon as possible, but no later than 2045.
- **Executive Order S-3-05:** Reduce GHG emissions to 80% below 1990 levels by 2050.

It should be noted that executive orders are legally binding only on State agencies and have no direct effect on local government or the private sector.

In December 2008, the California Air Resources Board (CARB) adopted the Climate Change Scoping Plan to identify how the State can achieve its 2020 climate action goal under AB 32. In 2017, CARB updated the Scoping Plan to identify how the State can achieve its 2030 climate action goal under SB 32, and substantially advance toward its 2050 climate action goal under Executive Order S-3-05. The 2017 Scoping Plan includes the regulatory programs, such as the Advanced Clean Cars Program, Low-Carbon Fuel Standard, Renewable Portfolio Standard Program, energy efficiency standards, and Cap-and-Trade Program (CARB, 2017).

In December 2020, Marin County adopted the Climate Action Plan 2030 (CAP) (Marin County Community Development Agency, 2020), which identifies GHG reduction targets and measures for unincorporated Marin County. The goals of the CAP, which align with the statewide long-term climate action goals, are to reduce GHG emissions 60% below 2005 levels by 2030 and reduce GHG emissions to below zero by 2045. The CAP provides a range of strategies and actions for achieving GHG emission reduction targets, including low-carbon transportation, renewable energy and electrification, energy efficiency, waste reduction, and water conservation.

CEQA CONTEXT

A project will normally result in a significant impact on GHG emissions if it results in a substantial increase in GHG emissions or conflicts with a plan, policy, or regulation intended to reduce GHG emissions.

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

Less-than-Significant Impact

The proposed Project would generate temporary GHG emissions through construction activities, such as operation of on-site heavy construction equipment and off-site construction vehicle trips. The BAAQMD does not recommend a threshold of significance for GHG emissions during construction because there is not sufficient evidence to determine a level at which temporary construction emissions are significant (BAAQMD, 2009). Furthermore, a construction contractor would also have no incentive to waste fuel during construction and therefore, it is generally assumed that GHG emissions during construction would be minimized to the maximum extent feasible. Once constructed, the Project would not result in new GHG emissions during operation; therefore, GHG emissions from implementation of the Project would have a less-than-significant impact on the environment.

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

No Impact

As discussed above, the 2017 Climate Change Scoping Plan identifies numerous regulations and programs the State will use to achieve its 2030 climate action goal, and substantially advance toward its 2050 climate action goal. The Marin County CAP identifies GHG reduction targets and measures that align with the statewide long-term climate action goals. Neither plan identifies measures to be implemented during construction activities. Development of the Project would support CAP measure *AG-C5: Blue Carbon,* which aims to expand terrestrial carbon sequestration efforts to aquatic environments and identify opportunities to enhance aquatic sequestration as the County develops sea-level rise mitigation projects such as coastal wetland restoration; therefore, the Project would not conflict with the 2017 Climate Change Scoping Plan and Marin County CAP, and no impact would occur.

I. HAZARDS AND HAZARDOUS MATERIALS

Table 23. Hazards and Hazardous Materials Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?	☐	☐	☐	☒
f)	Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

SETTING

Hazardous substances are materials designated in government codes and regulations or that exhibit certain characteristics such as being toxic, corrosive, flammable, reactive, or explosive. A non-hazardous substance can become a hazardous waste if during its normal use it comes to meet the definition of a hazardous material or hazardous substance.

Vehicles that travel through the Project site contain hazardous materials, including gasoline, lubricants, and other solutions. No hazardous materials are stored at the Project site.

CEQA CONTEXT

A project would normally result in a significant impact on hazards and hazardous materials if the project would expose people and/or the environment to hazards or hazardous materials.

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

Less-than-Significant Impact

During construction, the contractors would use small quantities of fuel, lubricants, and other similar construction materials that can be hazardous. There may be a potential for releases to occur during construction that could affect construction workers, recreational users, and the environment. During operation of the Project, infrequent maintenance activities involving heavy equipment may have the potential to result in releases of hazardous materials. Contractors and maintenance personnel must adhere to existing laws and regulations that govern the transport, use, storage, handling, and disposal of hazardous materials to reduce the potential hazards associated with these activities. California Occupational Safety and Health Administration (CalOSHA) is responsible for developing and enforcing workplace safety standards, including the handling and use of hazardous materials. The U.S. Department of Transportation (DOT) and the California DOT (Caltrans) regulate the transportation of hazardous materials. Together, federal and State agencies determine driver-training requirements, load-labeling procedures, and container specifications designed to minimize the risk of accidental release. The transport, use, storage, handling, and disposal of hazardous materials for the Project would be adequately controlled through existing regulatory requirements. Therefore, implementation of the proposed Project would result in less-than-significant impact associated with creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

b) Would the Project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less-than-Significant Impact

As discussed in Impact “a)” above, the proposed Project would involve construction and operation activities that use limited quantities of hazardous materials, such as gasoline, diesel fuel, oils, and lubricants, and other similar chemicals. Construction and operation activities associated with implementation of the Project would be subject to federal, State, and local laws and regulations governing hazardous materials. In addition, the Project includes Conservation Measures that include actions to protect water resources and pollution prevention, with most measures also being requirements under the Project’s National Pollution Discharge Elimination System (NPDES) stormwater pollution control permit coverage as implemented by the State Water Resource Control Board. These include actions to prevent the release of toxic materials by utilizing proper storage and containment, as well as dictating how tools and equipment will be stored and operated on-site. These actions will prevent the potential leakage and spills of toxic materials into the environment. For these reasons, implementation of the proposed Project would result in a less-than-significant impact associated with creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

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

No Impact

No existing or proposed schools are located within 0.25 mile of the Project site. The closest school is Bolinas-Stinson Union Elementary School which is located approximately 0.47 mile northwest of the Project site. For these reasons, implementation of the Project would result in no impact associated with the emission of hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.

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

No Impact

The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the State, local agencies, and developers to provide information about the location of hazardous materials release sites. Government Code Section 65962.5 requires the California Department of Environmental Protection Agency (CalEPA) to update the Cortese List annually. No hazardous waste and substances sites are located within one mile of the Project site based on a search of the current Cortese List (CalEPA, 2022); therefore, implementation of the Project would have no impact associated with creation of a significant hazard to the public or the environment due to its location on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?

No Impact

No airport is located within two miles of the Project site. The nearest airports to the Project site are the public Gnoss Field Airport in Novato and the private San Rafael Airport, approximately 16 miles and 11 miles to the northeast, respectively. No aviation hazards would result from implementing the proposed Project; therefore, implementation of the Project would result in no impact associated with creation of a safety hazard or excessive noise for people residing or working in the Project area.

f) Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less-than-Significant Impact

Marin County maintains an Emergency Operations Plan that provides information for emergency management, personnel responsibilities, and procedure before, during, and after major event. No roads within or adjacent to the Project site have been designated as evacuation routes (Marin County, 2022). In the event of a tsunami or high water, Bolinas residents would be directed to higher ground via Mesa Road and Horseshoe Hill Road rather than through the Project site on Olema Bolinas Road (Tsunami Annex, 2018). A temporary signal on Olema Bolinas Road or intermittent signal lane closures may be required for portions of the work during construction, but through access would still be provided. The Project would result in an overall improvement to the local roadway network, particularly during flooding events. The Project would not affect implementation of an emergency operation plan, emergency response plan, or an emergency evacuation plan for Marin County or the nearby communities. The impact would be less than significant. Impacts on emergency access are analyzed further in the Transportation Section of this CEQA Checklist.

g) Would the Project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

Less-than-Significant Impact

The California Department of Forestry and Fire Protection (CalFire) has mapped areas of high wildfire hazards throughout California, including Marin County. The Project site is mapped as a Moderate Fire Hazard Severity Zone (FHSZ) in a State Responsible Area (SRA) (CalFire, 2022). Equipment used during construction activities associated with the proposed Project could generate sparks which could result in wildland fire.

The proposed Project includes Conservation Measures that will be required of contractors to minimize the risk of wildfire that could be initiated from equipment needed to construct and maintain the proposed Project, such as requiring vehicles be equipped with fire extinguishers to address small fires ignited by construction or maintenance activities before a wildland fire develops. For these reasons, implementation of the proposed Project would result in a less-than-significant impact associated with the exposure of people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires. Impacts regarding wildland fires are analyzed further in the Wildfire Section of this CEQA Checklist.

J. HYDROLOGY AND WATER QUALITY

Table 24. Hydrology and Water Quality Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b)	Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i)	result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
ii)	substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	☐	☐	☒	☐
iii)	create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
iv)	impede or redirect flood flows?	☐	☐	☒	☐
d)	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation?	☐	☐	☒	☐
e)	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

SETTING

Four creeks enter Bolinas Lagoon in the vicinity of the Project. Lewis Gulch Creek enters the Wye from the northwest as it combines with Wharf Creek in a roadside ditch before crossing Olema Bolinas Road through a box culvert. Wilkins Gulch Creek enters the Wye from the northeast through a box culvert crossing SR-1 at its intersection with Fairfax Bolinas Road. Annual high flows from Wilkins Gulch Creek typically overwhelm the Wilkins Gulch Creek box culvert and spill across Fairfax Bolinas Road along a cattle grate and merge with Salt Creek before entering the lagoon underneath SR-1 near the southeastern corner of the Project site, approximately 250 feet southeast of the primary box culvert for Wilkins Gulch Creek at the SR-1/Fairfax Bolinas Road intersection. The drainage area for each creek is listed in Table 25 for a total drainage area of 1.6 square miles.

Table 25. Bolinas Lagoon Wye Wetlands Contributing Drainage Areas

WATERSHED	DRAINAGE AREA (SQUARE MILE)
Wharf Creek	0.1
Lewis Gulch Creek	0.7
Wilkins Gulch Creek	0.7
Salt Creek	0.1

Surface water hydrology in Lewis Gulch Creek is influenced by precipitation, with “flashy” hydrographs showing rapid flow and stage increases shortly after the onset of precipitation events, followed by rapid initial decreases after precipitation ends. Flow response to individual precipitation events is generally not detectable within a week of the end of precipitation (ESA, 2020). Groundwater elevations also show a direct correlation to precipitation within, and adjacent to, the proposed Project area. Groundwater elevations fluctuate between greater than eight feet and a few inches below the ground surface, with depth to groundwater increasing from south to north. Tidal elevations influence groundwater in the southern portion of the site (ESA, 2020).

The eastern portion of the Project site is located within Special Flood Hazard Area Zone AE mapped by the Federal Emergency Management Agency (FEMA) as having a 1% chance of a flood event per year, referred to as the 100-year flood hazard zone, with a base flood elevation of 8 feet referenced to the North American Vertical Datum of 1988 (NAVD 88) (FEMA, 2017).

Water quality in the State of California is regulated by the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards. The Project site is located in the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (Regional Water Board). Section 303(d) of the Federal Clean Water Act (CWA) requires that states identify water bodies including bays, rivers, streams, creeks, and coastal areas that do not meet water quality standards and the pollutants that are causing the impairment. The Bolinas Lagoon is not listed as an impaired water body by the State Water Board.

The Regional Water Board is responsible for implementing the Water Quality Control Plan (Basin Plan). The Basin Plan establishes beneficial water uses for waterways, water bodies, and groundwater within the region and is a master policy document for managing water quality in the region. The Bolinas Lagoon is listed in the Basin Plan as providing the beneficial uses of commercial and sport fishing, shellfish harvesting, marine and estuarine habitats, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact and noncontact recreation, and navigation. Wilkins Gulch Creek Lagoon is listed in the Basin Plan as providing the beneficial uses of cold and warm water habitats, fish migration, preservation of rare and endangered species, wildlife habitat, and water contact and noncontact recreation. Other creeks near the Project site are not listed in the Basin Plan (SFBRWQCB, 2017).

The Project site is not located within a designated groundwater basin according to the Basin Plan (SFBRWQCB, 2017). The Project site is located adjacent to a tidally influenced lagoon; therefore, shallow groundwater is present beneath the Project site, and the shallow groundwater is likely brackish and unsuitable for beneficial uses.

CEQA CONTEXT

A project would normally result in a significant impact to hydrology or water quality if it would substantially degrade surface water or groundwater quality, substantially deplete groundwater resources, or interfere with groundwater recharge, contribute to erosion or sedimentation, contribute to exceeding the capacity of stormwater conveyance systems, or contribute to flooding.

a) Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Less-than-Significant with Mitigation Incorporated

The proposed Project would realign the Lewis Gulch Creek within the Project site, remove the Fairfax Bolinas Road between SR-1 and Olema Bolinas Road, and construct a new intersection at Olema Bolinas Road and SR-1 with a bridge crossing the creek. The purpose of the Project is to restore hydrologic, geomorphic and ecologic processes. While the long-term water quality impacts from the implementation of the proposed Project are expected to be beneficial, Project construction will disturb approximately 4.2 acres of land and has the potential to cause short-term impacts to water quality in the vicinity of the Project site.

The potential for chemical release is present at most construction sites due to the use of paints, fuels, lubricants, and other hazardous materials associated with construction equipment. Once released, these hazardous materials could be transported to nearby surface waterways in stormwater runoff, wash water, and dust control water, potentially reducing the quality of the receiving waters. During construction activities, soil would be disturbed and there would be an increased potential for soil erosion and sedimentation compared to existing conditions. The release of sediments and other pollutants during construction could adversely affect water quality in receiving waters.

Because construction of the proposed Project would disturb greater than 1 acre of land, the Project would be subject to the requirements of the State Water Board's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002, as amended by Orders No. 2010-0014-DWQ and 2012-0006-DWQ) (Construction General Permit). In compliance with the requirements of the Construction General Permit, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared, and construction Best Management Practices (BMPs) detailed in the SWPPP would be implemented during construction activities. A SWPPP identifies all potential pollutants and their sources, including erosion, sediments and construction materials and includes a list of BMPs to reduce discharges of construction-related stormwater pollutants. A SWPPP includes a detailed description of controls to reduce pollutants, outlines maintenance and inspection procedures, and is kept onsite for ongoing monitoring requirements. The SWPPP also requires a construction site monitoring program. Depending on a particular project's risk level, the monitoring program may include visual observations of site discharges, water quality monitoring of site discharges (pH, turbidity, and non-visible pollutants, if applicable), and receiving water monitoring (pH, turbidity, suspended sediment concentration, and bioassessment). The Construction General Permit requires that all dischargers develop a sampling and analysis strategy for monitoring non-visible pollutants in stormwater at any construction site where the discharge can cause or contribute to an exceedance of a water quality objective.

The Project would also be subject to the Clean Water Act Section 401 Water Quality Certification, Clean Water Act, Section 402 NPDES permit, Clean Water Act, Section 404, Discharge into Waters of the U.S., and Porter-Cologne Water Quality Act. Dewatering may be required during construction activities involving excavation or when construction would occur in wetted channels. The Construction General Permit allows non-stormwater discharge of dewatering effluent if the water is not contaminated and is properly filtered or treated using appropriate technologies such as clarifier tanks or sand filters. If the dewatering activity is deemed by the Regional Water Board not to be covered by the Construction General Permit or other NPDES permit, and discharge of groundwater to the storm drain system is planned, then the discharger would be required to prepare a Report of Waste Discharge, and if approved by the Regional Water Board, be issued site-specific waste discharge requirements (WDRs) under NPDES regulations. Site-specific WDRs contain rigorous monitoring requirements and performance standards that, when implemented, ensure that receiving water quality is not substantially degraded. The discharge of dewatering effluent is authorized under the Construction General Permit if the following conditions are met:

- The discharge does not cause or contribute to a violation of any water quality standard.
- The discharge does not violate any other provision of the Construction General Permit.
- The discharge is not prohibited by the applicable Basin Plan.
- The discharger has included and implemented specific BMPs required by the Construction General Permit to prevent or reduce the contact of the non-stormwater discharge with construction materials or equipment.
- The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants.
- The discharge is monitored and meets the applicable numeric action levels.
- The discharger reports the sampling information in the annual report.

Heavy construction activities would be limited to dry-weather months to ensure construction within the ordinary high waterline will occur when stream flows are at their lowest (typically July through October). The Project would use bioengineering methods along Lewis Gulch Creek to protect areas experiencing accelerated erosion that impacts infrastructure. Bioengineering is a method of construction combining live plants with dead plants or inorganic materials, to produce living, functioning systems which prevent erosion, control sediment and other pollutants, and provide habitat (USEPA, 2022).

In order to ensure that potentially significant water quality impacts are mitigated, Mitigation Measure HYD-1, which addresses erosion/sediment control and pollution prevention, would be implemented during Project construction activities. Additional measures in accordance with NPDES permit requirements, including incorporation of standard construction stormwater BMPs to reduce pollutants of concern in stormwater runoff and protect water quality, would also be implemented.

Compliance with Mitigation Measure HYD-1 and NPDES permit requirements as discussed above would ensure that potential impacts related to surface water or groundwater quality would be less than significant.

Mitigation Measure HYD-1: Water Quality Protection

The following measures shall be implemented during Project-related construction activities:

1. Heavy construction shall be limited to the dry-weather months. Construction within the ordinary high waterline will occur when stream flows are at their lowest (typically July through October). All disturbed soils will be stabilized by October 31.
2. Workers shall receive an erosion, sediment control, and pollution prevention training and would be instructed to avoid conducting activities beyond the construction zone including storage of tools, materials, and soil.
3. Erosion and sediment control measures, such as silt fences and certified weed seed-free rice straw fiber rolls (wattles), shall be installed as needed to eliminate the potential for sediment movement. The use of erosion control measures and mulches that contain non-native plant seeds or non-biodegradable material shall be prohibited. Only rice straw-filled fiber rolls will be permitted, or sterilized seed, to prevent inadvertent introduction of wheat and barley species. The use of erosion control measures that may trap small animals shall be prohibited. Erosion control measures will not contain plastic netting or monofilament.
4. Sites where activities result in exposed soil shall be stabilized to prevent erosion as soon as feasible after Project activities are complete.
5. Excavated materials shall be stockpiled outside of drainages, contained with appropriate sediment controls, and covered with geo-fabrics or plastic sheeting.
6. Soils excavated during ground-disturbing activities shall be reused to the extent that these locally derived materials are found to be clean and weed-free. Any such reuse is subject to applicable County policies and guidance.
7. Regular site inspections shall be conducted during construction to ensure that erosion control measures remain in place and are maintained and functioning properly. Sediment control devices that collect sediment shall be regularly cleaned out and the sediment added to soil stockpiles.
8. Once Project actions are completed, native vegetation that was removed and saved as part of Project activities shall be replanted or used for passive seeding to support revegetation and erosion control activities.
9. Proper storage, use, and disposal of chemicals, fuels, and other toxic materials is required. Soil, silt, bark, rubbish, creosote-treated wood, raw cement, concrete (including washings), asphalt, paint, oil or other petroleum products, or other substances that could affect water quality and be harmful to aquatic biota shall be prevented from entering the soil and/or waters of the State.
10. Any chemicals stored on site (for fueling or equipment maintenance) shall be stored in a locked container with secondary containment in case of leaks.
    a. If maintenance must occur on-site, it shall occur in designated areas located at least 100 feet from drainages and channels and protected with perimeter controls and non-permeable surfaces placed under the equipment. Secondary containment, such as a drain pan or drop cloth, to catch spills or leaks, shall be used when removing or

changing fluids. Fluids shall be stored in appropriate containers with covers, and properly recycled or disposed of off-site.

   b. Emergency spill containment and clean-up materials shall be kept on the Project site.

11. Power tools shall be refueled only in upland areas and away from all surface water zones to prevent fuel spills near sensitive habitats. Tools shall be inspected for oil and gas leaks before being brought on-site and regularly while on-site.
12. Equipment parked on site overnight shall be placed over a non-permeable surface such as a tarp or plastic sheeting to prevent leaks and spills.
13. All trash and construction debris shall be contained in a covered debris box (or similar) and removed regularly from the Project site and disposed of appropriately off-site.
14. For all vehicles and equipment operated in or near Lewis Gulch Creek:
    a. All vehicles and equipment shall be kept clean. Excessive build-up of oil or grease shall be avoided.
    b. All equipment used in the creek channel shall be inspected for leaks each day prior to initiation of work. Action shall be taken to prevent or repair leaks, if necessary.
15. During bridge construction, a sheet of Visqueen® or similar material shall be attached under the bridge to catch wood dust, metal dust, loose hardware, etc., to avoid pollutants entering channels. These materials shall be bagged and removed from the site.
16. All soil and/or rock materials imported to the Project site shall be tested to ensure that they do not contain hazardous materials (such as heavy metals) above applicable screening levels such as those adopted by the State Water Resources Control Board.

b) Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

No Impact

As discussed above, the Project site is not located within a designated groundwater basin. The Project would not increase the use of groundwater since no new uses are proposed. The Project would remove the crossover road section of Fairfax Bolinas Road to achieve an unimpeded flow of surface and groundwater in the Bolinas Wye wetland while increasing groundwater recharge to counteract drought effects by allowing a greater connection of Lewis Gulch Creek with its floodplain.

Therefore, the Project would result in no impact related to decreasing groundwater supplies, interfering with groundwater recharge, or impeding sustainable groundwater management of the basin.

c) **Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:**

i) **Result in substantial erosion or siltation on- or off-site?**

Less-than-Significant Impact

The proposed Project would remove the crossover road section of Fairfax Bolinas Road, elevate Olema Bolinas Road, and realign the Lewis Gulch Creek channel. The realignment of Leiws Gulch Creek will restore it to its historic water course as discussed in the Project Need, Purpose and Objectives section of this document. Currently, sediment is accumulating in Bolinas Lagoon instead of the wetland areas, which indicates that the alluvial fan is not functioning properly. Once constructed, the Project would restore natural flooding and alluvial fan processes, including the dispersal of nutrient rich sediment, in the Bolinas Wye wetland where it is needed for wetland accretion to keep pace with SLR. In addition, the Project would use bioengineering methods along Lewis Gulch Creek to protect areas experiencing accelerated erosion that increases sedimentation into the creek and adversely affects water quality. As discussed above under Checklist Item a), compliance with NPDES permits during construction activities and implementation of Mitigation Measure HYD-1 would ensure that the Project would not result in substantial erosion or siltation during construction. Therefore, the Project would have a less-than-significant and beneficial impact related to substantial erosion or siltation on- or off-site associated with changing the existing drainage pattern of the Project site.

ii) **Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?**

Less-than-Significant Impact

The proposed Project would reduce the amount of impervious surface on the Project site by removing the crossover road section of Fairfax Bolinas Road, and therefore would reduce the amount of runoff compared to existing conditions. The Project would reconnect Lewis Gulch Creek with its historic floodplain by realigning Lewis Gulch Creek through the Bolinas Wye wetland. The Project would construct a new bridge over Lewis Gulch Creek that would be sized to pass the 100-year flood event and account for 5.5 feet of sea-level rise (SLR), which would allow for upstream flows to pass through the Bolinas Wye wetland and protect Olema Bolinas Road from flooding and extreme weather events in the long term. In addition, raising Olema Bolinas Road and realigning the Lewis Gulch Creek channel would reduce or eliminate the near-annual flooding of the roads which occurs and will increase over time with SLR; therefore, the Project would have a less-than-significant and beneficial impact related to flooding on- or off-site as a result of altering the course of a stream or river.

iii) **Create runoff which would exceed capacity of stormwater drainage systems or provide additional sources of polluted runoff?**

Less-than-Significant Impact

As discussed above, the Project would reduce the amount of impervious surface on the Project site which would reduce the amount of runoff compared to existing conditions; therefore, the Project would have no impact related to creating runoff that could exceed the capacity of stormwater drainage systems. As discussed under Checklist Item (a), compliance with NPDES permits and implementation of Mitigation Measure HYD-1 ensures that the Project would have a less-than-significant impact related to contributing additional sources of polluted runoff.

iv) Impede or redirect flood flows?

Less-than-Significant Impact

The eastern portion of the proposed Project site is located within a 100-year flood hazard zone. A detailed Hydrology and Hydraulics Modeling Report was completed as discussed in the Project Development section, and the design evaluated to ensure that proposed work would not exacerbate existing flooding, and that the proposed bridge over Lewis Gulch Creek would be designed to pass the 100-year flood event and account for 5.5 feet of SLR. The proposed Project would not involve placement of fill or structures within the 100-year flood hazard zone which could impede or redirect flood flows. The Project would include removal of two spoils piles and would excavate a new channel for Lewis Gulch Creek within the 100-year flood hazard zone. These activities were evaluated in the Hydrology and Hydraulics Modeling Report and found to have a beneficial effect related to flooding by increasing the flood water storage capacity of the Project site. As discussed in the Project Description, the proposed Project would reconnect Lewis Gulch Creek with its historic floodplain and raise and realign roadways, which would reduce roadway flooding. Therefore, the Project would have a less-than-significant impact related to impeding or redirecting flood flows.

d) Would the Project, in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less-than-Significant Impact

Inundation of construction sites can release pollutants as construction materials (that could include hazardous materials) which can be released into floodwaters. Once the Project is constructed, there would be no storage of hazardous materials or other pollutants at the Project site that could be released into floodwaters.

As discussed above, the eastern portion of the Project site is located within the 100-year flood hazard zone. Heavy construction activities for the Project would be limited to dry-weather months to ensure construction within the ordinary high waterline will occur when stream flows are at their lowest (typically July through October). In addition, construction staging areas would not be located within the 100-year flood hazard zone; therefore, the Project would have a less-than-significant impact related to the potential release of pollutants due to inundation of a flood hazard zone.

The Project site is located within a tsunami hazard zone mapped by the California Geologic Survey (County of Marin, 2022). The construction windows of the Project are relatively short, and the likelihood of a tsunami occurring during construction of the Project is very low. In addition, due to the limited scope and size of the Project, storage of large quantities of hazardous materials at the Project site is not anticipated; therefore, the Project would have a less-than-significant impact related to the potential release of pollutants due to inundation from a tsunami.

A seiche is the oscillation of a body of water. Seiches occur most frequently in enclosed or semi-enclosed basins such as lakes, bays, or harbors and may be triggered by strong winds, changes in atmospheric pressure, earthquakes, tsunami, or tides. Triggering forces that set off a seiche are most effective if they operate at specific frequencies relative to the size of an enclosed basin. The Project site could be susceptible to inundation due to a seiche in Bolinas Lagoon; however, based on the very shallow water depth throughout much of the Bolinas Lagoon, a seiche would not be expected to cause significant inundation of the Project site. The likelihood of a seiche occurring during the relatively short construction windows of the Project is very low, and as discussed above, storage of large quantities of hazardous materials at the Project site is not anticipated; therefore, the Project would have a less-than-significant impact related to the potential release of pollutants due to inundation from a seiche.

e) Would the Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less-than-Significant Impact

The applicable water quality control plan for the Project site is the Basin Plan (SFBRWQCB, 2017). The State Water Board and Regional Water Board enforce compliance with the water quality objectives of the Basin Plan through the issuance of NPDES permits. The Project would comply with NPDES permit requirements and would not conflict with the beneficial uses of surface waters identified in the Basin Plan; therefore, compliance with permit requirements would ensure that the Project would result in less-than-significant impacts related to, conflicting with, or obstructing implementation of the Basin Plan.

As discussed above, the Project site is not located within a designated groundwater basin. No significant groundwater resources are located at the Project site, and there is no groundwater management plan for the area of the Project site; therefore, the proposed Project would have no impacts related to, conflicting with, or obstructing implementation of a sustainable groundwater management plan.

K. LAND USE AND PLANNING

Table 26. Land Use and Planning Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Physically divide an established community?	☐	☐	☐	☒
b)	Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

SETTING

The Project site is zoned as Open Area (APN 188-110-10) and Coastal Agriculture Residential Planned, 5-acre minimum lot size (C-ARP-5; APN 188-140-04,). The Project site includes parcels owned and/or maintained by the County of Marin (APN 188-110-10) and MCOSD (APN 188-140-04).

CEQA CONTEXT

A project would normally result in a significant impact to land use and planning if it would conflict with the adopted land use and zoning regulations or if would disrupt or divide the physical arrangement of an established community.

a) **Would the Project physically divide an established community?**

No Impact

The proposed Project is located within land that is managed as open space, with rural residential uses to the northwest. The adjacent lands to the north and south are also managed as open space. The Project site is not located within an established community; therefore, the Project would not physically divide an established community and no impact would occur.

b) **Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?**

No Impact

The proposed Project would not change the existing use, zoning and land use designations of the Project parcels. Assessor's Parcel Number (APN) 188-140-04 is currently a vacant lot that is zoned Coastal, Agricultural Residential Planned with a five-acre minimum lot size. There would be minimal work on the land, and it would be limited to work within Lewis Gulch Creek and improvements to allow for improved drainage into the Bolinas Wye. This work is allowed in the C-ARP-5 and Open Area zoning districts. As discussed in the Biological Resources section above, the proposed Project would not conflict with the Marin Countywide Plan policies regarding the protection of biological resources, No impact would occur.

L. MINERAL RESOURCES

Table 27. Mineral Resources Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b)	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

SETTING

The State Mining and Reclamation Act of 1975 requires that counties adopt policies to protect certain state-designated mineral resource sites from land uses that preclude or inhibit mineral extraction needed to satisfy local market demand on a timely basis. The purpose of the act is to ensure that construction materials are available to all areas of the state at a reasonable cost. Eight mineral resource sites in Marin County have been designated by the California State Department of Conservation Division of Mines and Geology as having significant mineral resources for the North Bay region. Of the eight mineral sites, two no longer meet the minimum threshold requirements and are exempt from application of mineral resource policies (Marin County, 2005). There are no mineral resource sites located on the Project site (Marin County, 2017).

CEQA CONTEXT

A project would normally result in a significant impact to mineral resources if a loss of known mineral or of a locally important mineral resources recovery area would result from implementation of the Project.

a) Would the Project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact

The proposed Project is a wetland restoration and roadway relocation project. The proposed Project would not include mineral extraction and would not impact a known mineral resource. For these reasons, implementation of the proposed Project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

b) Would the Project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact

As discussed above, no known mineral resource sites are located on the Project site; therefore, the Project would not result in loss of a known mineral resource or mineral resource recovery site. For these reasons, implementation of the proposed Project would not result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. No impact would occur.

M. NOISE

Table 28. Noise Checklist Questions

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b)	Generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☒	☐
c)	For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒

SETTING

This section provides background information on noise and vibration, how to quantify the sound level associated with noise, and how to evaluate the possible impact associated with noise and vibration that could result from implementation of the project.

General Information on Noise

Noise is defined as unwanted sound that annoys or disturbs people and can have an adverse psychological or physiological effect on human health. Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of the sound and are described in terms of decibels. The decibel (dB) is based on a logarithmic scale and express the ratio of the sound pressure level being measured to a standard reference level. The starting point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Decibels and other acoustical terms are defined in Table 25. The human ear is only capable of hearing sound within a limited frequency range. To better characterize noise levels perceived by a human ear, a decibel scale called A-weighting (dBA) is typically used. On this scale, the low and high frequencies are given less weight than the middle frequencies. Typical A-weighted noise levels at specific distances are shown for different noise sources in Table 26.

Table 29. Definition of Acoustical Terms

TERM	DEFINITION
Decibel (dB)	A unit describing the amplitude of sound on a logarithmic scale. Sound described in decibels is usually referred to as sound or noise "level." This unit is not used in this analysis because it includes frequencies that the human ear cannot detect.
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, in a manner similar to the frequency response of the human ear, and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Maximum Sound Levels (Lmax)	The maximum sound level measured during a given measurement period.
Equivalent Noise Level (Leq)	The average A-weighted noise level during the measurement period. For this CEQA evaluation, Leq refers to a 1-hour period unless otherwise stated.
Ambient Noise Level	The existing level of environmental noise at a given location from all sources near and far.
Vibration Decibel (VdB)	A unit describing the amplitude of vibration on a logarithmic scale.
Peak Particle Velocity (PPV)	The maximum instantaneous peak of a vibration signal.
Root Mean Square (RMS) Velocity	The average of the squared amplitude of a vibration signal.

Source: Charles M. Salter Associates, Inc., 1998. Acoustics – Architecture, Engineering, the Environment, William Stout Publishers. Federal Transit Administration, 2018. Transit Noise and Vibration Impact Assessment Manual, FTA Report No.0123, September.

Table 30. Typical Sound Levels Measured in the Environment and Industry

Noise Source (Distance in Feet)	A-Weighted Sound Level in Decibels (dBA)
Jet Aircraft (200)	112
Subway Train (30)	100
Truck/Bus (50)	85
Vacuum Cleaner (10)	70

Noise Source (Distance in Feet)	A-Weighted Sound Level in Decibels (dBA)
Automobile (50)	65
Normal Conversation (3)	65
Whisper (3)	42

Source: Charles M. Salter Associates Inc., 1998. Acoustics – Architecture, Engineering, the Environment, William Stout Publishers.

Because sound pressure levels are based on a logarithmic scale, they cannot be added or subtracted using linear methods. For instance, if one noise source emits a sound level of 90 dBA, and a second source at the same location also emits a sound level of 90 dBA, the combined sound level will be 93 dBA, not 180 dBA. In other words, a doubling of sound source is equivalent to an increase of 3 dBA. When the second noise source is lower than the first noise source by at least 10 dBA, the contribution from the second noise source to the overall sound level is negligible (i.e., close to zero). For example, when adding an 80-dBA source to a 95-dBA source, the higher noise source dominates, and the combined noise level will be 95 dBA.

General Information on Vibration

Vibration is an oscillatory motion (a motion that repeats itself) through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Several different methods are used to quantify vibration. Typically, ground-borne vibration generated by human activities attenuates rapidly with distance from the source of the vibration, meaning vibration will quickly become imperceptible the further it gets from its source. Sensitive receptors to vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment. Vibration amplitudes are usually expressed as either Peak Particle Velocity (PPV) or as Root Mean Square (RMS) velocity. PPV is appropriate for evaluating potential damage to buildings, but it is not suitable for evaluating human response to vibration because it takes the human body time to respond to vibration signals. The response of the human body to vibration is dependent on the average amplitude of a vibration event. Thus, RMS is more appropriate for evaluating human response to vibration. PPV and RMS are described in units of inches per second (in/sec), and RMS is also often described in vibration decibels (VdB).

Regulatory Setting

In California, noise is primarily regulated at the local level, through the implementation of general plan policies and local noise ordinances. The State of California provides guidance for the preparation of general plan noise elements. The purpose of a local general plan is to identify the general principles intended to guide land use and development, and cities and counties commonly adopt ordinances to specify the standards and requirements for implementing the principles of the general plan.

Federal and State Guidance for Noise and Vibration

The Federal Transit Administration (FTA) has established a general construction threshold of 90 dBA 1-hour Leq at the nearest noise-sensitive receptor (FTA, 2006). According to the FTA, if the combined noise level in 1 hour from the two noisiest pieces of equipment exceeds the 90 dBA threshold at a residential land use (or other noise-sensitive receptors), then there may be a substantial adverse reaction.

The FTA has developed vibration thresholds to prevent disturbances to (i.e., annoyance of) building occupants based on the frequency of a vibration event (FTA, 2018). Construction vibrations that are equal to or exceed the vibration thresholds could result in potential disturbance to people or activities. For infrequent vibration events during construction (fewer than 30 vibration events of the same kind per day), FTA recommends a threshold of 80 VdB to prevent potential disturbance to nearby residents.

The California Department of Transportation (Caltrans) has developed vibration thresholds based on PPV values to evaluate the potential impact of construction vibration on structures (Caltrans, 2020). Construction vibrations that are equal to or exceed the vibration thresholds could result in potential damage to structures. For frequent intermittent vibratory sources during construction (e.g., vibratory compaction equipment), Caltrans recommends a threshold of 0.5 in/sec to prevent potential damage to older residential structures.

CEQA CONTEXT

Operation of a project would normally result in a significant impact to noise if it would substantially increase the ambient noise levels for adjoining areas or if it exceeded the noise levels recommended in an adopted plan or noise ordinance. Operation of the proposed Project would not be expected to generate a net increase in ambient noise levels and would not result in any noise impacts; therefore, the following evaluation focuses on potential noise impacts related to Project construction.

a) Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less-than-Significant with Mitigation Incorporated

Construction activities would temporarily increase noise levels in the vicinity of the Project site. The primary source of noise during construction would be generated by off-road equipment activity on the Project site. Construction noise levels would vary from day to day, depending on the number and condition of the equipment being used, the types and duration of activity being performed, the distance between the noise source and the receptor, and the presence or absence of barriers, if any, between the noise source and receptor.

The assumptions regarding the types of construction equipment that would be used on the Project site are based on a project-specific equipment list provided by the Project engineer. In accordance with the Conservation Measures listed in the Project Description section of this document, Project construction activities would generally be limited between 7 AM and 6 PM Monday through Friday, and in accordance with the requirements of bird nesting season and between two hours after sunrise and two hours before sunset.

In accordance with guidance from the FTA, construction noise impacts were evaluated by quantifying the maximum noise levels that would result from the simultaneous operation of the two noisiest pieces of equipment near the perimeter of the Project site closest to a sensitive receptor. The types of construction equipment that would be used on the Project site and the associated noise calculations are presented in the noise modeling analysis, available upon request. As shown in Table 31, the Project's construction noise levels were estimated at the nearest noise-sensitive receptor, a single-family home located about 200 feet southwest of the Project site, for each construction phase. Based on this analysis, Project construction would not generate noise levels above the FTA's recommend threshold of 90 dBA.

Table 31. Potential Noise Impacts from Construction Equipment

Construction Phase	Noise Levels at Nearest Residence (dBA Leq)	Noise Threshold (dBA Leq)	Threshold Exceeded?
Roadway Construction	72	90	No
Bridge Construction	65		No
Restoration	70		No

Source: Noise calculations are available upon request.

The proposed Project does not include new designated parking or other amenities that would normally contribute to a significant increase in visitors, new types of visitors, or create a destination attraction. However, construction noise generated by the Project could impact nesting birds within the vicinity. Mitigation Measure NOI-1 requires that pre-construction nesting bird surveys be conducted and, if nests are found, that species-appropriate buffers be established. With implementation of the Conservation Measures for Noise Control and Mitigation Measure NOI-1, implementation of the proposed Project would result in a less-than-significant impact associated with generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Mitigation Measure NOI-1: Noise Buffers

If noise-inducing work occurs during the bird nesting season (February 1–July 31), pre-construction surveys for nesting birds shall be conducted. If nests are found, buffers will be established according to the species detected and state and federal regulations. Otherwise, if no nests are found, then noise-inducing activities will only take place between two hours after sunrise and two hours before sunset. If activities are particularly noisy, meaning louder than applicable county noise thresholds, sound barriers shall be erected around noise-inducing work sites to limit noise impacts to wildlife.

b) Would the Project result in generation of excessive ground-borne vibration or ground-borne noise levels?

Less-than-Significant Impact

Construction activities can result in varying degrees of ground vibration, depending on the equipment, activity, and relative proximity to sensitive receptors. The primary types of equipment that would generate ground vibration during Project construction and the associated vibration calculations are listed in the noise modeling analysis, available upon request. The use of pile drivers is not anticipated for the Project.

To evaluate the Project's potential vibration effects on nearby sensitive receptors, a buffer distance that would be needed to avoid exceeding the FTA and Caltrans construction vibration thresholds was estimated for each type of equipment. The estimated buffer distances for potential disturbance to residents and damage to older residential buildings are summarized in Tables 32 and 33, respectively. Based on this analysis, Project construction would not generate vibration levels above the vibration disturbance and building damage thresholds; therefore, Project construction would not generate excessive ground-borne vibration in the Project vicinity and this impact would be less than significant.

Table 32. Potential Vibration Disturbance to Residents during Construction

Equipment	Vibration Threshold	Buffer Distance to Threshold	Distance to Closest Receptor	Threshold Exceeded?
Unit	**VdB**	**feet**	**feet**	
Vibratory roller	80	73	300	No
Large bulldozer		43		No
Loaded truck		40		No
Small bulldozer		5		No

Source: Vibration calculations are available upon request.

Table 33. Potential Vibration Damage to Older Residential Buildings during Construction

Equipment	Vibration Threshold	Buffer Distance to Threshold	Distance to Closest Receptor	Threshold Exceeded?
Unit	**in/sec**	**feet**	**feet**	
Vibratory roller	0.5	14	300	No
Large bulldozer		8		No
Loaded truck		7		No
Small bulldozer		1		No

Source: Vibration calculations are available upon request.

c) **For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?**

No Impact

The Project site is not located within the vicinity of a private airstrip or an airport land use plan, or within 2 miles of a public airport or public use airport; therefore, the Project would have no impact related to the exposure of people to excess noise levels from aircraft noise.

N. POPULATION AND HOUSING

Table 34. Population and Housing Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b)	Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

SETTING

The Project site is zoned as Open Area and Agriculture Residential Planned. There is no housing, or any business located within the Project site. The Project site is unpopulated.

CEQA CONTEXT

A project would normally result in a significant impact to population and housing if it would cause substantial population growth or would remove existing housing.

a) **Would the Project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**

No Impact

The proposed Project would not directly or indirectly induce growth in the area. The Project would involve restoration of wetland areas, relocation of a stream channel, removal of a segment of Fairfax Bolinas Road, and the construction of a new bridge and intersection of Olema Bolinas Road and SR-1. The Project does not include new homes, businesses, or infrastructure that would induce unplanned population growth in the area. The construction workers are anticipated to live and commute to the Project site from Marin County or adjacent counties and would not require housing. Therefore, there the proposed Project would not induce substantial unplanned population growth in the area, either directly or indirectly.

b) **Would the Project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?**

No Impact

There is no housing located on the Project site. Therefore, the proposed Project would not displace any housing or people or necessitate the construction of replacement housing elsewhere.

O. PUBLIC SERVICES

Table 35. Public Services Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
	Fire protection?	☐	☐	☐	☒
	Police protection?	☐	☐	☐	☒
	Schools?	☐	☐	☐	☒
	Parks?	☐	☐	☐	☒
	Other public facilities?	☐	☐	☐	☒

SETTING

The Project area is located within the unincorporated area of Marin County. The Project area is served by Bolinas Fire Protection District located at 100 Mesa Road and Marin County Sheriff's Office (Point Reyes Substation). The nearest school to the Project site is Bolinas-Stinson Union Elementary located approximately 0.5 mile to the northwest. There are no park facilities such as parking, restrooms, or playgrounds in the Project area and none are proposed as part of the Project.

CEQA CONTEXT

A project would normally result in a significant impact to public services if it would result in the need for new or additional public services in order to maintain acceptable service ratios, including response times and other performance objectives.

a) **Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental**

impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

- **Fire protection?**
- **Police protection?**
- **Schools?**
- **Parks?**
- **Other public facilities?**

No Impact

Implementation of the proposed Project would improve the wetland habitat, restore a more natural ecosystem, and reduce the occurrence of flooding within the Project area. The proposed bridge and removal of the Fairfax Bolinas Road crossover segment within the Project site would improve safe vehicle access to Bolinas from SR-1, including increasing protection from flooding, which would be a beneficial effect. Existing access through Olema Bolinas Road would be maintained during construction.

The Bolinas Fire Protection District and Marin County Sheriff's Office would continue to provide fire and police protection, respectively, to the Project area during construction and operation of the Project. The proposed Project does not include new housing, or commercial or industrial development which could result in the need for new or improved public services, such as fire protection, police protection, schools, parks, or other public facilities; therefore, implementation of the proposed Project would not result in the need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities. No impact would occur.

P. RECREATION

Table 36. Recreation Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b)	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

SETTING

Bolinas Lagoon, an Audubon Important Bird Area, is within the Greater Farallones National Marine Sanctuary, within the Golden Gate National Biosphere Reserve, and one of only seven Ramsar Wetlands of International Importance in the western U.S. (Marin County Parks, 2022). Bolinas Lagoon provides recreational opportunities for hiking, fishing, and kayaking in the region. The Project site contains no recreational facilities, and none are proposed as a part of the Project.

CEQA CONTEXT

A project would normally result in a significant impact to recreation if it would conflict with the established recreational uses of the Project area.

a) **Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?**

No Impact

The proposed Project would ensure safe access to the western side of the Bolinas Lagoon along Olema Bolinas Road through the Project site by elevating a section of Olema Bolinas Road and installing a full span bridge. The proposed Project would account for a 100-year storm event and 5.5 feet of future SLR. The Project would restore wetland habitat by realigning Lewis Gulch Creek with its historic channel and floodplain and removing the crossover segment of Fairfax Bolinas Road. None of these Project components would adversely impact other regional or local parks,but would allow continued safe access to parklands that are currently publicly available. Therefore, the proposed Project actions would not induce population growth nor increase the use of the existing parks or other recreational facilities such that physical deterioration of the facilities would occur or be accelerated. Therefore, there would be no impact.

b) **Would the Project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?**

No Impact

The proposed Project would not construct or necessitate the construction of any recreational facilities since it only includes infrastructure improvements that will ensure continued access to public lands that are currently available for recreational activities. Therefore, no impact would occur.

Q. TRANSPORTATION

Table 37. Transportation Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☐	☒	☐	☐
b)	Conflict with or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?	☐	☐	☒	☐
c)	Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☒	☐	☐
d)	Result in inadequate emergency access?	☐	☒	☐	☐

SETTING

The proposed Project is within the unincorporated area of Marin County. SR-1 traverses the eastern side of the Project area and is mentioned in various local and regional policies addressing the circulation system, including the *Marin Countywide Plan*, the *Caltrans District 4 Bike Plan*, and the *Marin County Unincorporated Area Bicycle and Pedestrian Master Plan*. There are currently no designated pedestrian or bicycle facilities along SR-1, Fairfax Bolinas Road, or Olema Bolinas Road. The sections of SR-1 to the north and south of the Project site generally have no shoulders. The section of SR-1 within the Project area includes turnouts on both sides of the roadway and an unimproved shoulder. The SR-1 corridor is known as a popular route for bicyclists, who share the travel lanes with vehicle traffic; however, the lack of designated pedestrian and bicycle facilities in the area is typical of rural areas.

Traffic counts were conducted in 2017 (AECOM). In 2020, Fehr & Peers conducted revised traffic counts and prepared a Traffic Engineering Assessment Technical Memo (Fehr & Peers, 2020). The memo presented analysis in support of the Caltrans Design Engineering Evaluation Report (DEER) process. In 2022, an Intersection Control Evaluation (ICE) was completed following Caltrans guidance (TOPD 13-02) (Fehr & Peers, 2020). An ICE is required when modifying intersections on a state highway. Fehr & Peers completed a traffic analysis to determine appropriate and feasible control options based on existing traffic volumes under AM, PM and weekend mid-day peak hour conditions. Lastly, Fehr & Peers prepared an updated Traffic Engineering Assessment Technical Memo in 2023 that includes updated traffic counts and collision history and a left-turn lane warrant analysis (Fehr & Peers, 2023).

CEQA CONTEXT

Senate Bill (SB) 743 established Vehicle Miles Traveled (VMT) associated with a Project as the metric for use in determining a Project's transportation impacts, replacing the use of the delay-based criteria associated with a Level of Service (LOS) analysis. While many jurisdictions still maintain policies establishing a LOS goal, a CEQA impact cannot be identified based on adverse impacts on traffic operations associated with a Project, even if the resulting delay conflicts with a local agency' policy. As a result, no LOS analysis was conducted as part of this evaluation.

Whether adopting a threshold of significance, or evaluating transportation impacts on a case-by-case basis, a lead agency should ensure that the analysis addresses:

a) Direct, indirect, and cumulative effects of the transportation Project (CEQA Guidelines, §15064, subds. [d], [h])
b) Near-term and long-term effects of the transportation Project (CEQA Guidelines, §15063, subd. [a][1], §15126.2, subd. [a])
c) The transportation Project's consistency with state greenhouse gas reduction goals (Pub. Resources Code, §21099)
d) The impact of the transportation Project on the development of multimodal transportation networks (Pub. Resources Code, §21099)
e) The impact of the transportation Project on the development of a diversity of land uses (Pub. Resources Code, §21099)

a) Would the Project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

Less than Significant with Mitigation

Regional and Local Plans

Marin Countywide Plan (2007)

The following goals and policies were determined to be relevant to the proposed Project.

- **Policy TR-1.2. Maintain Service Standards.** Establish level of service standards for vehicles on streets and highways and performance standards for transit, bicycles, pedestrians, and other modes of transportation.
- **Policy TR-1.d. Coordinate with Local Agencies.** Work with a proposed City-County Planning Committee, Department of Public Works, Transportation Authority of Marin, Metropolitan Transportation Commission, and other Bay Area counties to coordinate transportation system planning, including updating the County Congestion Management Program and the Capital Improvement Program to prioritize the projects that will meet the goals of the County Transportation Vision.
- **Goal TR-4. Protection of Environmental Resources.** Minimize environmental disruption and energy use related to transportation.
- **Policy TR-4.1. Maintain Disturbance and Condemnation.** Limit environmental disruption and condemnation of land due to transportation projects.

- **Implementing the Program TR-4.a. Limit Project Impacts.** Work with Caltrans and private transportation contractors to minimize environmental damage and storm water runoff through best management practices, and to avoid condemnation of private or publicly owned land in conjunction with transportation improvement projects.

The Proposed project would not increase traffic volumes or alter levels of service at the intersection of Olema Bolinas Road and SR-1 **(Fehr & Peers, 2022)**. Relevant performance standards for bicycle and pedestrian use have been incorporated into the Project design, including a pullout for bicyclists at the existing Fairfax Bolinas Road/SR-1 intersection. Thus, the proposed Project is consistent with Policy TR-1.2.

Caltrans has been consulted throughout the process of Project design, as has the Marin County Department of Public Works. The Transportation Authority of Marin has been included in Project stakeholder updates at the 30 and 60 percent design stages. Input from each agency has been incorporated into the Project. Thus, the proposed Project is consistent with Policy TR-1.d.

The proposed Project will reduce the area devoted to transportation infrastructure at the Project site and would not increase traffic volumes. As an environmental restoration and enhancement project, the proposed Project would result in increased protection of environmental resources. Thus, the proposed Project is consistent with Goal TR-4.

The proposed Project would remove a roadway segment of Fairfax Bolinas Road in order to restore a historic wetland complex along Lewis Gulch Creek. No condemnation of land would result from implementation of the proposed Project, nor would environmental disruption (other than that necessary to restore natural processes) occur. Thus, the proposed Project is consistent with Goal TR-4.1.

The proposed Project will comply with applicable Caltrans stormwater management requirements and best management practices, as described in the Conservation Measures listed in the Project Description section of this document. No land condemnation would result from implementation of the proposed Project. Thus, the proposed Project is consistent with Program TR-4.a.

Caltrans District 4 Bike Plan, 2018

The *Caltrans District 4 Bike Plan* identifies priorities for improving bicycle access along or parallel to the state highway network. SR-1 improvements in west Marin near the Project area are identified as a Caltrans mid-tier priority for further planning and study. The section of SR-1 adjacent to the Project site currently has an unimproved shoulder and turnout. The proposed Project would include a four-foot minimum width paved shoulder along SR-1 and Olema Bolinas Road near the proposed new Olema Bolinas Road/SR-1 intersection. Also included in the proposed Project is a retained paved section of the “Crossover Road” at SR-1 that could be used by southbound cyclists before turning left and crossing SR-1 onto Fairfax Bolinas Road. These Project components are being reviewed by Caltrans and would result in improvements to bicycle safety. Thus, the proposed Project would be consistent with the objectives in the *Caltrans District 4 Bike Plan*.

Marin County Unincorporated Area Bicycle and Pedestrian Master Plan 2018 Update

SR-1 is identified as a proposed Class IIr bikeway, which consists of Class II pavement width without stenciling or signage as a bike lane. The Plan includes a recommendation to continue implementation of the Rural Roads Improvement Project by Marin County in partnership with Caltrans. This includes the County’s program to “widen where feasible,” to add or widen shoulders along designated roadways as part of resurfacing projects. SR-1 from Tamalpais Valley to the Sonoma County line is identified as one route for improvements. Objective D.2 in the Plan states that the repair and construction of transportation facilities should minimize disruption to the bicycling and walking environment to the extent practical. The proposed Project is consistent with this recommendation as it would retain the existing shoulders along SR-1 in the Project area and improve them within the area of encroachment along SR-1.

The Plan also includes recommendations regarding countywide projects, noting under Recommendation #2 that the need of bicyclists and pedestrians should be considered in performing maintenance and repair work. This includes providing suitable construction warning signs where appropriate and, where necessary, providing detour routes around areas undergoing construction.

As noted above, the proposed Project would include a four-foot minimum width paved shoulder along SR-1 and Olema Bolinas Road near the proposed new Olema Bolinas Road/SR-1 intersection. The proposed Project includes provisions for bicyclists and pedestrians to access and pass through the Project area safely during both construction and Project operation and the implementation of Mitigation Measure TRAN-01 below would ensure that the proposed Project will be consistent with this recommendation in the *Marin County Unincorporated Area Bicycle and Pedestrian Master Plan 2018 Update.*

Existing Facilities

Marin Transit Route 61 operates between Bolinas and Marin City in the vicinity of the Project location, but there are no stops in the Project area. The Project would result in a minimal impact on travel times given the small increase in travel distance.

The existing shoulders and turnouts along SR-1 near the Project site would be retained and improved, so the Project would not impact the potential to establish continuous bicycle or pedestrian facilities. Transit service would not be impacted by the Project as there are no bus stops in the Project area and transit access from SR-1 to Bolinas would remain. There would be potential impacts to circulation for all modes of travel during the construction period. Mitigation Measure TRAN-01 would require providing smooth surface for bicyclists and providing detour and warning signage to inform bicyclists and drivers regarding road conditions. With the implementation of Mitigation Measure TRAN-01, the Project impact would be less than significant.

Mitigation Measure TRAN-01: Bicyclist Safety

Bicyclists share the road with vehicles at the Project location under typical conditions, so maintaining an adequate travel way or detour route through the area would be needed for both transportation modes in each direction along SR-1, Olema Bolinas Road, and Fairfax Bolinas Road. To ensure that the route is adequate for bicyclists, a smooth surface shall be provided along with detour and warning signage on the approaches to the Project area to raise awareness for drivers and bicyclists of the temporary conditions.

b) Would the Project Conflict with or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

Less-than-Significant Impact

SB 743 established VMT associated with a project as the metric for use in determining a project’s transportation impacts, replacing the use of the delay-based criteria associated with a LOS analysis.

Marin County has not yet adopted a policy or threshold of significance regarding VMT. As a result, the proposed closing of a segment of Fairfax Bolinas Road, geometric modification of the intersection of SR-1/Olema Bolinas Road, and measures to mitigate flooding were evaluated based on guidance provided by the California Governor's Office of Planning and Research (OPR) in the publication *Transportation Analysis Under CEQA, First Edition: Evaluating Transportation Impacts of State Highway System Projects,* 2020.

In analyzing the VMT impacts of transportation projects, the primary consideration is if the Project would result in an increase in capacity, which is expected to result in induced vehicle travel and an increase in VMT. The OPR guidance includes an extensive list of project types that would not be expected to lead to a substantial or measurable increase in vehicle travel, and therefore generally should not require an analysis of induced travel. The guidance indicates that this is not a comprehensive list of projects for which a VMT analysis would not be required, but identifies the following types of projects that would be expected to have a less-than-significant impact in terms of VMT:

- Rehabilitation and maintenance projects that do not add motor vehicle capacity
- Roadside safety devices or hardware installation such as median barriers and guardrails
- Roadway shoulder enhancements to provide "breakdown space," dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes.
- Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left-turn, right-turn, and U-turn pockets, two-way left-turn lanes, or emergency breakdown lanes that are not used as through lanes
- Reduction in number of through lanes
- Installation or reconfiguration of traffic-calming devices

The Caltrans guidance regarding project screening for transportation projects is consistent with that provided by OPR. Specifically, the guidance states that a detailed VMT impact analysis may not be necessary if the project, "would not be likely to lead to a measurable and substantial increase in VMT." Since the proposed Project would not increase the capacity of the impacted transportation facilities, there would be no induced travel associated with the Project. The OPR guidance is also cited, noting that safety projects are included among the project types not likely to lead to an increase in VMT.

The roadway modifications associated with the proposed Project would have a nominal impact on VMT. There would be no impact for vehicles traveling between Bolinas and points north along SR-1, as the Project would shift the location of the intersection approximately 200 feet to the south and would modify the intersection geometry. For vehicles traveling between the community of Bolinas and Fairfax Bolinas Road or points to the south on SR-1, the trip length would be increased by approximately 500 feet. As determined in TAM's *Origin and Destination Study,* 2018, the average trip length in unincorporated Marin County is 9.1 miles; the increased travel distance associated with the Project represents an increase of 1.0% for the average trip.

As noted in the Caltrans CEQA guidance, the primary concern regarding construction impacts is related to drivers opting for circuitous routes to avoid the Project site. Otherwise, "vehicle trips used for construction purposes would be temporary, and any generated VMT would generally be minor, limited to construction equipment and personnel, and would not result in long-term trip generation."

The Project would not result in increased roadway capacity. There would be a nominal impact on VMT due to the proposed closure of Fairfax Bolinas Road between Olema Bolinas Road and SR-1 and there would be a negligible and temporary increase in VMT during construction. The Project could therefore be presumed to have a less-than-significant VMT impact and thus screened out from a detailed VMT analysis.

c) **Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?**

Less than Significant with Mitigation

Among the goals of the Project is to reduce flooding on County roads and improve traffic safety. Several components of the Project would reduce roadway flooding—Olema Bolinas Road would be raised and realigned to reduce roadway flooding during winter storm and high tide events; Lewis Gulch Creek, which crosses under the road, would be rerouted; and the bridge over the creek would be replaced to better withstand high water events. The flooding on Fairfax Bolinas Road would be eliminated by the road closure. These Project features would support the maintenance of safer access to and from Bolinas.

The Project would also modify the geometrics of the intersection of SR-1 (Shoreline Highway)/Olema Bolinas Road. As currently configured, the intersection is skewed, which could result in limited visibility and difficulty turning left for northbound drivers in large vehicles. With the modification, the two roadways would intersect at approximately a right angle, enabling drivers turning left onto SR-1 to see traffic approaching from the right more easily. The proposed modification would also require southbound drivers traveling toward Bolinas to reduce their speed to turn right onto Olema Bolinas Road, whereas currently they can proceed with a slight turn. This is expected to reduce vehicle speeds as drivers transition from SR-1 to enter Bolinas.

Sight distance at the proposed location was evaluated in the field in accordance with corner sight distance criteria provided in the Caltrans *Highway Design Manual.* Due to the curvature of the roadway, the relocation of the intersection to the south would result in a reduction in the sight distance between the intersection and points to the north. There are no speed limit signs posted near the proposed intersection, so the prima facie speed of 55 mile per hour (mph) was assumed for the sight distance evaluation. The recommended sight distance for a roadway with a 55-mph design speed is 605 feet. The sight distance as measured from the minor street approach at the proposed location of the intersection is over 1,000 feet in both directions, which exceeds the minimum requirements and is adequate for speeds over 70 mph (W-Trans, 2022). In accordance with Caltrans standards, the Project design includes the grading and graveling of the SR-1 shoulder near Wilkins Ranch to minimize the potential growth of vegetation that could impact sight distances.

Consideration was also given to the adequacy of sight lines for drivers on SR-1 to observe and react to a vehicle slowing or stopping to turn left or right onto Olema Bolinas Road. Given the flat and relatively straight alignment of SR-1 near the proposed intersection location, stopping sight far exceeds the 500 feet needed for a 55-mph approach speed (W-Trans, 2022).

Potential impacts of Project construction were assessed based on the proposed two-year phasing plan. During Year 1, the new SR-1/Olema Bolinas Road intersection would be constructed; during this time, traffic along SR-1 would be impacted and traffic control provided in accordance with Caltrans standards. Fairfax Bolinas Road will remain open during the Year 1 construction activities to provide a detour route to connect SR-1 to Bolinas. A temporary paved ramp will be required for the transition from Olema Bolinas Road to Fairfax Bolinas Road. Approximately 2,820 sf of temporary paving will also be added to the intersection of Fairfax Bolinas Road and SR-1 to allow for vehicles to turn onto Fairfax Bolinas Road from southbound SR-1.

During Year 2 of construction, Fairfax Bolinas Road will be closed to traffic and the realigned Olema Bolinas Road intersection would be open. Staging areas will be located off-road in locations that would be decommissioned after Project completion. The Year 2 staging area may require transport of construction materials across the road. There may be impacts to traffic during Year 1 construction along SR-1 at the relocated SR-1/Olema Bolinas Road intersection and during Year 2 construction at the Fairfax Bolinas Road intersection. Mitigation Measure TRAN-02 would require placing of construction and detour warning signs in advance and implementing temporary control measures to direct traffic. With implementation of Mitigation Measure TRAN-02, temporary Project construction impacts would be reduced to a less-than-significant level.

Once constructed, the proposed closure of the segment of Fairfax Bolinas Road and relocation of the SR-1/Olema Bolinas Road intersection would not result in an increase to hazardous conditions due to design features. No new roadway uses would be introduced as a result of the Project. Operational impacts would be less than significant. The proposed Project would not result in a substantial increase in hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Mitigation Measure TRAN-02: Construction Signage

Construction and detour warning signs shall be placed on SR-1 in advance of construction activities along the roadway for both northbound and southbound traffic. Additional signage, as well as traffic control personnel, may be required at the intersection based on proximity of construction activities to the roadway and whether any temporary modifications of the travel lanes are required.

During Year 2 construction, to the degree that construction materials are required to be transported across the road to and from the staging area, temporary traffic control shall be required. To the extent that the staging area encroaches upon the roadway, traffic control may be required to maintain adequate clearances. Construction warning signage shall be stationed upstream of active construction and staging areas.

d) Would the Project result in inadequate emergency access?

Less than Significant with Mitigation

The reconfigured intersection at SR-1/Olema Bolinas Road will be designed to provide an adequate turning radius for fire trucks per the applicable Caltrans Design Exceptions standards for SR-1. The intersection layout is designed to accommodate a 40-foot bus and an American Association of State Highway and Transportation Officials (AASHTO) WB-40 truck. Therefore, once constructed, it is expected that the emergency vehicle access at the Project location would be adequate. As described in Impact c) above, construction activities could result in temporary circulation and access impacts—including turning radii for trucks and emergency vehicles as well as encroachments into the roadway, which could similarly impact emergency access.

The temporary closure of the Olema Bolinas Road intersection could potentially impact emergency vehicle access during Year 1 of construction. However, adequate access would continue to be maintained throughout the construction period, although travel times may occasionally be delayed. Once constructed, the Project would provide adequate access for emergency vehicles. Mitigation Measure TRAN-02 would require short-term improvements on the roadway to accommodate movements of emergency vehicles, if needed. Consultation with the Marin County Fire department and Bolinas Fire Protection District has occurred during the Project design process and has addressed the maintenance of adequate emergency access, meeting turning radius needs, and providing adequate traffic control.

With implementation of Mitigation Measure TRAN-02 during the construction period, the impact of the proposed Project would be less than significant.

R. TRIBAL CULTURAL RESOURCES

Table 38. Tribal Cultural Resources Checklist Questions

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:		**Potentially Significant Impact**	**Less than Significant with Mitigation**	**Less-than-Significant Impact**	**No Impact**
a)	Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code §5020.1(k)?	☐	☒	☐	☐
b)	A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

SETTING

The following discussion has been summarized from the Archaeological Survey Report prepared by Far Western (Far Western, 2023).

The proposed Project is centered in Marin County, where the Coast Miwok spoke one of the California Penutian languages, and were closely related linguistically to the nearby Lake Miwok (Barret S. A., 1908) (Georke, 2007) (Kelly, 1978) (Kroeber, 1925). They had one of the highest population densities in the Bay Area (Milliken R. , 2010). Prior to European contact, the native people of the Bay Area were hunters and gatherers with a heavy reliance on marine food resources. The Coast Miwok settlement system consisted of a primary village located along a principal stream, with satellite communities or special-use sites, usually seasonally occupied, in the surrounding countryside. The Bay Miwok were particularly impacted by Spanish missionization in the late 1700s. When missions were secularized in the 1830s, many Natives transitioned to servitude to Mexican landowners. Following European settlement, a series of acts and bills passed by congress in the mid-1800s left Native Californians landless and legally powerless until 1920, when the Bureau of Indian Affairs purchased a 15.45-acre tract of land in Graton to create a “village home” for dispersed people of Marshall, Bodega, Tomales, and Sebastopol (Federated Indians of Graton Rancheria, 2020). In 1958, Congress passed the California Rancheria Act which terminated all 41 Rancherias in the state, extinguished the recognition of their residents as American Indians, and removed the land from Federal Trust. As with many other California Tribes, federal recognition for the Coast Miwok was not restored until decades later. For the Graton Rancheria, campaigning began in 1990, with recognition restored in December 2000, and a tribal constitution ratified by the Bureau of Indian affairs in 2002, allowing the tribe to re-establish a land base, funding for cultural preservation, and establishment of tribally owned businesses to achieve self-sufficiency (Federated Indians of Graton Rancheria, 2020). Today, the "Graton Rancheria community is a federation of Coast Miwok and Southern Pomo groups recognized as a tribe by the United States Congress. The Miwok of west Marin County have, through the years, been referred to as Marshall Indians, Marin Miwok, Tomales, Tomales Bay, and Hookooeko. The Bodega Miwok (aka, Olamentko) traditionally lived in the area of Bodega Bay. The neighboring Southern Pomo Sebastopol group lived just north and east of the Miwok" (Federated Indians of Graton Rancheria, 2020).

Cultural Resource Studies

Archaeological Survey Report

An *Archaeological Resources Inventory Report* for the Project was prepared by Far Western in January 2023. Because the report contains confidential information about the locations and characteristics of archaeological sites and tribal cultural resources, the technical report is not included in this Initial Study for public review but a redacted version that omits culturally sensitive information can be made available to agencies and other professionals for review as necessary.

The technical report included a cultural resources records search, consultation with the Federated Indians of Graton Rancheria (FIGR), outreach with the Bolinas Museum and Marin History Museum, buried site sensitivity assessment, and pedestrian surveys of the Project site conducted in 2020 and 2021. Additionally, the report included results of presence/absence archaeological testing, which consisted of drilling two deep cores and nine hand augers in accessible areas adjacent to the proposed bridge footings and shallow hand augers along the proposed creek channel.

Survey field methods are described in detail in the Cultural Resources section of this document. Additional archaeological testing was conducted to test for the presence or absence of Native American archaeological deposits within the APE, specifically the area of direct impact for the new bridge ad channel reconstruction efforts. Testing consisted of drilling two deep cores and nine hand augers in accessible areas adjacent to the proposed bridge footings and shallow hand augers along the proposed creek channel. Testing was conducted on September 13, 2021, in coordination with FIGR.

Based on the results of the records search and literature review, no previously identified archaeological sites have been documented within the Project site. Two previously identified historic-era resources intersect with the Project site and are discussed in detail in the Cultural Resources section of this document.

Archaeological testing within the APE for the bridge footings and new creek channel did not result in the identification of any cultural deposits and determined a general lack of buried archaeological sensitivity within the APE, except the upper 9 feet in the area of the bridge footings where archaeological materials could be present due to landform age and formation, however beyond that depth the underlaying strata are too old to contain archaeology. No archaeological materials were identified when visually examining all sediments uncovered from hand augurs and cores and dry screening select contexts.

POTENTIAL FOR BURIED PRECONTACT ARCHAEOLOGICAL RESOURCES

Applicable Regulations

California Register of Historic Resources

The California Register is a listing of State of California resources that are significant within the context of California's history, and includes all resources listed in or formally determined eligible for the National Register. The criteria used to determine the significance of an impact to a "historical resource" (important archaeological or built-environment resources) are based on Appendix G of the CEQA Guidelines. California regulations require that effects to cultural resources be considered only for resources meeting the criteria for eligibility to the California Register, as outlined in PRC §5024.1. The California Register identifies resources considered to be important for state and local planning purposes and affords certain protection under CEQA. Resources must possess physical integrity, as well as integrity of setting, and meet at least one of the following criteria (CEQA Guidelines, CCR §15064.6).

A resource that is eligible to the California Register is one that:

1. is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. is associated with the lives of persons important in California's past;
3. embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic value; or
4. has yielded, or may be likely to yield, information important in prehistory or history.

Demolition, replacement, substantial alteration, or relocation of an eligible resource are actions that could change the eligibility of a resource. Under CEQA Guidelines, effects to cultural resources may be considered significant if a project alternative would result in any of the following:

- cause a substantial adverse change in the significance of a historical resource, as defined in CEQA Guidelines (CCR §15064.5);
- cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines (CCR §15064.5); or
- disturb any human remains, including those interred outside formal cemeteries.

In addition, a project that has potential to impact a traditional cultural property such that it would cause a substantial adverse change constitutes a significant effect on the environment unless mitigation reduces such effects to a less-than-significant level.

AB 52

AB 52 amended CEQA to address California Native American tribal concerns regarding how cultural resources of importance to tribes are treated under CEQA. With the addition of AB 52, CEQA now specifies that a project that may cause a substantial adverse change in the significance of a "tribal cultural resource" [as defined in PRC 21074(a)] is a project that may have a significant effect on the environment. According to the AB 52, tribes may have expertise in tribal history and "tribal knowledge about land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources."

The AB 52 process entails the following:

- The CEQA lead agency must begin consultation with a California Native American tribe(s) that is traditionally and culturally affiliated with the geographic area of the proposed project, if the tribe(s) requested to the lead agency, in writing, to be informed by the lead agency of proposed projects in that geographic area and the tribe(s) requests consultation.
- A proposed Negative Declaration, Mitigated Negative Declaration (MND), or a Draft EIR cannot be released for public review before the tribe(s) has had the opportunity to request consultation.
- If the tribe(s) requests formal consultation, a MND cannot be released for public review until consultation between the tribe(s) and the lead agency is completed and mitigation measures acceptable to the tribe(s) are incorporated into the MND and the related Mitigation Monitoring or Reporting Program (MMRP).

Native American Outreach and Consultation

Far Western contacted the Native American Heritage Commission (Commission) on October 27, 2020, informing them of the Project and requesting a review of their Sacred Lands File and list of contacts who might have knowledge concerning cultural and tribal resources within the proposed Project. The Commission responded on November 2, 2020, that the Sacred Lands File did not indicate any Native American resources in the immediate area but cautioned that the lack of information did not indicate the absence of such resources. A list of potentially interested Native American individuals and organizations was provided by the Commission. Far Western sent outreach letters to FIGR and Guidiville Indian Rancheria on behalf of the County to initiate Project outreach, informing them of the background environmental studies and inviting their participation in the consultation process. Based on a response from FIGR, formal consultation was initiated between FIGR and MCOSD and numerous meetings were held to discuss the Project details and identification efforts. As a result of consultation, FIGR requested presence/absence testing in locations proposed for deep disturbances, such as for the new bridge footings and grading within the creek channel. Far Western, in coordination with FIGR, conducted the testing (two deep cores and nine augers) and no cultural deposits were encountered. MCOSD will continue to update FIGR as the Project's environmental and cultural compliance progresses.

CEQA CONTEXT

A project would normally result in a significant impact to tribal cultural resources if it would adversely change the significance of a tribal cultural resource, including those identified by tribes.

a) **Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code §5020.1(k)?**

b) **Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources**

Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Less than Significant with Mitigation Incorporated

Two historic-era resources (one site/Oyster House Site and one isolate/bottle) were encountered within the APE during the field site survey conducted by Far Western. A second isolate was identified immediately adjacent to the APE on the former Wilkins Ranch property and includes a California Division of Highways survey monument (C-Block). These resources do not qualify as tribal cultural resources, and the ARS did not identify any other tribal cultural resources within the Project site. Formal consultation was initiated between FIGR and MCOSD and numerous meetings were held to discuss the Project details and identification efforts. As a result of consultation, FIGR requested presence/absence testing in locations proposed for deep disturbances, such as for the new bridge footings and grading within the creek channel. Far Western, in coordination with FIGR, conducted the testing (two deep cores and nine augers) and no cultural deposits were encountered. MCOSD will continue to update FIGR as the Project's environmental and cultural compliance progresses. MCOSD will continue to update FIGR as the Project's environmental and cultural compliance progresses. The Project will implement Mitigation Measures CUL-1, CUL-2, AND CUL-3 (see the Cultural Resources section of this CEQA Checklist) to reduce impacts to tribal cultural resources to a less-than-significant level.

S. UTILITIES AND SERVICE SYSTEMS

Table 39. Utilities and Service Systems Checklist Questions

	Would the project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
b)	Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years?	☐	☐	☐	☒
c)	Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d)	Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e)	Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

SETTING

The Project site is an undeveloped area containing roadway infrastructure. Overhead PG&E power lines are located along SR-1 and Olema Bolinas Road within the Project site. Existing uses of the Project site do not include parking, restrooms, drinking water, or other similar facilities that would require utilities, such as electricity, natural gas, telecommunication, potable water, or wastewater.

CEQA CONTEXT

A project would normally result in a significant impact on utilities and service systems if it would exceed or conflict with existing standards, service capacities, and/or entitlements. Potentially significant impacts to utilities and service systems have been evaluated by determining if new or altered services would be required to implement the proposed Project.

a) Would the Project require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects?

Less-than-Significant Impact

Implementation of the proposed Project would not require the relocation, construction, or expansion of any utility or public service facility other than the roadways on-site. Water would be trucked to the Project area during construction for dust control. Construction equipment would be powered by diesel fuel, gasoline, and generators, and would not require electrical infrastructure. Surface runoff from impervious surfaces on the Project site would flow to the roadside ditches and would not generally change the existing stormwater drainage patterns, except that rainfall would infiltrate rather than runoff in the area currently occupied by the crossover segment of Fairfax Bolinas Road. During construction, portable toilets would be transported to the Project site for use by construction workers. The portable toilet waste generated during the construction period would be trucked to an appropriate wastewater treatment facility. No expansion of wastewater treatment facility capacity would be required to accommodate this small, temporary quantity of waste. For these reasons, implementation of the proposed Project would result in a less-than-significant impact associated with the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects.

b) Would the Project have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years?

No Impact

Implementation of the proposed Project would require water for dust control. Water would be imported and tracked to the Project site. Implementation of the proposed Project would not require a regular supply of water. The Project site currently does not require water service, and none is proposed as part of the Project. Implementation of the proposed Project would not create new demands for water supply and would not include or require any drinking fountains, irrigation, or water facilities. For these reasons, implementation of the proposed Project would result in no impact associated with the sufficiency of water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years.

c) Would the Project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact

There are no existing restrooms or water facilities available within the Project area. Implementation of the proposed Project does not include new restrooms that would increase projected demand for wastewater treatment. Refer to the analysis under Impact a) above for a discussion of the need for portable toilets during construction. Implementation of the proposed Project would not result in any impact associated with adequate wastewater treatment capacity to serve the Project's projected demand in addition to the provider's existing commitments.

d) Would the Project generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less-than-Significant Impact

Grading and existing road demolition activities during construction of the proposed Project would result in the need for disposal of up to 500 cubic yards of cut soil and demolition materials. Materials would likely be transferred to the Marin Resource Recovery Center in San Rafael for disposal or recycling. The materials that are determined to not be recyclable would be disposed of at the Redwood Landfill in the City of Novato. The Redwood Landfill has a permitted throughput capacity which allows receipt of 2,300 tons per day of waste material, has a design capacity of 26,000,000 cubic yards, and is estimated to cease operations in July 2024 (CalRecycle, 2022). The volume of construction-related solid waste would not exceed the capacity of the Redwood Landfill.

Implementation of the proposed Project would comply with applicable county, State, and federal regulations regarding solid waste disposal; therefore, implementation of the proposed Project would have a less-than-significant impact with respect to the generation of solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or the attainment of solid waste reduction goals.

e) Would the Project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No Impact

As discussed in Impact d) above, implementation of the proposed Project would generate solid waste, primarily associated with grading and road demolition activities. This waste would be disposed of at the Redwood Landfill, located in Novato. The volume of construction-related solid waste would not exceed existing landfill capacity. The proposed Project would comply with applicable county, State, and federal regulations regarding solid waste disposal; therefore, implementation of the proposed Project would not result in any impact associated with compliance with federal, state, and local management and reduction statutes and regulations related to solid waste.

T. WILDFIRE

Table 40. Wildfire Checklist Questions

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:		Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b)	Due to slope, prevailing winds, and other factors, would the Project exacerbate wildfire risks and thereby expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c)	Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d)	Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

SETTING

CalFire has mapped areas of high wildfire hazards throughout California, including Marin County. The Project site is mapped as Moderate Fire Hazard Severity Zone within the State responsibility area (CalFire, 2022). No areas within the Project vicinity are classified as Very High Fire Hazard Severity Zones.

CEQA CONTEXT

A project would normally result in a significant impact on wildfire if it is located in or near State responsibility areas or lands classified as a very high fire hazard severity zone and would increase wildfire risk, air pollution concentration from wildfire due to topographic features or prevailing winds, risk to people or structures form post-wildfire flooding or landslides, or conflict with an adopted emergency response plan or emergency evacuation plan.

a) **Would the Project impair an adopted emergency response plan or emergency evacuation plan?**

No Impact

The Project site is not within an adopted emergency response plan area or an emergency evacuation plan area. Implementation of the Project would improve ingress/egress of visitors and residents through the Project area in case of an emergency. Emergency vehicles would continue to access the Bolinas community through the Project area during construction and operation of the Project. Therefore, implementation of the proposed Project would not result in any impact associated with impairment of an adopted emergency response plan or emergency evacuation plan.

b) **Due to slope, prevailing winds, and other factors, would the Project exacerbate wildfire risks and thereby expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?**

Less-than-Significant Impact

The Project site would continue to be an undeveloped area containing a road and bridge connecting the Bolinas community to SR-1. No structures or amenities would be developed that could potentially exacerbate wildfire risks.

Equipment used during Project construction activities could generate sparks which could result in wildland fire. The MCOSD would require the construction contractor to minimize risk of wildfire that could be initiated from equipment to construct and maintain the proposed Project, by requiring vehicles be equipped with fire extinguishers to address small fires ignited by construction or maintenance activities. This provision would be included in the standard construction document specifications. For these reasons, implementation of the proposed Project would result in a less-than-significant impact associated with exacerbation of wildfire risks.

c) **Would the Project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?**

No Impact

The proposed Project would not include the installation or maintenance of fuel breaks, emergency water sources, power lines, or other utilities. Implementation of the proposed Project would improve wetland habitat and safe access to the Bolinas community. New infrastructure proposed includes the relocation of the Olema Bolinas Road intersection with SR-1, and removal of the Crossover Road. Therefore, fewer roads would be present post construction. The roadway improvements proposed as part of the Project would reduce the need for regular maintenance since the risk of flooding would be reduced with the installation of a full span bridge to route flows from Lewis Gulch Creek, versus the existing undersized culvert that requires frequent cleanouts. For these reasons, implementation of the proposed Project would result in no impact associated with the installation or maintenance of associated infrastructure, such as roads, fuel breaks, emergency water sources, power lines, or other utilities that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

d) Would the Project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact

As discussed in the Project Description and in the Hydrology and Water Quality section of this CEQA Checklist, the proposed Project would move roadways out of flood inundation areas by removing the Fairfax Bolinas Road between SR-1 and Olema Bolinas Road and constructing a new intersection at Olema Bolinas Road/SR-1 with an elevated roadway and new bridge crossing over the realigned Lewis Gulch Creek on Olema Bolinas Road. Removing the section of the Fairfax Bolinas Road and realigning Lewis Gulch Creek within the Project site would reconnect the creek with its historic floodplain, which would improve floodplain function and reduce flood risk. The Project would also stabilize the eastern bank of Lewis Gulch Creek north of the Olema Bolinas Road/SR-1 intersection to prevent further stream bank erosion and incision. With these improvements, there would be an unrestricted floodplain that would allow for flow and sediment dispersal outside of the roadway. For these reasons, implementation of the proposed Project would result in no impact associated with the exposure of people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

U. MANDATORY FINDINGS OF SIGNIFICANCE

Table 41. Mandatory Findings of Significance Checklist Questions

	Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
a)	Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number, or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b)	Does the Project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past, current, and probable future projects.)?	☐	☐	☒	☐
c)	Does the Project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

SETTING

Implementation of the proposed Project would result in an overall beneficial effect to the environment as it would restore more natural hydrologic, geomorphic, and ecological processes to the aquatic, wetland, and upland habitat in the Bolinas Wye wetlands. Potential impacts described in this document that could result from implementation of the proposed Project would be temporary and mitigation measures have been included in the document to reduce the significance of potentially significant impacts to less-than-significant levels.

a) Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number, or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

Less than Significant with Mitigation Incorporated

The proposed Project would restore the Bolinas Wye wetlands' natural geomorphic and biological processes by reconstructing the physical and biological linkages between Lewis Gulch Creek and Bolinas Lagoon. The proposed Project would realign both Olema Bolinas Road and Lewis Gulch Creek to allow space for natural geomorphic and biological process to occur. The proposed Project would remove the section of Fairfax Bolinas Road that passes through the Bolinas Wye wetland between SR-1 and Olema Bolinas Road to allow for the realignment of Lewis Gulch Creek and to allow for wetland migration with an anticipated 5.5 feet of SLR and a 100-year storm event (8 feet of combined SLR). Restoration work would include earthmoving, construction of road and bridge infrastructure, erosion control planting, placement of large woody debris for habitat, removal of non-native species, restoration of native wetland habitat, and management of invasive species.

Potentially significant construction-related impacts to biological resources would be reduced to less-than-significant levels with the implementation of Mitigation Measures BIO-1 through BIO-7 and Mitigation Measure NOI-1. Potentially significant impacts to cultural and tribal cultural resources would be reduced to less-than-significant levels with the implementation of Mitigation Measures CUL-1 through CUL-3.

For these reasons, with mitigation measures identified in this document, the implementation of the proposed Project would result in a less-than-significant impact associated with the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory.

b) Does the Project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past, current, and probable future projects.)

Less-than-Significant Impact

In recent years, the County of Marin has granted coastal permits in Bolinas for residential structures, site improvements, lot modifications, and agricultural purposes. Current projects on the County of Marin Community Development Agency's website include (County of Marin Community Development Agency, 2022):

- Cascado Coastal Permit, 8 Ocean Avenue
- Bolinas community Land Trust Coastal Permit, vacant lot on Aspen Road
- Loeb Bobbi Coastal Permit, 95 Nymph Road

- Satris Jones Coastal Permit and Merger, 230 Larch Road
- David Alexander Separate Trust Etal Coastal Permit and Design Review, vacant parcel with frontage on Elm Road, Hawthorne Road, and Grove Road

These permitted projects are not in the vicinity of the Project site and thus, would not combine with the proposed Project to generate cumulative impacts.

The Project is part of the MCOSD's larger strategy for improving climate change/SLR resiliency and improving natural habitat functionality at the north end of Bolinas Lagoon. Projects developed in accordance with this strategy (see the Project Description) are expected to have a net-positive impact on Bolinas Lagoon and surrounding environments. As such, the proposed Project is anticipated to contribute to cumulative net positive impacts resulting from Bolinas Lagoon restoration projects. For these reasons, implementation of the proposed Project would not result in adverse impacts that are individually limited, but cumulatively considerable.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Less-than-Significant Impact with Mitigation Incorporated

The Project site is located in a largely undeveloped, unpopulated area. The nearest residential receptor is located approximately 200 feet to the southwest of the Project site. The proposed Project would restore the Bolinas Wye wetlands' natural geomorphic and biological processes by reconstructing the physical and biological linkages between Lewis Gulch Creek and Bolinas Lagoon. The proposed Project would realign both Olema Bolinas Road and Lewis Gulch Creek to allow space for natural geomorphic and biological process to occur. The proposed Project would remove the section of Fairfax Bolinas Road that passes through the Bolinas Wye wetland between SR-1 and Olema Bolinas Road to allow for the realignment of Lewis Gulch Creek and to allow for wetland migration with an anticipated 5.5 feet of SLR and a 100-yer storm event (8 feet of combined SLR). Restoration work would include earthmoving, construction of road and bridge infrastructure, erosion control planting, placement of large woody debris for habitat, removal of non-native species, restoration of native wetland habitat, and management of invasive species.

The proposed Project does not include new parking areas or recreational amenities that would normally contribute to a significant increase in visitors, new types of visitors, or create a destination. Potential impacts to humans in the vicinity have been analyzed in this Initial Study, including Air Quality, Greenhouse Gas Emissions, Noise, and Transportation. Mitigation Measures HYD-1, NOI-1, and TRAN-1 through TRAN-3 for potentially significant water quality, noise, and transportation-related impacts have been identified. Implementation of these mitigation measures would reduce potential Project impacts to a less-than-significant level. All other identified human impacts associated with implementation of the proposed Project have been concluded to be less than significant. For these reasons, implementation of the proposed Project would result in a less-than-significant impact associated with environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly.

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GEOTECHNICAL REPORT

FINAL FOUNDATION REPORT

Marin County Open Space District Bolinas Lagoon Wetlands Wye Project

Marin County, California
Crawford File No. 19-570.1
Bridge No.: XXXXXXX

Prepared by:

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
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July 2023

Prepared for:

WRA
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July 13, 2023

Crawford File No. 19-570.1
Bridge No.: XXXXXXX

Mr. Brian Bartell
WRA
2168-G East Francisco Blvd
San Rafael, CA 94901

Subject: **FINAL FOUNDATION REPORT**
Marin County Open Space District Bolinas Lagoon Wye Wetlands Project
Marin County, California

Dear Mr. Bartell,

Crawford & Associates, Inc. (Crawford) prepared this Foundation Report for the Marin County Open Space District Bolinas Lagoon Wye Wetlands Project in Marin County, California. Crawford prepared this report in accordance with our December 18, 2019 agreement. This report presents the results of our subsurface exploration and testing, and provides our conclusions and geotechnical recommendations for use in design of new structure foundations and approach roadway sections.

Thank you for the opportunity to be part of your design team. Please call if you have questions or need any additional information.

Sincerely,

Crawford & Associates, Inc.,

Ellen Tiedemann, P.E.
Project Manager

REGISTERED PROFESSIONAL ENGINEER
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1 INTRODUCTION

1.1 PURPOSE

Crawford & Associates, Inc. (Crawford) prepared this Foundation Report for the Marin County Open Space District Bolinas Lagoon Wye Wetlands Project in Marin County, California. Crawford prepared this report in accordance with our December 18, 2019 agreement. This report presents the results of our subsurface exploration and testing, and provides our conclusions and geotechnical recommendations for use in design of new structure foundations and approach roadway sections.

1.2 GEOTECHNICAL SERVICES

To prepare this report, Crawford:

- discussed the project with WRA, Marin County, Marin County Parks, Mark Thomas, and Far Western Anthropological Research Group Inc.;
- attended kick off meeting on December 11, 2019;
- reviewed the Conceptual Design Report dated December 2017 prepared by AECOM;
- completed a Preliminary Foundation Report dated June 17, 2020;
- reviewed 60% Design Plans provided by WRA and Mark Thomas dated July 30,2020;
- 65% General Plan provided by Mark Thomas dated December 2022;
- reviewed available published geologic and seismic mapping of the site;
- completed a site review and subsurface explorations at the site October 2021;
- completed laboratory testing on soil samples obtained during subsurface exploration;
- subcontracted Slate Geotechnical Consultants, Inc to complete a Surface Fault Rupture Study dated May 2022; and
- performed geotechnical engineering evaluation and analysis.

Limitations of this study are discussed in the final section of this report.

2 PROJECT DESCRIPTION

The project site is in Bolinas Lagoon in Marin County, California; located at the intersection of Olema-Bolinas Road and State Route (SR) 1. The site coordinates are approximately latitude 37.9352°N and longitude 122.6998°W. See Figure 1 in Appendix I for the site vicinity map. The elevations referenced within this report are based on the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted.

The purpose of the Marin County Open Space District Bolinas Lagoon Wye Wetlands Project is to provide roadway improvements that help restore wetlands/streams, protect wildlife, improve safety, reduce flooding, and create climate change resiliency. The intersection of Olema-Bolinas Road and SR 1 will be realigned approximately 180 ft east for the proposed realignment/restoration of Lewis Gulch Creek. The new structure (Pier 2 and eastern section of Pier 1) will be partially located off of the existing paved roadway over the proposed realigned Lewis Gulch Creek. The proposed structure is a three-span, 36 ft wide, 80 ft long, cast-in-place post-tension concrete slab on a slight, concave easterly curved roadway (“OB” Line) alignment. The main span will be 60 ft long with 10 ft long approaches cantilevered onto stem walls. The stem walls will be aligned parallel to Olema-Bolinas Road. The piers are proposed to each consist of two, 66-inch diameter Cast-In-Drilled-Hole (CIDH) piles (Type II Shafts) with 42-inch diameter column extensions. With Type II shafts, permanent casing is required to 5 ft below the construction joint. Based on conversations with Mark Thomas, we understand the permanent casing will be 17 ft long to accommodate the 5 ft penetration requirement below the construction joint. The CIDH piles will be spaced about 22 ft Center-to-Center (CTC). The supports are shown to be skewed 20 degrees to the realigned Lewis Gulch Creek.

The new approach roadway will be about 55 ft wide and established on new embankment up to about 5 ft behind the bridge end diaphragms. The new embankment is planned with 2:1 (horizontal:vertical distance) side and end slopes. At the north approach (End Diaphragm 2 to SR 1), the new roadway will generally be located within coast live oak woodland. At the south approach (End Diaphragm 1 to Fairfax-Bolinas Road), the northbound lane will be realigned/widened into forested wetlands; the southbound lane will follow the existing Olema-Bolinas Road alignment and encroach into intermittent waters.

The project also includes the removal of the existing Olema-Bolinas Road and SR 1 intersection and approximately 525 ft of Fairfax-Bolinas Road to restore natural wetlands. The source of fill for the new embankment is expected to be import fill. In the proposed bridge vicinity, the realigned Lewis Gulch Creek is shown as 2 ft deep, 4 ft wide at channel bottom with 2:1 side slopes.

In California, all local agency bridge projects that are not on the State Highway System are designed in accordance with the current adopted edition of the American Association of State Highway Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications with California Amendments.

3 GEOTECHNICAL INVESTIGATION

3.1 GEOTECHNICAL BORINGS

3.1.1 BORINGS BY OTHERS

As part of the conceptual design, AECOM retained Pitcher Drilling Company to drill and sample seven test borings to a maximum depth of 66.5 ft bgs. The borings were drilled in March/April 2017 and borings B-1 and B-6 are located closest to the proposed bridge and roadway improvements. The relevant AECOM boring logs and locations are attached in Appendix IV.

3.1.2 BORINGS BY CRAWFORD

Crawford retained Taber Drilling to drill and sample five test borings (R-21-001 through A-21-005) at the project. The test borings were drilled on October 5 to 8, 2021. Refer to Figure 2 in Appendix I for the Exploration Map.

Taber Drilling used a track-mounted drill rig to complete the borings with 4-inch diameter solid-stem auger, mud-rotary drilling equipment, and 96-mm outer diameter HQ rock core barrel. Boring R-21-001 was drilled with 4-inch diameter solid-stem auger to a depth of 23 ft (elev. -3 ft) then advanced by mud-rotary drilling method with a 3.9-diameter drag bit to 76 ft bgs (elev. -56 ft). R-21-001 was completed with 96-mm outer diameter HQ rock coring equipment to boring termination (91 ft; elev. -71 ft). Boring R-21-003 was drilled with 4-inch diameter solid-stem auger 15 ft bgs (elev. 5 ft), continued with mud-rotary drilling method with a 3.9-diameter drag bit to 60 ft bgs (elev. -40 ft), and then drilled with a 3.9-diameter tri-cone bit until boring termination (80.5 ft; elev. -60). Borings A-21-002, A-21-004, and A-21-005 were drilled to termination depths with 4-inch diameter solid-stem auger.

The maximum depth of exploration was 91±ft bgs (R-21-001; lowest elev. -71±ft).

3.1.3 DRILLING AND SAMPLING

The subsurface explorations completed for this project study are summarized in Table 1.

Table 1: Subsurface Exploration Summary

Support Location	Boring Designation	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Approx. Ground Surface Elevation (ft)	Boring Depth (ft)
Pier 1	R-21-001	10/6/21	CME 55 Track	Auto	83	20	91.0
Pier 2	R-21-003	10/7/21				20.2	80.5
Approach Roadway	A-21-004	10/8/21				24	31.5
Approach Roadway	A-21-005	10/8/21				12.3	31.5
Roadway Removal	A-21-002	10/6/21				10	6.5
Approach Roadway	D-21-006	10/5/21	N/A	N/A	N/A	22	19
Approach Roadway	D-21-007	10/5/21	N/A	N/A	N/A	22	25.7

Crawford soil samples were recovered by means of 2.0-inch O.D. Standard Penetration Test (SPT) split-spoon sampler (ASTM D1586) with 1.4-inch I.D. stainless steel liners, a 3.0-inch O.D. "Modified California" split-spoon sampler (ASTM D3550) with 2.4-inch I.D. stainless steel liners, and 3-inch OD thin-walled shelby tube sampler. The shelby tube samples were "pushed" in to recover sample and the "resistance" was measured (in psi). The drive samplers were advanced with standard 350 ft-lb striking force using a 140-lb automatic hammer and a drop height of 30 inches. A hammer energy calibration test was not performed specifically for this project/site. At the time of the field exploration, Taber Drilling reported the last energy calibration performed on May 24, 2021 on the hammer used in the field for this project has an average efficiency of 83%.

Drive samples taken in the borings were typically collected at approximate 5 ft intervals and as otherwise directed by the field engineer/geologist. At each test interval, the sampler was driven 18 inches (or until sampler refusal criterion was met), and the blows necessary to advance the sampler each 6 inches of penetration were recorded. The sample refusal criterion is defined as 50 or more blows with less than 6 inches of sampler advancement.

Select portions of recovered soil samples from the driven samplers were retained in sealed containers for laboratory testing and reference. The bulk soil samples collected from the auger cuttings were placed in plastic bags for laboratory testing and reference. Samples of rock were recovered with diamond core barrels and retained in core boxes.

3.1.4 LOGGING

Crawford's field personnel logged the test borings consistent with the Unified Soil Classification System and the Caltrans Logging Manual[1]. While logging in the field, Crawford also completed pocket penetrometer and/or torvane tests on drive samples of cohesive soils to determine consistency and provide an estimate of unconfined compressive strength. Groundwater observations were recorded during drilling operations. Steve Carter was the senior geologist for this study.

3.1.5 SAMPLER PENETRATION RESISTANCE (N-VALUE)

The in-situ sampler penetration resistance (N-value) in blows per foot was recorded in the field to obtain an approximate measure of the dynamic resistance of the soil. The N-value was recorded as the number of hammer blows necessary to drive the sampler the final 12-inches of the 18-inch sample interval, unless refusal was met.

The SPT N-value adjusted to 60% hammer energy (N_{60}) is routinely used to provide an index of the apparent density of cohesionless soils and sometimes (albeit less reliably) to estimate the consistency of cohesive soils. The energy-corrected N_{60} value normalized for effective overburden stress referred to as $(N_1)_{60}$ is typically used to correlate soil strength parameters and bearing characteristics.

For a non-standard sampler (i.e., non-SPT sampler), the in-situ N-value was corrected to an Equivalent SPT N-Value using guidance by Caltrans[2], then adjusted to provide an *Equivalent* N_{60} and/or *Equivalent* $(N_1)_{60}$ value that can be correlated to soil strength and bearing characteristics for use in geotechnical analysis.

The in-situ (uncorrected) N-values are shown on the Log of Test Borings (LOTB) drawing and boring logs provided in Appendix III.

3.1.6 BOREHOLE ABANDONMENT

At completion, the test borings were backfilled with grout in accordance with the county boring permit requirements.

3.2 DYNAMIC CONE PENETRATION TESTS

The sampled test borings were supplemented with two Dynamic Cone Penetration (DCP) tests located on the proposed new roadway alignment. The DCPs were completed by Crawford personnel on October 5, 2021.

[1] Caltrans, Soil and Rock Logging, Classification, and Presentation Manual, 2010 Edition
[2] Caltrans, Geotechnical Manual, Sampler Size Conversions to SPT N-value, Soil Correlations Module (March 2021).

A manually-operated Wildcat Dynamic Cone Penetrometer manufactured by Triggs Technology, Inc. was used to complete the DCP tests. The test consists of continuously driving a 1.4" O.D. steel cone tip attached to a lead rod until effective refusal (50 blows per approximately 4-inches) is recorded. The rods are advanced using a hand-actuated, 35-lb safety drop hammer falling a distance of 15-inches. The DCP test provides an approximate quantification of a material's apparent density or stiffness.

The locations of the DCP tests are shown on Figure 2 and are summarized in Table 1. The DCP logs are included in Appendix III.

3.3 SUBSURFACE EXPLORATION LOCATIONS AND ELEVATIONS

The boring and DCP locations were measured in the field with respect to existing site features and then referenced to project stationing. The boring and DCP elevations are referenced to project datum provided by Mark Thomas. The details and locations of test borings are shown on the LOTB drawing/ logs (Appendix III), and on Figure 2 (Appendix I).

4 LABORATORY TESTING PROGRAM

Laboratory tests have been completed on selected representative samples obtained from the exploratory borings to aid in soil classification and evaluate the physical and engineering properties of the earth materials for use in geotechnical analysis required for the project such as liquefaction potential, settlement, deep foundations, and corrosion potential.

The following laboratory tests have been or will be completed on representative soil samples obtained from the exploratory borings include:

- Atterberg Limits (ASTM D4318)
- Consolidation Test (ASTM D2435)
- Corrosivity Testing (CTM 643, CTM 417, and CTM 422)
- Direct Shear (ASTM D3080)
- Material Finer than No. 200 Sieve (ASTM D1140)
- Moisture Content (ASTM D2216)
- Particle Size Analysis (ASTM D 6913)
- Unit Weight (ASTM D7623)

Crawford laboratory test results are provided in Appendix VI and the test sample locations are shown on the LOTB and boring logs included in Appendix III.

5 GEOTECHNICAL CONDITIONS

5.1 GEOLOGY

The project is located near the western extent of the Coast Ranges Geomorphic Province[3] of California, characterized by a series of northwest trending mountain ranges subparallel to the San Andreas Fault. This geomorphic province is bounded by the Klamath Mountains to the north, the Great Valley on the east and the Transverse Ranges to the south. To the west is the Pacific Ocean and strata dip beneath alluvium of the Great Valley on the east. The coastline is

[3] California Geologic Survey (2002), *California Geomorphic Province*, Note 36.

uplifted, terraced and wave-cut. The Coast Ranges are composed of thick Mesozoic and Cenozoic sedimentary strata. The northern and southern ranges are separated by a depression containing the San Francisco Bay.

Published geologic mapping[4] shows the proposed bridge crossing underlain by undivided Holocene aged Alluvial deposits (Qa), comprised of gravel, sand, silt and clay. The mapping shows existing Fairfax-Bolinas Road is underlain by Holocene aged Estuarine-delta deposits (Qed) characterized by a mixture of coarse/fine estuarine sediment deposited in delta at mouths of tidally influenced coastal streams where fresh water mixes with seawater. At the project location, Olema-Bolinas Road is mapped within both Qa and Qed deposits.

In the vicinity of the project, the San Andreas Fault zone is comprised of San Gregorio Fault, San Andreas Fault, Golden Gate Fault, and multiple unnamed fault traces. The “western boundary fault” or the San Gregorio Fault is located west of the site. The 1906 surface fault rupture line (main trace) and three additional fault traces are also located west of the site. Slate Geotechnical Consultants (Slate) completed a Fault Rupture Hazard Displacement Report and estimated the closest fault trace as about 16.6 m (54 ft) from the southwest corner of the proposed bridge.

We include a geologic map of the project area on Figure 3 in Appendix I.

5.2 SURFACE CONDITIONS

The project site is located adjacent to the wetlands of Bolinas Lagoon. Site topography at the proposed bridge location is essentially flat and slopes very gently to the south. Lewis Gulch Creek (part of the stream realignment), Wilkins Gulch Creek, and surface runoff drain southerly into the lagoon.

The project site is located in a rural area of the county with residences nearby. The Golden Gate National Recreational Area manages land to the east of the site. Overhead utility lines are present at the site and parallel the east side of Olema-Bolinas Road and the south side of State Route 1. An underground communication line is also present in the southbound shoulder of State Route 1. Locations of other utilities, if present, are unknown.

5.3 SUBSURFACE CONDITIONS

Earth materials encountered in the borings completed for this study are considered consistent with the published geologic mapping and are separated into three general soil units considered significant to the proposed project as summarized below. Refer to the LOTB drawing and boring logs in Appendix III that show more specific soil descriptions and boring details for borings R-21-001, A-21-003, R-21-003, A-21-004, A-21-005, D-21-006, and D-21-007. Refer to the 2022 Caltrans Standard Plans A10F, A10G and A10H that provide an explanation of terms and engineering geology descriptors used to log the soil. For AECOM borings B1 and B6, refer to Appendix IV.

[4] Cochrane, G.R., Dartnell, Peter, Johnson, S.Y., Greene, H.G., Erdey, M.D., Golden, N.E., Hartwell, S.R., Manson, M.W., Sliter, R.W., Endris, C.A., Watt, J.T., Ross, S.L., Kvitek, R.G., Phillips, E.L., Bruns, T.R., and Chin, J.L., 2015, California State Waters Map Series: offshore of Bolinas, California: U.S. Geological Survey, Open-File Report OF-2015-1135, scale 1:24,000

We completed boring A-21-002 within the paved eastbound lane of Fairfax-Bolinas Road and the encountered pavement section consists of 1-inch of Hot Mix Asphalt (HMA) over 4-inches of Aggregate Base (AB) at this location.

- **Unit 1** consisted of very soft to hard lean clay, fat clay, and silty clay and loose clayey sand. Unit 1 was penetrated from the ground surface to a depth of about 15 ft bgs (elev. 5 ft) at the bridge piers (R-21-001 and R-21-003). Unit 1 was interpreted in D-21-006 and D-21-007 (roadway explorations) with the apparent cohesion of very soft to medium stiff to approximately elev. 7 ft. In Boring A-21-002 along Fairfax-Bolinas Road, Unit 1 materials were encountered below the pavement section to the terminal boring depth with the upper 4.5 ft interpreted as roadway fill. We interpret Unit 1 as alluvium and estuarine deposits (Qes, Qed, and Qa).

- **Unit 2** consisted of stiff to hard clay and loose to very dense clayey sand, silty sand, and poorly-graded sand with clay. Materials of this unit were encountered below Unit 1 to approximately 46 to 55 ft bgs (elev. -33 at Pier 1; elev. -28 at Pier 2). D-21-006 and D-21-007 terminated in Unit 2 within materials exhibiting apparent cohesion of stiff to hard. Borings A-21-004 and A-21-005 also terminated within Unit 2.

- **Unit 3** consisted of variably weathered/fractured sedimentary bedrock (claystone, sandstone, and shale interpreted as Kfs) and was encountered below Unit 2 soils to the maximum depth explored (91 ft; elev. -71). The top of rock appears to slope south with rock encountered at elev. -17 ft approximately 200 ft north of Pier 2 (B1), elev. -28 at Pier 2 (R-22-003), elev. -33 at Pier 1 (R-22-001), and at elev. -42 approximately 200 ft south of Pier 1 (B6). Unit 3 bedrock in borings R-21-001, R-21-003, and B1 consisted of claystone and sandstone. Shale was encountered in AECOM boring B6, located south of the San Andreas fault trace. Unit 3 bedrock was augered in borings R-21-003, B1, and B6 and until elev. -55 ft in boring R-21-001. Bedrock was cored in R-21-001 (Pier 1) from elev. -55 to the terminal boring depth (91 ft; elev. -71). Due to the softness[5] of the bedrock, the Rock Quality Designation (RQD) was considered 0% for R-21-001. The overall rock mass quality of Unit 4 is generally classified as “very poor” based on Table 4.4.8.1.2A of Caltrans Bridge Design Specifications (November 2003).

A Point-Load Index test (utilizing a Soiltest Model RM-735 testing apparatus) was completed in the laboratory on a rock core sample in evaluation of the bedrock compressive strength. Point Load Index test results on rock core sample tested indicate correlated uniaxial compressive strength of 500 psi in boring R-21-001. Factors accounting for the variability in point load strength include rock composition, fracturing, grain size, and weathering characteristics. Lower or higher values at different locations and depths cannot be precluded.

The correlated uniaxial compressive strength of the rock core sample tested is shown on the LOTB drawing. The Point Load Index test results are included in Appendix VI.

[5] FHWA NHI-06-008 Section 3.6.5.5, page 3-47

6 GROUNDWATER

Groundwater encountered in the 2017 AECOM borings ranged from 1.5 to 10 ft bgs during their subsurface exploration. AECOM installed four groundwater monitoring wells and measured groundwater depths ranging from 0.3 to 2.8 ft bgs between March and April of 2017.

Groundwater encountered in the 2021Crawford borings ranged from 3.5 to 21.5 ft bgs. The borings were backfilled before reliable "static" groundwater level measurements could be taken (24 hours or more is commonly needed to define "static" level). Groundwater was not encountered in boring A-21-002. Boring A-21-002 was explored to a maximum depth of 6.5 ft (elev. 3.5 ft).

Groundwater data collected by Crawford and AECOM is provided in Table 2.

Table 2: Groundwater Data

Boring ID	Approx. Ground Surface Elevation (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Date Measured	Monitoring Well Installed?
B-1 (AECOM)	28	10	18	3/27/17	Yes
B-2 (AECOM)	21	5.2	15.8	3/28/17	Yes
B-3 (AECOM)	13	1.5	11.5	3/30/17	No
B-4 (AECOM)	8	2.8	5.2	3/31/17	Yes
B-5 (AECOM)	8	2.8	5.2	3/30/17	No
B-6 (AECOM)	13	1.9	11.1	4/20/17	Yes
B-7 (AECOM)	12	4.9	7.1	4/21/17	No
R-21-001	20	21.5	-1.5	10/5/21	No
R-21-003	20.2	15	5.2	10/7/21	No
A-21-004	24	10	14	10/8/21	No
A-21-005	12.3	3.5	8.8	10/8/21	No

Groundwater and seepage at the bridge site is expected to coincide with surface water elevation in realigned Lewis Gulch Creek. Groundwater levels can fluctuate due to changes in precipitation, seasonal variations, creek level, sea level rise, and possibly other factors. Based on the historical groundwater data and expected sea level rise, the groundwater elevation used for design is 18 ft.

7 AS-BUILT DATA

The proposed bridge is a new structure and no as-built plans exist.

8 SCOUR DATA

Scour data provided by Mark Thomas is summarized in Table 3.

Table 3: Scour Data

Support Location	Long Term Scour (Degradation and Contraction) Elevation (ft)	Short Term Scour (Local) Depth (ft)
Pier 1	15	2
Pier 2	15	2

We understand that bridge design will also include consideration of scour caused by a tsunami event. Based on conversations with Mark Thomas, a design tsunami event at this site has the potential to scour down to resistant bedrock. Based on the quality of sedimentary bedrock encountered in borings R-21-001 and R-21-003, we estimate scour resistant bedrock at elev. -38 ft.

9 CORROSION EVALUATION

The project is located in a marine environment and near a tidal channel (chloride concentration in seawater is approximately 19,000 mg/l) that is considered corrosive and the design of reinforced concrete and steel foundation elements should consider potential exposure to corrosive salt water and marine atmosphere.

For structural elements, Caltrans[6] defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 1,500 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE wall design, Caltrans does not include minimum resistivity as a parameter to define a corrosive area for structures. Soil and water are not required to be tested for chlorides and sulfates if the minimum resistivity is greater than 1,100 ohm-cm.

The results of corrosivity tests on soil samples obtained from the borings completed for this project are summarized in Table 4.

Table 4: Soil Corrosion Test Summary

Boring / Sample No.	Depth (ft)	Elevation (ft)	Soil Descriptio n	Minimum Resistivity (ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)	Corrosive?
R-21-003 / 2A	5.5	14.7	Lean Clay with Sand	3,750	5.47	7.3	18.4	Yes
R-21-003 / 9	25	-3	Lean Clay	1,820	6.76	8.1	19.0	No

Based on the corrosivity test results summarized in Table 4 and current Caltrans' guidelines, the site is corrosive to structural concrete/steel foundation elements due to marginal pH = 5.47 (<5.5). The test results are only an indicator of soil corrosivity. Section 12 of Caltrans' guidelines

6 Caltrans, Corrosion Guidelines Version 3.2, May 2021.

provides information regarding corrosion mitigation measures for structural elements and lists additional Caltrans guideline documents regarding corrosion mitigation if deemed appropriate by the designer. The designer should also consult with a corrosion engineer if the test result values are considered significant.

10 SEISMIC INFORMATION

10.1 SHEAR WAVE VELOCITY AND CLASSIFICATION OF SOILS

For this project, a correlated shear wave velocity (V_{S30}) in the upper 30 meters (100 ft) of the soil profile equal to 319 meters per second (about 1,047 ft/sec) is considered appropriately conservative for use in new bridge design.

The correlated V_{S30} values estimated from the test boring logs are shown in Table 5.

Table 5: Correlated Shear Wave Velocity

Support Location	Boring Designation	Top of Boring Elevation (ft)	Bottom of Boring Elevation (ft)	Total Boring Depth (ft)	Correlated Shear Wave Velocity in Upper 100 ft	
					V_{S30} (m/sec)	V_{S30} (ft/sec)
Pier 1	R-21-001	20	-71	91.0	319	1,047
Pier 2	R-21-003	20.2	-60.3	80.5	329	1,081

For seismic design, Caltrans classifies soil as either Class S1 or Class S2. The Class S1 soil classification represents competent soil. The Class S2 soil classification represents non-competent soils, including marginal soil, poor soil and soil susceptible to lateral spreading.

According to Caltrans' SDC V2.0, Class S1 soil must meet all of the following criteria:

- Standard Penetration Test, $(N_1)_{60} \geq 30$ (Granular Soils)
- Undrained Shear Strength, s_u > 2,000 psf (Cohesive Soils)
- Shear Wave Velocity, V_{s30} > 886 ft/sec
- Not susceptible to liquefaction, lateral spreading, or scour

Soil that does not satisfy the requirements for S1 listed above is to be classified as Class S2 soil.

Based on the boring data and criteria listed above, site soils are classified as Class S2 (non-competent) due to the presence of granular soil layers with $(N_1)_{60} < 30$, clays with s_u < 2,000 psf, potential liquefaction, and potential scour. The simplified design method as specified in Section 6.2.3.2 of Caltrans' SDC V2.0 is not allowed for piles founded in Class S2 soil and lateral analysis as specified in Section 6.2.4.2 of Caltrans' SDC V2.0 is required.

10.2 GROUND MOTION HAZARD

10.2.1 METHODOLOGY

The Caltrans ARS Online (V3.0.2)[7] web-based tool was used to calculate the probabilistic acceleration response spectra for the site based on criteria outlined in Appendix B of Caltrans SDC.

We assume the new bridge is categorized as Ordinary. For Ordinary bridges, the design spectrum is based on the Safety Evaluation Earthquake (SEE) spectrum only. A probabilistic evaluation approach is used to determine the SEE design spectrum taken as the spectrum based on the 2014 USGS Seismic Hazard Map for the 5% in 50 years probability of exceedance (or 975-year return period).

Caltrans structure design practice requires an increase to spectra due to fault proximity (near-fault factor) and when the site is located over a deep sedimentary basin (basin factor). The near-fault adjustment factor is applied for locations with a site to rupture plane distance (Rrup) of 25 km (15.6 miles) or less to the causative fault and is based on the deaggregated mean distance for spectral acceleration at a period of 1.0 second. The near-fault factor applies to the site; the basin factor does not apply to this site.

The mean magnitude value reported by ARS Online is not used in the ground motion calculation. It is included to support simplified liquefaction analysis and is obtained from a hazard deaggregation performed at the Peak Ground Acceleration (PGA).

10.2.2 RECOMMENDED SEISMIC DATA

Based on the above information, we recommend structure design for an ordinary bridge using the SEE Design Spectrum in accordance with following Caltrans SDC parameters:

- Shear Wave Velocity, V_{S30}: 319 m/s (1,047 ft/s);
- PGA: 0.9g;
- Magnitude (M) at PGA: 7.67; and
- Mean Site-to-Fault Distance at 1.0 Second: 0.7 km (0.4 mi).

The Design Ground Motion Data Sheet presenting the SEE Design ARS data, curve, and other relevant information is in Appendix II. Nearby faults are shown on Figure 4 in Appendix I.

10.3 OTHER SEISMIC HAZARDS

10.3.1 SURFACE FAULT RUPTURE

The site is located within an Alquist–Priolo Earthquake Fault Zone (EFZ) mapped by the California Geologic Survey. An Earthquake Fault Zone is defined as a regulatory zone around a fault that shows evidence of surface rupture within the past 11,000 years. Based on Caltrans Memo to Designers 2013 (MTD) 20-10, a fault rupture hazard analysis is required.

Crawford consulted with Caltrans' engineering geologist Ms. Anna Sojourner to discuss Caltrans' procedures to evaluate surface fault rupture for bridge design. Following our

[7] https://arsonline.dot.ca.gov/, accessed 1/2/2023.

consultation with Ms. Sojourner, Crawford subcontracted with Slate Geotechnical Consultants (Slate) to perform a surface fault rupture study following the guidelines outlined in Caltrans' draft Fault Rupture Manual.

Slate performed the surface fault rupture study and recommended the bridge be designed for 0.34 m (about 1.1 ft) of displacement based on Caltrans' fault rupture design methodology. Slate also estimated the closest fault trace as about 16.6 m (54 ft) from the southwest corner of the proposed bridge.

Slate's Surface Fault Rupture Study is provided in Appendix VIII.

10.3.2 LIQUEFACTION POTENTIAL

Soil liquefaction can occur when saturated, relatively loose sand and specific soft, fine-grained saturated soils (typically within the upper 50 feet) are subject to ground shaking strong enough to create soil particle separation that results from increased pore pressure. This separation and subsequent pore pressure dissipation can lead to decreased soil shear strength and settlement. Liquefaction is known to occur in soils ranging from low plasticity silts to gravels. However, soils most susceptible to liquefaction are clean sands to silty sands and non-plastic silts. Granular soils with SPT blow count $(N_1)_{60} \geq 30$, rock and most clay soil are not liquefiable.

Based on our analysis/review of the 2021 borings, potentially liquefiable soil layers are identified in borings R-21-003 and A-21-004. Refer to Appendix VII for the design assumptions, methodology, and summary.

10.3.3 SEISMIC SETTLEMENT

During a seismic event, ground shaking can cause densification of granular soils that can result in settlement of the ground surface. For bridge foundation design, we consider the potentially liquefiable soil layers identified in Appendix VII to be subjected to reduction to residual shear strength values and seismically induced (vertical) settlement under conditions of strong ground shaking from a design earthquake event.

Based on our analysis, the magnitude of potential post-liquefaction ground settlement associated with the susceptible soil layers at Pier 1 (R-21-001) is about 2-inches.

The methods outlined by Idriss and Boulanger (2008)[8] were used to estimate post-liquefaction settlement. The method follows the approach developed by Ishihara and Yoshimine (1992) that relates volumetric strain, SPT $(N_1)_{60cs}$ [i.e., $(N_1)_{60}$ values corrected for fines content], and the factor of safety against liquefaction (FS_L) to estimate the post-liquefaction settlement of a liquefied layer.

10.3.4 SEISMIC SLOPE INSTABILITY

The potential for seismically induced slides on 2H:1V or flatter slopes constructed as planned for this project, is also considered low. Therefore, seismic instability of the planned engineered fill slopes is considered insignificant and not a design consideration.

[8] Idriss, I. M. and Boulanger, R. W., "Soil Liquefaction During Earthquakes," Earthquake Engineering Research Institute, pages 140-142 and 152-158, 2008.

10.3.5 LATERAL SPREADING

Lateral spreading, characterized by incremental flow-failure within liquefiable soil on sloping ground or a free face, is capable of producing horizontal ground displacement during a seismic event. Youd et al. (2002)[9] indicate that potentially liquefiable soil layers with SPT $(N_1)_{60}$ values greater than 15 blows per foot (bpf) are too dense and dilative for lateral spread to occur. The potentially liquefiable soil layer identified at this site has an average $(N_1)_{60} > 15$. Therefore, lateral spreading is not a consideration for bridge foundation design at this site.

10.3.6 TSUNAMI

The west coast of California is subject to tsunami hazard. A tsunami is a large sea wave or series of waves generated by the sudden displacement in the sea floor that can be produced by an earthquake, submarine landslide, volcanic activity, or other event that causes large-scale disturbance of the sea floor.

Based on the regional mapping[10], the site is within a tsunami hazard area. Potential hazard from a tsunami to the proposed bridge could include debris impact to the structure and possible erosion/scour due to temporary increased flow rate through the creek.

We understand the project team contracted with Arcadis to model a design tsunami wave at the project site. The bridge and foundation design include considerations for a design tsunami wave loading and associated scour.

11 GEOTECHNICAL RECOMMENDATIONS

The site is considered adequately stable with support available for new bridge foundations established within the underlying rock. The site is located within a seismically active region and high ground shaking can be expected at the site during the design life of the bridge.

Geotechnical conditions that will require particular consideration in new foundation/roadway design and construction include:

- Potential surface fault-rupture.
- Tsunami scour and wave loading.
- Differential settlement between the bridge and structure embankment approaches due to the presence of thick clay layers and potential for long-term static (consolidation) settlement.
- Potential for differential settlement within the planned embankment due to a portion of the embankment being constructed within both the coast live oak woodland, forested wetlands, and the existing roadway.
- Sloping top of rock elevation across the site.
- Potentially liquefiable soil layers.
- Presence of relatively shallow groundwater.
- Constructability over soft, saturated soils.

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[9] Youd, et.al, Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacement, December 2002.

[10] Patton, J.R., and Wilson, R.I., 2022. Tsunami Hazard Area Map, Marin County; produced by the California Geological Survey and the California Governor's Office of Emergency Services; dated 2022, displayed at multiple scales.

Current project design and construction will need to accommodate roadway settlement, liquefaction settlement at the bridge, and associated loading conditions. Specifically, vertical (un-battered) piles and use of approach slabs are recommended.

Due to the potential for deep scour caused by a design tsunami event at this site, the use of large diameter CIDH (Type II) shafts to provide adequate lateral resistance are considered most appropriate for new bridge foundations and are recommended. CIDH piles may also be preferable due to potential noise/vibration constraints at the site. Such piles will require the use of permanent steel casing to accommodate the construction joint and penetration into the underlying bedrock unit. The casing diameter should be at least 8-inches greater than the CIDH pile to help prevent binding of the drilling tool. CIDH piles will be installed in the “wet” due to high groundwater at the site. The foundation recommendations in this report for the 66-inch diameter CIDH piles with 74-inch diameter permanent casing are in accordance with the AASHTO LRFD Bridge Design Specifications[11] (BDS) with Caltrans Amendments.

The use of large diameter Cast-In-Steel-Shell (CISS) piles are also considered feasible. Excavation requirements/impacts in the channel would be similar to CIDH piles. CISS piles can provide excellent resistance against horizontal loads and are a good option where scour potential exist that will cause long unsupported pile lengths. Challenges with such piles at this site include transporting/handling long pile lengths, installation by means of vibration and/or hard driving conditions through dense and very dense granular soils/rock that would require center relief drilling, and pile driving acoustic and vibration impacts.

The use of Caltrans Standard pre-cast concrete piles (Alternative “X” and “Y”) and steel pipe piles (Alternative “V” and “W”) are not considered appropriate at this site due to the potential for hard driving within rock above specified tip elevation (possibly resulting in damage to the pile). Pre-drilling or relief drilling might be required to achieve assured pile penetration without damaging the pile. Steel H-section piles could achieve adequate bearing, but would require significantly greater penetration than concrete or steel pipe piles to achieve an equivalent geotechnical resistance.

Spread footing foundations are not recommended due to limited bearing resistance, potentially excessive settlement, lateral loading, and scour.

11.1 DEEP FOUNDATIONS

11.1.1 FOUNDATION DATA AND LOADING

Foundation data and loading for the proposed pile foundations provided by Mark Thomas are shown in Tables 6 through 8

[11] American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications, 8th Edition, November 2017

Table 6: Foundation Design Data

Support Location	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement – Service Load (in)	Number of Piles per Support
				B	L		
Pier 1	66-inch CIDH Concrete Piles (Type II Shaft)	16.08	12	0	0	2	2
Pier 2	66-inch CIDH Concrete Piles (Type II Shaft)	16.33	12	0	0	2	2

Table 7: Foundation Factored Design Loads

Support No.	Service-I Limit State (kips)		Strength/Construction Limit State (Controlling Group, kips)				Extreme Limit State - Seismic (Controlling Group, kips)				Extreme Limit State - Tsunami (Controlling Group, kips)			
	Total Load Per Support	Permanent Loads Per Support	Compression		Tension		Compression		Tension		Compression		Tension	
			Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Pier 1	1,000	600	1,540	770	0	0	600	300	0	0	940	470	0	0
Pier 2	1,000	600	1,580	790	0	0	600	300	0	0	940	470	0	0

Table 8: Foundation Factored Design Lateral Loads

Support No.	Service-I Limit State (kips)		Strength/Construction Limit State (Controlling Group, kips)		Extreme Limit State - Seismic (Controlling Group, kips)		Extreme Limit State - Tsunami (Controlling Group, kips)	
	Total Load Per Support	Permanent Loads Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Pier 1	560	400	600	300	1,100	550	360	180*
Pier 2	560	400	600	300	1,100	550	360	180*

*180kips in the transverse direction; 160kips in the longitudinal direction

11.1.2 FOUNDATION DESIGN RECOMMENDATIONS

The foundation recommendations for 66-inch diameter CIDH piles at the piers are summarized in Table 9. Refer to Appendix VII for our foundation design calculations that include geotechnical design parameters, assumptions, methodology, and summaries/results of our pile compression resistance, tension resistance, lateral resistance, settlement, negative skin friction and group reduction analyses.

Table 9: Foundation Design Recommendations

Support Location	Pile Type	Cut-off Elev. (ft)	Service-I Limit State Load Per Support (kips)		Total Permissible Support Settlement (inches)	Nominal Resistance (kips)						Top of Rock Elev. (ft)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Steel Casing Specified Tip Elev. (ft)[4]
						Strength/Const.		Extreme - Seismic		Extreme - Tsunami					
			Total	Perm.		Comp. $\phi = 0.7$	Tens. $\phi = 0.7$	Comp. $\phi = 1.0$	Tens. $\phi = 1.0$	Comp. $\phi = 1.0$	Tens. $\phi = 1.0$				
Pier 1	66-inch CIDH Concrete Piles (Type II Shaft)	12	1,000	600	2	1,100	N/A	300	N/A	470	N/A	-30±	-46 (a-I) -21 (a-II) -53 (a-III) -21 (b-I) -28 (b-II) -69 (b-III)	-69	-5
Pier 2	66-inch CIDH Concrete Piles (Type II Shaft)	12	860	540	2	1,130	N/A	300	N/A	470	N/A	-35±	-38 (a-I) -14 (a-II) -53 (a-III) -21 (b-I) -28 (b-II) -69 (b-III)	-69	-5

Notes:
1) Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event-Seismic), (a-III) Compression (Extreme Event-Tsunami), (b-I) Lateral Load (Service), (b-II) Lateral Load (Extreme – Seismic), and (b-III) Lateral Load (Extreme -Tsunami).
2) Design Tip Elevations for settlement are not calculated because the piles are tipped into rock.
3) The Specified Tip Elevation should not be raised above the lateral design tip elevation.
4) Bottom of permanent casing elevation.

11.1.3 PILE DATA TABLE

The recommended Pile Data Table is presented as Table 10.

Table 10: Pile Data Table

Location	Pile Type	Nominal Resistance (kips)		Top of Rock Elev. (ft)	Design Tip Elevations (ft)	Specified Tip Elevations (ft)	Steel Casing Specified Tip Elev. (ft)[4]
		Compression $\phi = 0.7$	Tension				
Pier 1	66-inch CIDH Concrete Piles (Type II Shaft)	1,100	N/A	-30±	-53 (a) -69 (b)	-69	-5
Pier 2	66-inch CIDH Concrete Piles (Type II Shaft)	1,130	N/A	-35±	-53 (a) -69 (b)	-69	-5

Notes:
1) Design tip elevations are controlled by: (a) Compression and, (b) Lateral Load.
2) Design Tip Elevations for settlement are not calculated because the piles are tipped into rock.
3) The Specified Tip Elevation should not be raised above the lateral design tip elevation.
4) Bottom of permanent casing elevation.

The controlling limit state is the tsunami lateral loading.

11.2 DYNAMIC MONITORING AND PILE LOAD TESTING

Sample borings, load test piles and dynamic monitoring are not necessary for this project.

11.3 APPROACH FILLS AND GRADING

The realignment of Olema-Bolinas roadway includes new pavement in the coast live oak woodland, forested wetlands, and existing roadway. The embankment fill will experience differential settlement across these areas. This differential settlement may cause a linear roadway crack; therefore, we provide the following recommendations in an attempt to reduce the amount of differential movement experienced by the embankment and therefore the roadway. Some degree of additional maintenance (cracking sealing, grinding, and/or potentially additional overlays) should be expected over the first five to six years as the settlement comes to equilibrium.

11.3.1 EARTHWORK

Site grading and earthwork should be performed in accordance with Section 17 and Section 19 of Standard Specifications[12], respectively.

11.3.2 FILL MATERIAL

The source of borrow material for construction of approach fills has not been identified. All imported borrow should be tested and approved by the resident engineer prior to transporting to the site and used as compacted fill. In general, all fill material should be free of debris and organic material.

Import soil for new general embankment fill should meet the following criteria: contain no visual concentration of organics, debris or deleterious materials; have a maximum particle size of 3-inches with at least 50% passing the No. 4 Sieve and at least 15% passing the No. 200 sieve; and have low expansion potential (i.e., Expansion Index (EI) ≤ 50 and Sand Equivalent (SE) ≥ 20).

11.3.3 FILL LIMITS

Structure backfill must be placed behind the bridge piers following a 1:1 (H:V) slope that begins 1 ft horizontally from the end of the pile cap. The approach slabs should be supported on a minimum of 4 ft of fill meeting structure backfill requirements.

11.3.4 SUBGRADE PREPARATION/OVEREXCAVATION

Due to the soft soil condition within the existing unpaved areas, some level of overexcavation should be completed. We recommend the upper 18 inches of subgrade be removed and replaced with properly compacted fill per Section 11.3.5. The overexcavation requirement is not necessary within the existing pavement area. Prior to placing fill, to improve the subgrade and reduce the amount of differential settlement, we recommended the use of a Mirafi HP570 or equivalent geotextile fabric between the exposed subgrade/existing pavement and embankment fill. The geotextile should extend across the full roadway section including the shoulder.

[12] Caltrans, Standard Specifications, 2022

The subgrade and existing asphalt surface should be smooth and free of rough edges prior to placing geotextile fabric. Place the geotextile fabric per manufacturers. Overlap adjacent geotextile fabrics at least 3 ft. Due to the expected soft and saturated conditions within the exposed subgrade (following the overexcavation) processing and compacting the subgrade is not necessary prior to placing the geotextiles fabric. Depending on the amount of movement/pumping in the subgrade an additional layer of fabric may be necessary to bridge the soft subgrade conditions.

11.3.5 FILL PLACEMENT AND COMPACTION

Construct embankment and place new fill in accordance with Caltrans Standard Specifications, including at least 95% relative compaction per CTM 216 on all fill within 150 ft of bridge piers. Soil should be placed in thin lifts (6 to 8-inches) prior to compaction.

11.3.6 SLOPE GEOMETRY AND STABILITY

The maximum new fill height for the embankments is indicated to be up to 5 ft tall. Based on boring data generated for this study, the subsurface soils along the alignment consist predominately of soft to hard cohesive soil layers and medium dense to loose granular soils. Such soils are expected to settle and consolidate under the anticipated fill loads. We expect that new embankment constructed as above, and with exterior side slopes at 2:1 (H:V), or flatter, will be stable.

11.3.7 EROSION CONTROL

Soils used for embankment construction are considered at least locally susceptible to erosion and provisions for erosion control (such as planting, erosion control mats, etc.) are recommended. Over-side runoff from pavement should be controlled by use of curbs, dikes, down-drains, gutters, etc. Local sloughing is expected to be controllable by typical maintenance procedures.

11.3.8 SETTLEMENT

Native soils are expected to adequately support proposed new/widened embankment without gross distress, but with settlement. The settlement of newly constructed embankments is expected to occur due to compression of the underlying soils and compression of the fill itself.

The settlement due to new embankment fill is generally above the bridge foundations. Per AASHTO Section 3.11.8, the pile will be subjected to downdrag if the settlement in a soil layer is 0.4-inches or greater relative to the pile. Static settlement below 8 ft (elev. 12) due to the embankment is less than 0.4-inches per soil layer and therefore is not a design consideration for bridge foundations. However, the consolidation settlement is expected to affect the roadway approaches.

Generally, the north approach is located on coast live oak woodland where poor soil conditions were encountered. Along the north approach embankment, we anticipate about 4 to 6 inches of settlement (3 to 5 inches being consolidation and secondary settlement). The south approach is located along the existing Olema-Bolinas roadway alignment and forested wetlands. Along the south approach embankment, we anticipate about 5 to 8 inches of settlement (4 to 5 inches being consolidation and secondary settlement).

See Appendix VII for further details about the roadway approach settlement.

11.3.9 WAITING PERIOD

The majority of the settlement is expected above the bridge foundations. Therefore, no waiting period is required for the bridge foundations.

A 90-day waiting period should be specified from the time of completion of the approach embankments before installation of the approach slab and pavement section. We understand the design team anticipates opening the roadway to traffic during the waiting period with temporary pavement. Do not excavate for approach slabs before the end of the settlement period.

Approximately 50% of the expected settlement is expected to occur during the initial construction and settlement waiting period. It is advised/recommended that embankment fill construction be completed as soon as practical to maximize the waiting period.

To reduce the settlement waiting period, wick drains, surcharging the fill, and/or utilization of lightweight fill can be considered.

12 PAVEMENT SECTION

To improve the roadway performance, we recommend utilizing a composite SEG_G and SEG_T (separation and stabilization) geosynthetic between the embankment fill and aggregate base similar to Mirafi HP570. In Table 11, we provide pavement recommendations based on a composite geosynthetic.

Table 11: New Pavement Structural Sections (R-value = 20 with Geotextile/Geogrid)

Section Alternatives	Material	Traffic Index (TI)						
		5.0	5.5	6.0	6.5	7.0	7.5	8.0
Hot Mix Asphalt (HMA) over Class 2 Aggregate Base (AB)	HMA (feet)	0.20	0.25	0.25	0.30	0.30	0.35	0.40
	AB (feet)	0.75	0.75	0.90	0.95	1.05	1.10	1.15

13 NOTES FOR SPECIFICATIONS

This section is provided to assist the designer develop the geotechnical related Standard Special Provisions (SSPs) for this project element. Before using the information provided in this section, the designer should read and review the report to comprehend the contents and intent of the geotechnical design.

For the project described herein, we also recommend that the foundation report, log of test borings and legend, and any subsequent addenda be included with project documents during the bidding process for reference purposes.

13.1 WAITING PERIOD

At the roadway approaches, a 90-day settlement period should be specified from the time of completion of the approach embankment to the installation of approach slab and pavement to account for variability within the subsurface soil profile. Do not excavate for approach slabs before the end of the settlement period.

It is advised/recommended that embankment fill construction be completed as soon as practical to maximize the waiting period prior to start of bridge construction.

13.2 EXISTING FACILITIES

Overhead utility lines are present at the site and parallel the east side of Olema-Bolinas Road and the south side of State Route 1. An underground communication line is also present in the southbound shoulder of State Route 1. To avoid damaging these utilities, the lines should be rerouted or protecting in place (structures, lightweight fill, etc.).

13.3 VIBRATION AND NOISE MONITORING

The proposed bridge is located near residences and within an environmentally sensitive area. Vibration and noise monitoring during pile installation should be considered by the design team.

13.4 GEOSYNTHETICS

We recommended a SEG_T (Mirafi HP570 or equivalent) between the native soil/existing pavement and roadway/embankment fill. We recommend an additional layer of Mirafi HP570 or equivalent between the embankment fill and roadway aggregate base.

14 NOTES FOR CONSTRUCTION

14.1 CONSTRUCTION CONSIDERATIONS FOR CIDH PILES

Construct CIDH piles in conformance with Section 49-3 of the 2022 Caltrans Standard Specifications, Revised Standard Specifications, and Standard Special Provisions. Since groundwater was encountered in the borings completed for this project, we recommend that the CIDH piles be installed using the “wet” method, including slurry drilling and concrete placed under slurry using tremie pipe. The slurry construction method (“wet” method) requires placement of inspection tubes to permit Gamma-Gamma Logging (GGL) and Cross-hole Sonic Logging (CSL) of the CIDH pile.

Permanent casing for Type II shafts should extend to 5 ft below the construction joint and is anticipated to be 17 ft long. The tsunami scour Limit State controls the foundation design at both piers and geotechnical resistance is ignored in the tsunami scour interval. Geotechnically, it is permissible for the contractor to install the permanent casing below elev. -5 ft at the piers but not below elev. -38 ft. The casing diameter should be at least 8-inches greater than the CIDH pile to help prevent binding of the drilling tool.

If the contractor elects to use temporary casing in addition to permanent casing, it is their responsibility for the design and installation.

The project specifications should explicitly prohibit vibration and impact installation methods if noise or vibrations are of concern or otherwise not allowed due to environmental constraints, proximity of nearby residences or to protect existing facilities (e.g., underground utilities potentially susceptible to vibration damage). Determination of noise and vibration requirements are to be made by others.

The permanent steel casing may be placed in a drilled hole, and annular space backfilled with grout (Standard Specifications 49-3.02B(5), 49-3.02C(6)). It is also permissible to drill/oscillate/rotate the permanent casing into place. Provided that noise and vibration are acceptable for this project/site, installation by driving or vibration is also permissible.

If rotator/oscillator methods are used to install temporary or permanent steel casing the contractor should be prepared for subsurface soil conditions that include layers of silty/clayey sand, poorly graded sand, and soft to hard lean clay. If utilized, temporary casing must be removed during placement of concrete.

If an oscillator or rotator is used to construct the CIDH piles:

- The contractor must maintain a positive fluid head within the drill road at all times. Due to the presence of silty sand at the CIDH tip elevation the fluid must be mineral or polymer slurry; water is not permitted.
- The contractor is to maintain a minimum 10-foot soil plug within the drill rod. The 10-foot plug is to be maintained until the drill rod reaches the specified tip elevation. It may be necessary to extend the casing below the bottom of the pile tip to maintain a soil plug to help maintain stability at the base.
- The contractor must provide access to the top of the oscillator/rotator drill rod, as requested by the Engineer, to verify the positive head and minimum soil plug are being maintained.
- It is important to maintain continuous rotation/oscillation and place rebar/concrete expeditiously to avoid lockup. The contractor should take into account the work window allowed by the project specifications to install foundations when proposing oscillator/ rotator method of installation.

The CIDH piles are designed to obtain their geotechnical capacity in side resistance. Nonetheless, the bottom of drilled holes must be cleaned in accordance with Section 49-3.02C(2), “Drilled Holes,” of Caltrans 2022 Standard Specifications. Prior to approval, the Engineer must verify the bottom of drilled holes are cleaned before placement of concrete.

Excavation of the CIDH piles, placement of the rebar cage, and concrete pour should be completed in one continuous operation.

The contractor should anticipate variable drilling conditions in all CIDH pile excavations due to the variable weathering/fractures/hardness of the bedrock and sloping depth to rock. Variable drilling conditions may include alternating between soft and hard drilling techniques. The use of conventional drilling (i.e., soil augers) for CIDH pile excavations is not expected to be effective in advancing the hole within slightly weathered and hard bedrock. The contractor should be prepared to use “heavy duty” equipment specifically tooled for “hard” rock excavation. Coring and/or use of down-hole percussion hammer may be required for drill advancement in intact rock.

Rock core samples selected for laboratory rock strength tests may have broken or failed along preexisting planes of weakness and, as a result, the reported rock strengths may be less than the in-situ intact rock strength.

The rapid insertion and removal of the drilling tool may result in scouring the excavation sidewall within zones of decomposed to intensely weathered bedrock. Therefore, the contractor should exercise caution while drilling the CIDH pile excavations to help avoid such condition.

Prior to mobilization to the site, the foundation contractor should prepare a Pile Installation Plan in accordance with Section 49-3.02A(3)(b) of the Standard Specifications. The drilled shaft installation plan to be submitted by the contractor should include a description of the tools and equipment planned to be used by the contractor for CIDH pile installation. The actual tools and equipment used during CIDH pile excavation/installation should be documented in the construction records. If oscillator/rotator method is used, the contractor’s workplan should include/outline measures to extract a seized casing without compromising the integrity of the CIDH excavation.

14.2 EXCAVATION AND SHORING

Based on the subsurface conditions at this site, we expect that excavation to the indicated pile cut-off depths can be achieved using typical heavy-duty construction equipment. The contractor is responsible for design and construction of excavation sloping and shoring in accordance with Cal/OSHA requirements, including verifying soil type in open excavations, and to protect personnel, existing structures, utilities and other facilities during construction.

14.3 SOFT UNSTABLE SUBGRADE

The presence of soft and saturated subgrade soils encountered within the existing wetland and woodlands will make grading and compaction difficult. While the soil will support the ultimate embankment, the soil will experience pumping and shoving if subjected to heavy construction loading. Heavy compaction equipment has a tendency to increase the pore water pressure and therefore reduce the shear strength of fine-grained materials such as those encountered within the project area. The contractor should consider limiting the size and type of equipment used within the existing wetland and woodland areas.

14.4 DEWATERING

Based on groundwater data for this and other project elements, foundation excavations, roadway removals, and Lewis Gulch Creek grading are expected to be within or near groundwater.

Winter or spring construction, or periods during or following rain, can expect higher water surface level in the lagoon and may also encounter higher/perched groundwater levels. Nuisance water within foundation excavations may be present and the contractor should be prepared to dewater excavations with sump pumps and/or by means of diking/diversion of surface water (if present).

15 RISK MANAGEMENT

Our experience, and that of our profession, clearly indicates the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the Geotechnical Engineer of Record to provide additional services during design and construction. For this project, Crawford should be retained as the Geotechnical Engineer of Record to:

- Review and provide comments on the final plans and specifications, insofar as they rely upon this report, prior to construction bidding to verify consistency with the recommendations contained herein;

- Observe pile installation during construction in order to verify/confirm geotechnical resistance and provide additional or alternate recommendations if necessary; and,
- Update this report if design changes occur, 2 years or more lapse between this report and construction, and/or site conditions have changed.

Should there be significant change in the project or should soil conditions different from those described in this report be encountered during construction, this office should be contacted/notified for evaluation and supplemental recommendations as necessary or appropriate.

Crawford cannot be responsible for any other parties' interpretation of our report and recommendations contained herein, as well as subsequent addendums, letters, and discussions. If others perform the construction observation, they should review this report and either accept the conclusions and recommendations herein as their own or provide alternative recommendations.

16 LIMITATIONS

The conclusions and recommendations of this study are professional opinion based upon the indicated project criteria and the limited data described herein. It is recognized there is potential for variation in subsurface conditions and modification of conclusions and recommendations might emerge from further, more detailed study. This report is intended only for the purpose, site location, and project description indicated and construction in accordance with Caltrans practice.

As changes in appropriate standards, site conditions and technical knowledge cannot be adequately predicted; review of recommendations by this office for use after a period of two years is a condition of this report.

A review by this office of any foundation and/or grading plans and specifications or other work product insofar as they rely upon or implement the content of this report, together with the opportunity to make supplemental recommendations as indicated therefrom is considered an integral part of this study and a condition of recommendations.

Subsequently defined construction observation procedures and/or agencies are an element of work, which may affect supplementary recommendations.

Opinions and recommendations apply to current site conditions and those reasonably foreseeable for the described development--which includes appropriate operation and maintenance thereof. They cannot apply to site changes occurring, made, or induced, of which this office is not aware and has not had opportunity to evaluate.

APPENDIX I

North

Map Source:
-USGS 7.5' Topographic Maps, Bolinas, Marin County, California, 2018, Scale 1:24,000

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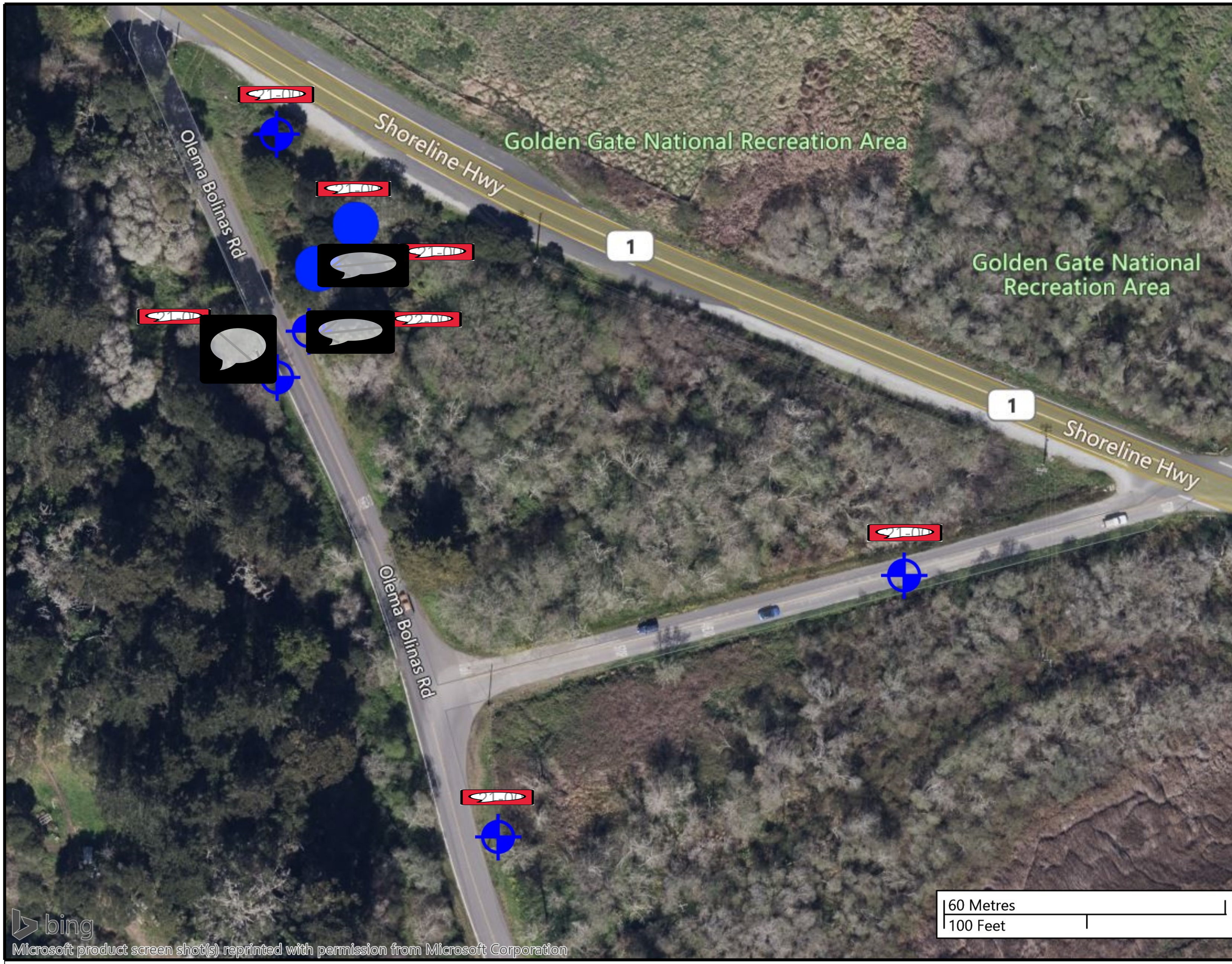
Taber Since 1954

MARIN COUNTY OPEN SPACE DISTRICT BOLINAS LAGOON WYE WETLANDS PROJECT

MARIN COUNTY, CA

Figure 1
Vicinity Map

Proj. No:	19-570.1
Scale:	1" = 2,000'
Date:	6/16/2020



Legend

- Boring Location
- Dynamic Cone Penetration Location

N

Basemap: OpenGround Cloud Map, using Bing Maps

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4701 Freeport Blvd
Sacramento, CA 95822

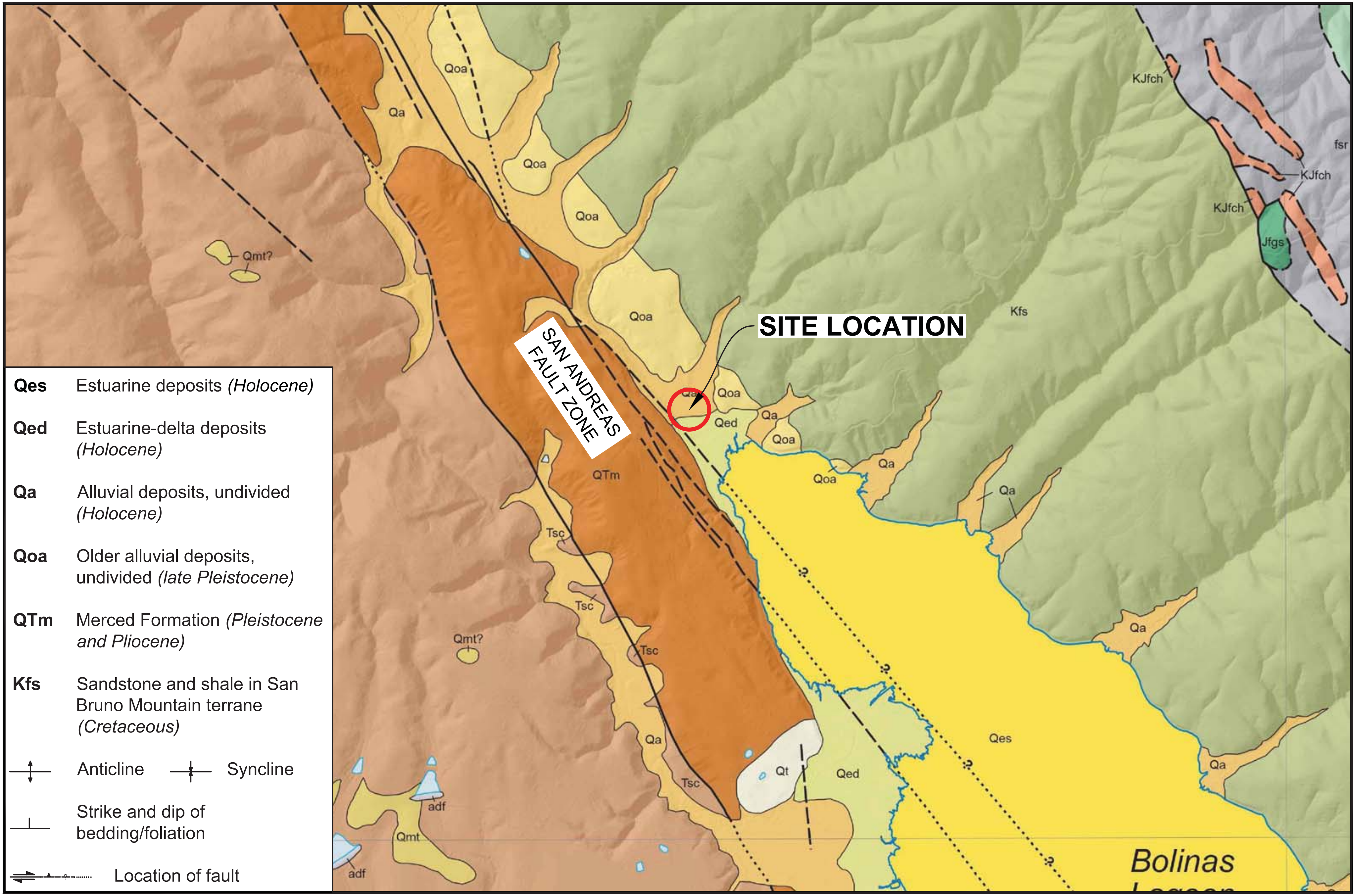
Bolinas Lagooon Wye Wetlands Project

Bolinas, CA

Figure 2

Exploration Map

Project ID	19-570.1
Scale	1:1200
Date	12/13/2022



North

Map Source:

-Cochrane, G.R., et al. *California State Waters Map Series: offshore of Bolinas, California*. 1:24,000. Denver, CO: U.S. Geological Survey, 2015, Sheet 10.

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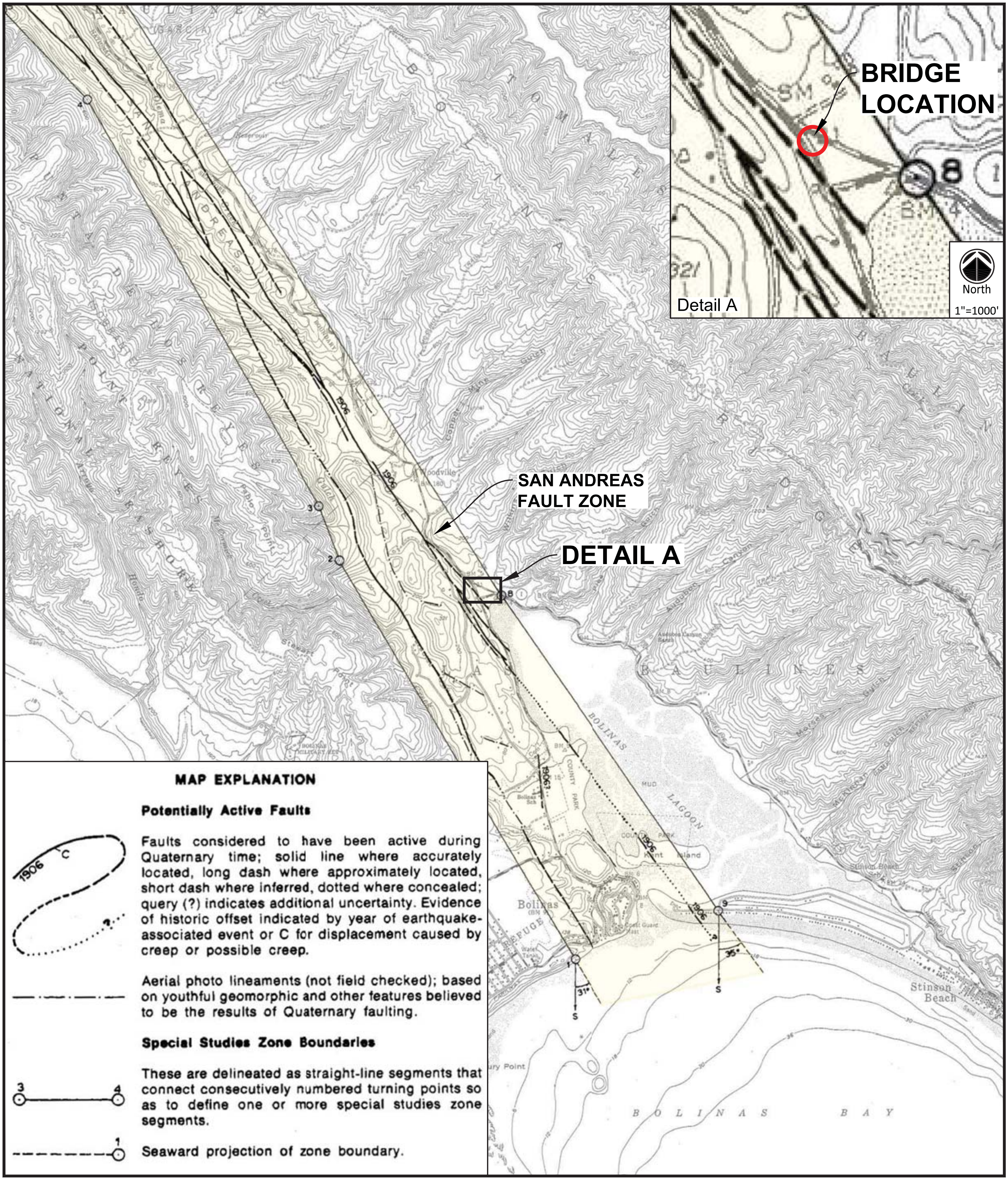
MARIN COUNTY OPEN SPACE DISTRICT
BOLINAS LAGOON WYE WETLANDS PROJECT

MARIN COUNTY, CA

Figure 3
Geologic Map

Proj. No:	19-570.1
Scale:	1"=2,000'
Date:	6/16/2020



North

Source:
James E. Slosson; Bolinas Quadrangle California - Marin Co. 7.5-Minute Series (Topographic); Special Study Zones
Scale: 1:24,000; California Division of Mines and Geology, 1974.

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MARIN COUNTY OPEN SPACE DISTRICT BOLINAS LAGOON WYE WETLANDS PROJECT

MARIN COUNTY, CA

Figure 4
Fault Map

Proj. No:	19-570.1
Scale:	1"=4,000'
Date:	12/17/21

APPENDIX II

Ground Motion Data Sheet

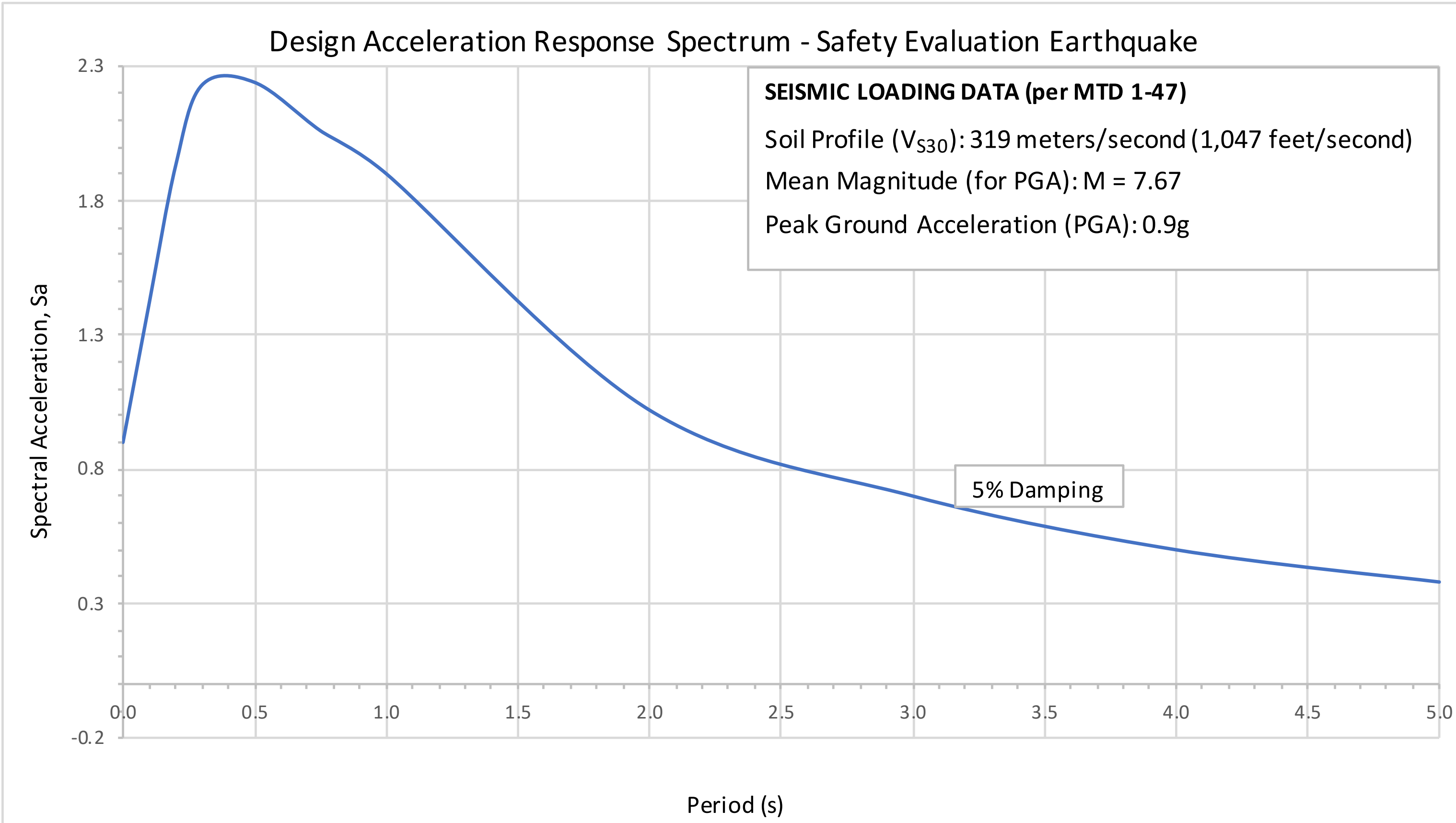
GROUND MOTION DATA SHEET - SAFETY EVALUATION EARTHQUAKE (SEE)

Marin County Open Space District Bolinas Lagoon Wye Wetlands Project

Caltrans Seismic Design Criteria: V2.0
Caltrans ARS Online Version: V3.0.2
Date Accessed: 1/2/2023

Marin County, California

Period (s)	Spectral Acceleration, Sa (g)
0.0	0.90
0.10	1.42
0.20	1.93
0.30	2.23
0.50	2.24
0.75	2.06
1.0	1.90
2.0	1.02
3.0	0.70
4.0	0.50
5.0	0.38



The Accleration Response Spectrum (ARS) for the Safety Evaluation Earthquake (SEE) is based on the USGS 2014 National Seismic Hazard Map for 975-year return period, (Hazard Model/Edition "Dynamic Conterminous U.S. 2014 (Update)(V4.20)") hazard data obtained by using ARS Online. Modifications for basin-effects and/or near-fault effects were applied, where applicable.

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Site Latitude: 37.9352
Site Longitude: -122.6998

Crawford No.: 19-570.1

Appendix II

APPENDIX III

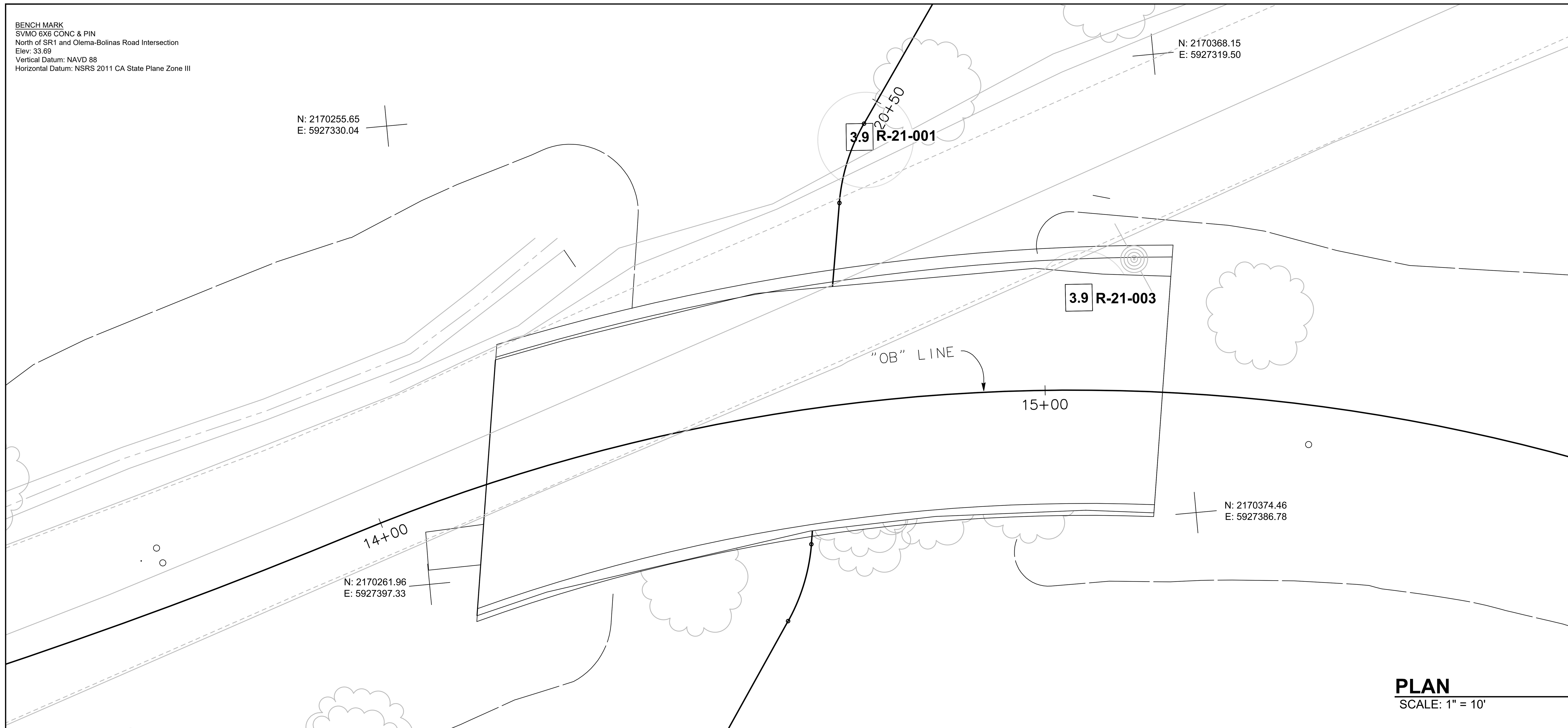
Log of Test Borings

Boring Log Legend

Boring Logs

DCP Logs

BENCH MARK
SVMO 6X6 CONC & PIN
North of SR1 and Olema-Bolinas Road Intersection
Elev: 33.69
Vertical Datum: NAVD 88
Horizontal Datum: NSRS 2011 CA State Plane Zone III

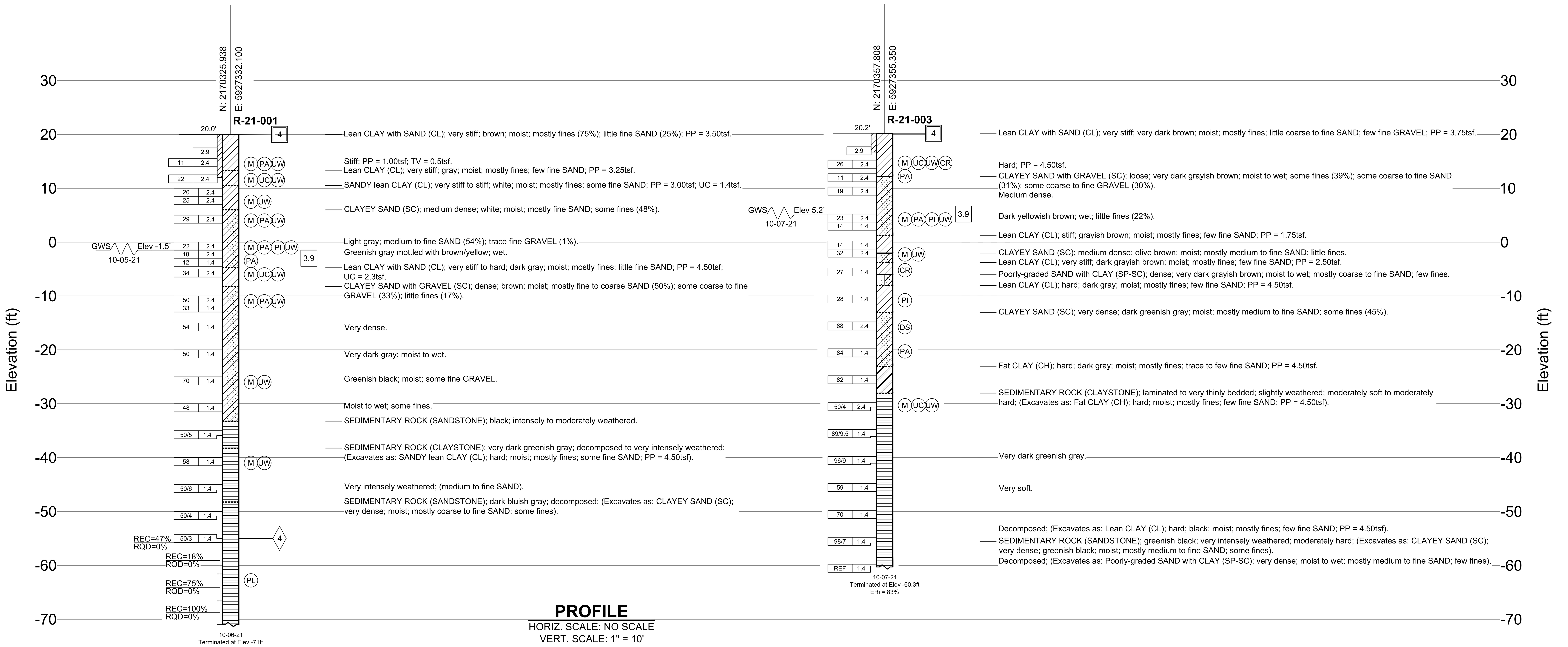


PLAN
SCALE: 1" = 10'

NOTES:
1. Field classification of soils and this LOTB sheet were prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).
2. Soil legends are provided in 2018 Caltrans Standard Plans A10F, A10G, and A10H.
3. Standard Penetration tests were performed in accordance with ASTM D 1586 using a hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with steel liners.
4. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. Driven in same manner as SPT ("1.4 inch") sampler.
5. "2.9 inch sampler": Shelby tube pushed into soil as per ASTM D 1587.
6. If laboratory tests are not shown as being performed, the soil descriptions presented on the LOTB are based solely on the visual practices described in the Caltrans Manual.
7. The length of each sampled interval is shown graphically on the boring log. Whole number blow counts ("N") represent the "standard penetration resistance" interval in accordance with the Caltrans Soil & Logging, Classification, and Presentation Manual (June 2010). Where less than 0.5 feet of penetration is achieved, the blow count shown is for that fraction of the "standard penetration resistance" interval actually penetrated.
8. Blow counts shown as "REF" where less than 0.5 feet of penetration were achieved in the first seating interval.
9. Consistency of soils shown in ( ) where estimated.
10. Groundwater surface (GWS) elevations in the borings indicated on the Log of Test Boring Sheets reflect the fluid level in the borings on the specified date.
11. Groundwater elevations are subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.

Boring Location Table

Hole ID	Alignment Name	Station and Offset
R-21-001	"OB" Line	14+73.7, 38.6' Rt.
R-21-003	"OB" Line	15+05.5, 13.6' Rt.



PROFILE
HORIZ. SCALE: NO SCALE
VERT. SCALE: 1" = 10'

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BOLINAS LAGOON WYE WETLANDS PROJECT BOLINAS, CALIFORNIA

MARIN COUNTY PARKS PRESERVATION · RECREATION

NOT FOR CONSTRUCTION

Date	Issues And Revisions	No.
11/18/2022	65% DESIGN	
7/8/2020	30% DESIGN	
3/20/2020	CONCEPT PLAN	

PROJECT #29244
DRAWN BY: KD, JD
CHECKED BY: JP
ORIGINAL DRAWING SIZE: 24 X 36

Sheet

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names	Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTS

C	Consolidation
CL	Collapse Potential
CP	Compaction Curve
CR	Corrosion, Sulfates, Chlorides
CU	Consolidated Undrained Triaxial
DR	Drained Residual Shear Strength
DS	Direct Shear
EI	Expansion Index
M	Moisture Content
OC	Organic Content
P	Permeability
PA	Particle Size Analysis
PI	Liquid Limit, Plastic Limit, Plasticity Index
PL	Point Load Index
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value
SE	Sand Equivalent
SG	Specific Gravity
SW	Swell Potential
TV	Pocket Torvane
UC	Unconfined Compression - Soil
	Unconfined Compression - Rock
UU	Unconsolidated Undrained Triaxial
UW	Unit Weight

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler (ID 2.0 in.)
- Modified California Sampler (ID 2.5 in.)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010) with Errata Sheet (2015).

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Boring Record Legend

Soil Legend

Sheet 1 of 2

CONSISTENCY OF COHESIVE SOILS				
Descriptor	**Unconfined Compressive Strength (tsf)**	**Pocket Penetrometer (tsf)**	**Torvane (tsf)**	**Field Approximation**
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS	
Descriptor	**SPT N_{60} (blows / 12 inches)**
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

MOISTURE	
Descriptor	**Criteria**
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Descriptor	**Criteria**
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE		
Descriptor		**Size**
Boulder		> 12 inches
Cobble		3 to 12 inches
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay		Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS	
Descriptor	**Criteria**
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION	
Descriptor	**Criteria**
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SJC	**10-06-21**	**10-06-21**	**5927770.54706752E 2170176.86125838N NAD 1983 StatePlane California III FIPS 0403 Feet**	**A-21-002**

DRILLING CONTRACTOR	BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber Drilling		**10.0 ft**
DRILLING METHOD	DRILL RIG	BOREHOLE DIAMETER
Solid-Stem Auger	**CME 55 (Track)**	**4.0 in.**
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MCAL (2.4" ID)	**Automatic; 140 lbs; 30 in drop**	**83.0%**
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS DURING DRILLING **Not Encountered** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat Cement Grout		**6.5 ft**

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Remarks
	0	ASPHALT CONCRETE(1")									AC = 1.0"
		AGGREGATE BASE(4")									AB = 4.0"
9.00	1	Lean CLAY with SAND (CL); medium stiff; reddish brown; moist to wet; mostly medium plasticity, low to medium toughness fines; little fine to coarse SAND; trace fine, subrounded GRAVEL; [FILL].									
8.00	2										
7.00	3	black	1	2 2 3	5	33				PP=0.75 TV=0.30	Percent Fines = 74%
6.00	4										
5.00	5	Lean CLAY (CL); very soft; black; wet; mostly medium plasticity, medium toughness fines; few fine SAND.	2	2 2 2	4	100				PP=0.00 TV=0.20	
4.00	6										
3.00	7	Bottom of borehole at 6.5 ft bgs									
2.00	8										
1.00	9										
0.00	10										
-1.00	11										
-2.00	12										
-3.00	13										
-4.00	14										
-5.00	15										
-6.00	16										
-7.00	17										
-8.00	18										
-9.00	19										
-10.00	20										
-11.00	21										
-12.00	22										
-13.00	23										
-14.00	24										
-15.00	25										
-16.00	26										
-17.00	27										
-18.00	28										
-19.00	29										
-20.00	30										
-21.00	31										
-22.00	32										
-23.00	33										

Column headers also printed: Material Graphics; Sample Location; Drilling Method; Casing Depth.

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Sacramento, CA 95822
(916) 455-4225

REPORT TITLE				HOLE ID
BORING RECORD				**A-21-002**
DIST. **4**	COUNTY **Marin**	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME	**Bolinas Lagoon Wye Wetlands Project**			
BRIDGE NUMBER	PREPARED BY **MNA**	DATE **10/11/2021**	SHEET **1 of 1**	

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SJC	**10-08-21**	**10-08-21**	**5927335.81641844E 2170496.31211941N NAD 1983 StatePlane California III FIPS 0403 Feet**	**A-21-004**

DRILLING CONTRACTOR	BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber Drilling		**24.0 ft**

DRILLING METHOD	DRILL RIG	BOREHOLE DIAMETER
Solid-Stem Auger	**CME 55 (Track)**	**4.0 in.**

SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
Bulk, ST, MCAL (2.4" ID), SPT (1.4" ID)	**Automatic; 140 lbs; 30 in drop**	**83.0%**

BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat Cement Grout		**10.0 ft**		**31.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		Lean CLAY with SAND (CL); hard; very dark grayish brown; dry to moist; mostly medium plasticity, medium toughness fines; little fine SAND.		Bulk			100							
23.00	1														
22.00	2														
21.00	3				1			94							
20.00	4											PP=>4.50			200 psi
19.00	5				2	7 12 19	31	89							
18.00	6		SANDY lean CLAY (CL); hard; brown; dry to moist; mostly medium plasticity fines; some coarse to fine SAND; trace fine, subrounded GRAVEL.									PP=>4.50			
17.00	7														
16.00	8				3			96							Percent Fines = 61%
15.00	9														50 psi
14.00	10				4	0 3 4	7	89							
13.00	11		very soft to medium stiff; very dark gray; wet									PP=0.00 TV=0.30			Rootholes with free water Unconfined Compressive Strength = 446 psf
12.00	12														
11.00	13														
10.00	14														
9.00	15				5			100							
8.00	16		stiff												Consolidation <50 psi
7.00	17											PP=1.00			
6.00	18														
5.00	19		CLAYEY SAND (SC); loose; gray; wet; mostly fine SAND; some fines.												
4.00	20				6	4 7 8	15	0							Percent Fines = 26 % Used SPT sample to recover material
3.00	21		Poorly-graded SAND with CLAY (SP-SC); loose; gray; wet; mostly fine SAND; few fines.												
2.00	22														
1.00	23		SANDY lean CLAY (CL); (hard); gray; wet; mostly fines; some fine SAND.												
0.00	24														
-1.00	25				7	3 9 12	21	83							Used sand catcher
-2.00	26														Percent Fines = 60%
-3.00	27														
-4.00	28														
-5.00	29														
-6.00	30		hard; yellowish brown; moist		8	6 8 11	19	83							Used sand catcher
-7.00	31											PP=>4.50			
-8.00	32		Bottom of borehole at 31.5 ft bgs												
-9.00	33														

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REPORT TITLE				HOLE ID
BORING RECORD				**A-21-004**
DIST. **4**	COUNTY **Marin**	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME	**Bolinas Lagoon Wye Wetlands Project**			
BRIDGE NUMBER	PREPARED BY **MNA**	DATE **10/11/2021**	SHEET **1 of 1**	

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SJC	**10-11-21**	**10-11-21**	**5927480.51701946E 2170000.46699252N NAD 1983 StatePlane California III FIPS 0403 Feet**	**A-21-005**

DRILLING CONTRACTOR	BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber Drilling		**12.3 ft**
DRILLING METHOD	**DRILL RIG**	**BOREHOLE DIAMETER**
Solid-Stem Auger	**CME 55 (Track)**	**4.0 in.**
SAMPLER TYPE(S) AND SIZE(S) (ID)	**SPT HAMMER TYPE**	**HAMMER EFFICIENCY, ERi**
Bulk, MCAL (2.4" ID), ST, SPT (1.4" ID)	**Automatic; 140 lbs; 30 in drop**	**83.0%**
BOREHOLE BACKFILL AND COMPLETION	**GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)**	**TOTAL DEPTH OF BORING**
Neat Cement Grout	**3.5 ft**	**31.5 ft**

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Remarks
12.00	0	CLAYEY SAND with GRAVEL (SC); medium dense; very dark gray; dry to wet; some coarse to fine SAND; some fine to coarse, subrounded GRAVEL; little fines.	Bulk			100					
11.00	1										
10.00	2										Driller notes hard drilling at 2'; hand auger from 2-2.5'
9.00	3		1	9 9 7	16	67		13	112		Percent Fines = 20%
8.00	4										
7.00	5	CLAYEY SAND (SC); dark gray; wet; mostly fine SAND; some fines.	2			58					
6.00	6										100 psi
5.00	7										
4.00	8	SANDY lean CLAY (CL); soft; very dark gray; wet; mostly medium plasticity, medium toughness fines; little to some fine SAND.	3	0 0 2	2	100				PP=0.25 TV=0.30	
3.00	9	Lean CLAY (CL); medium stiff; very dark gray; wet; mostly medium plasticity, medium toughness fines; few fine SAND.									
2.00	10		4			100					
1.00	11									PP=0.75	
0.00	12										Consolidation <100 psi
-1.00	13										
-2.00	14	SANDY lean CLAY (CL); medium stiff; black; wet; mostly medium plasticity, medium toughness fines; some fine SAND; trace fine GRAVEL.									
-3.00	15		5	3 2 2	4	89		28	95	PP=0.50 TV=0.25	Percent Fines = 65%
-4.00	16										
-5.00	17										
-6.00	18										
-7.00	19										
-8.00	20	very stiff; greenish gray; moist	6	4 5 7	12	67				PP=2.00	Liquid Limit = 33 Plastic Limit = 17
-9.00	21										
-10.00	22										
-11.00	23										
-12.00	24										
-13.00	25		7	7 10 13	23	83		20	111	PP=3.75	Liquid Limit = 29 Plastic Limit = 20
-14.00	26	low plasticity, medium toughness fines									
-15.00	27										
-16.00	28	CLAYEY SAND (SC); medium dense; dark greenish gray; moist; mostly fine to coarse SAND; some fines.									
-17.00	29										
-18.00	30		8	11 18 27	45	83		19	113		
-19.00	31										
-20.00	32	Bottom of borehole at 31.5 ft bgs									
-21.00	33										

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REPORT TITLE				HOLE ID
BORING RECORD				**A-21-005**
DIST. **4**	COUNTY **Marin**	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME	**Bolinas Lagoon Wye Wetlands Project**			
BRIDGE NUMBER	PREPARED BY **MNA**	DATE **10/11/2021**	SHEET **1 of 1**	

WILDCAT DYNAMIC CONE LOG

Crawford & Associates, Inc.
4701 Freeport Blvd
Sacramento, CA 95822

HOLE #:	D-21-006	PROJECT NUMBER:	19-570.1
CREW:	MNA, OMR	DATE STARTED:	10-05-2021
PROJECT:	Bolinas Lagoon Wye Wetlands Project	DATE COMPLETED:	10-05-2021
ADDRESS:	37.934910°, -122.699228°	SURFACE ELEVATION:	22
LOCATION:	Bolinas , CA	WATER ON COMPLETION:	N/A
		HAMMER WEIGHT:	35 lbs.
		CONE AREA:	10 sq. cm

	BLOWS	RESISTANCE	GRAPH OF CONE RESISTANCE		TESTED CONSISTENCY	
DEPTH	PER 10 cm	Kg/cm²	0 50 100 150	N'	NON-COHESIVE	COHESIVE
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	12	53.3	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 1 ft	14	62.2	••••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	11	48.8	••••••••••••••	13	MEDIUM DENSE	STIFF
-	15	66.6	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
- 2 ft	13	57.7	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	10	44.4	••••••••••••	12	MEDIUM DENSE	STIFF
-	9	40.0	•••••••••••	11	MEDIUM DENSE	STIFF
- 3 ft	8	35.5	••••••••••	10	LOOSE	STIFF
- 1 m	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
-	9	34.7	••••••••••	9	LOOSE	STIFF
- 4 ft	12	46.3	•••••••••••••	13	MEDIUM DENSE	STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	7	27.0	•••••••	7	LOOSE	MEDIUM STIFF
- 5 ft	7	27.0	•••••••	7	LOOSE	MEDIUM STIFF
-	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
-	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
- 6 ft	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
-	4	15.4	••••	4	VERY LOOSE	SOFT
- 2 m	3	11.6	•••	3	VERY LOOSE	SOFT
- 7 ft	4	13.7	•••	3	VERY LOOSE	SOFT
-	6	20.5	•••••	5	LOOSE	MEDIUM STIFF
-	5	17.1	••••	4	VERY LOOSE	SOFT
- 8 ft	2	6.8	•	1	VERY LOOSE	VERY SOFT
-	3	10.3	••	2	VERY LOOSE	SOFT
-	2	6.8	•	1	VERY LOOSE	VERY SOFT
- 9 ft	3	10.3	••	2	VERY LOOSE	SOFT
-	2	6.8	•	1	VERY LOOSE	VERY SOFT
-	4	13.7	•••	3	VERY LOOSE	SOFT
- 3 m 10 ft	5	17.1	••••	4	VERY LOOSE	SOFT
-	9	27.5	•••••••	7	LOOSE	MEDIUM STIFF
-	9	27.5	•••••••	7	LOOSE	MEDIUM STIFF
- 11 ft	12	36.7	••••••••••	10	LOOSE	STIFF
-	9	27.5	•••••••	7	LOOSE	MEDIUM STIFF
-	7	21.4	••••••	6	LOOSE	MEDIUM STIFF
- 12 ft	12	36.7	••••••••••	10	LOOSE	STIFF
-	25	76.5	••••••••••••••••••••••	21	MEDIUM DENSE	VERY STIFF
-	34	104.0	••••••••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
- 13 ft	28	85.7	••••••••••••••••••••••••	24	MEDIUM DENSE	VERY STIFF
- 4 m	23	70.4	••••••••••••••••••••	20	MEDIUM DENSE	VERY STIFF

PROJECT: Bolinas Lagoon Wye Wetlands Project PROJECT NUMBER: 19-570.1

	BLOWS	RESISTANCE	GRAPH OF CONE RESISTANCE		TESTED CONSISTENCY	
DEPTH	PER 10 cm	Kg/cm²	0 50 100 150	N'	NON-COHESIVE	COHESIVE
-	7	19.4	•••••	5	LOOSE	MEDIUM STIFF
- 14 ft	8	22.2	••••••	6	LOOSE	MEDIUM STIFF
-	14	38.8	•••••••••••	11	MEDIUM DENSE	STIFF
-	22	60.9	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
- 15 ft	33	91.4	••••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
-	27	74.8	•••••••••••••••••••••	21	MEDIUM DENSE	VERY STIFF
-	39	108.0	•••••••••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
- 16 ft	38	105.3	••••••••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
-	39	108.0	•••••••••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
- 5 m	52	144.0	•••••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 17 ft	44	111.8	••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	47	119.4	••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	62	157.5	•••••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 18 ft	108	274.3	•••••••••••••••••••••••••••••••••••••••	25+	VERY DENSE	HARD
-	56	142.2	•••••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	63	160.0	•••••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 19 ft	83	210.8	•••••••••••••••••••••••••••••••••••••••	25+	VERY DENSE	HARD
-	110/3"	373.4	•••••••••••••••••••••••••••••••••••••••	25+	VERY DENSE	HARD
-						
- 6 m 20 ft						
-						
-						
- 21 ft						
-						
-						
- 22 ft						
-						
-						
- 22 ft						
- 7 m						
-						
- 24 ft						
-						
-						
- 25 ft						
-						
-						
- 26 ft						
-						
- 8 m						
- 27 ft						
-						
-						
- 28 ft						
-						
-						
- 29 ft						
-						
-						
- 9 m						

WILDCAT DYNAMIC CONE LOG

Crawford & Associates, Inc.
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Sacramento, CA 95822

PROJECT NUMBER: 19-570.1
DATE STARTED: 10-05-2021
DATE COMPLETED: 10-05-2021

HOLE #: D-21-007
CREW: MNA, OMR
PROJECT: Bolinas Lagoon Wye Wetlands Project
ADDRESS: 37.934910°, -122.699228°
LOCATION: Bolinas , CA

SURFACE ELEVATION: 22
WATER ON COMPLETION: N/A
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	10	44.4	••••••••••••	12	MEDIUM DENSE	STIFF
-	18	79.9	••••••••••••••••••••••	22	MEDIUM DENSE	VERY STIFF
- 1 ft	13	57.7	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	11	48.8	•••••••••••••	13	MEDIUM DENSE	STIFF
-	11	48.8	•••••••••••••	13	MEDIUM DENSE	STIFF
- 2 ft	13	57.7	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	12	53.3	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	14	62.2	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
- 3 ft	16	71.0	••••••••••••••••••••	20	MEDIUM DENSE	VERY STIFF
- 1 m	15	66.6	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
-	14	54.0	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 4 ft	14	54.0	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	15	57.9	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	14	54.0	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 5 ft	14	54.0	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	10	38.6	•••••••••••	11	MEDIUM DENSE	STIFF
-	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
- 6 ft	2	7.7	••	2	VERY LOOSE	SOFT
-	2	7.7	••	2	VERY LOOSE	SOFT
- 2 m	2	7.7	••	2	VERY LOOSE	SOFT
- 7 ft	10	34.2	•••••••••	9	LOOSE	STIFF
-	7	23.9	••••••	6	LOOSE	MEDIUM STIFF
-	2	6.8	•	1	VERY LOOSE	VERY SOFT
- 8 ft	2	6.8	•	1	VERY LOOSE	VERY SOFT
-	3	10.3	••	2	VERY LOOSE	SOFT
-	2	6.8	•	1	VERY LOOSE	VERY SOFT
- 9 ft	3	10.3	••	2	VERY LOOSE	SOFT
-	3	10.3	••	2	VERY LOOSE	SOFT
-	4	13.7	•••	3	VERY LOOSE	SOFT
- 3 m 10 ft	5	17.1	••••	4	VERY LOOSE	SOFT
-	5	15.3	••••	4	VERY LOOSE	SOFT
-	10	30.6	••••••••	8	LOOSE	MEDIUM STIFF
- 11 ft	4	12.2	•••	3	VERY LOOSE	SOFT
-	4	12.2	•••	3	VERY LOOSE	SOFT
-	6	18.4	•••••	5	LOOSE	MEDIUM STIFF
- 12 ft	7	21.4	••••••	6	LOOSE	MEDIUM STIFF
-	11	33.7	•••••••••	9	LOOSE	STIFF
-	17	52.0	••••••••••••••	14	MEDIUM DENSE	STIFF
- 13 ft	7	21.4	••••••	6	LOOSE	MEDIUM STIFF
- 4 m	7	21.4	••••••	6	LOOSE	MEDIUM STIFF

HOLE #: D-21-007

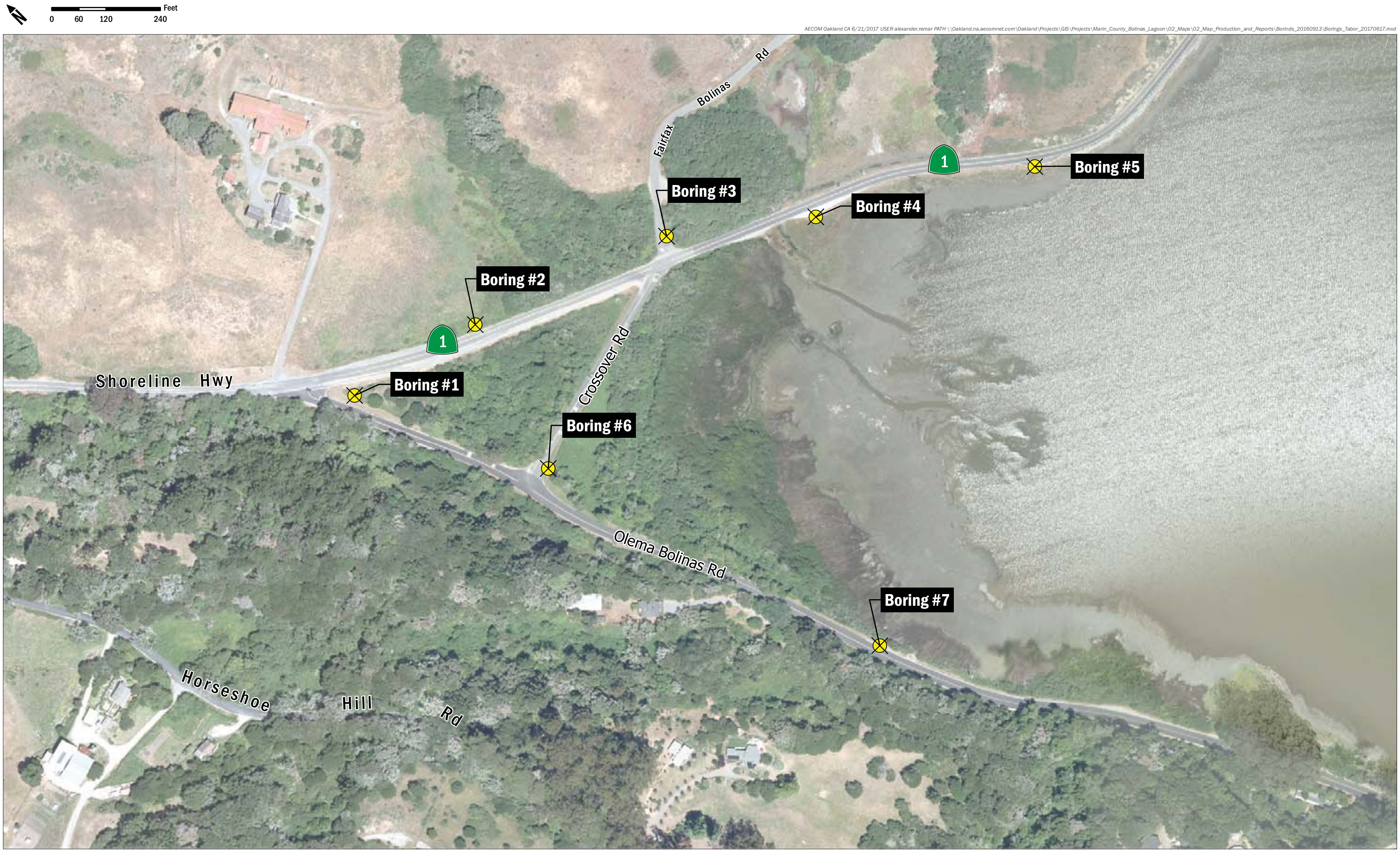
WILDCAT DYNAMIC CONE LOG

PROJECT: Bolinas Lagoon Wye Wetlands Project PROJECT NUMBER: 19-570.1

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	COHESIVE
-	7	19.4		5	LOOSE	MEDIUM STIFF
- 14 ft	10	27.7		7	LOOSE	MEDIUM STIFF
-	11	30.5		8	LOOSE	MEDIUM STIFF
-	12	33.2		9	LOOSE	STIFF
- 15 ft	11	30.5		8	LOOSE	MEDIUM STIFF
-	14	38.8		11	MEDIUM DENSE	STIFF
-	15	41.6		11	MEDIUM DENSE	STIFF
- 16 ft	17	47.1		13	MEDIUM DENSE	STIFF
-	19	52.6		15	MEDIUM DENSE	STIFF
- 5 m	29	80.3		22	MEDIUM DENSE	VERY STIFF
- 17 ft	26	66.0		18	MEDIUM DENSE	VERY STIFF
-	31	78.7		22	MEDIUM DENSE	VERY STIFF
-	23	58.4		16	MEDIUM DENSE	VERY STIFF
- 18 ft	21	53.3		15	MEDIUM DENSE	STIFF
-	20	50.8		14	MEDIUM DENSE	STIFF
-	24	61.0		17	MEDIUM DENSE	VERY STIFF
- 19 ft	24	61.0		17	MEDIUM DENSE	VERY STIFF
-	25	63.5		18	MEDIUM DENSE	VERY STIFF
-	27	68.6		19	MEDIUM DENSE	VERY STIFF
- 6 m 20 ft	31	78.7		22	MEDIUM DENSE	VERY STIFF
-	31	72.2		20	MEDIUM DENSE	VERY STIFF
-	37	86.2		24	MEDIUM DENSE	VERY STIFF
- 21 ft	42	97.9		25+	MEDIUM DENSE	VERY STIFF
-	36	83.9		23	MEDIUM DENSE	VERY STIFF
-	42	97.9		25+	MEDIUM DENSE	VERY STIFF
- 22 ft	41	95.5		25+	MEDIUM DENSE	VERY STIFF
-	42	97.9		25+	MEDIUM DENSE	VERY STIFF
-	42	97.9		25+	MEDIUM DENSE	VERY STIFF
- 22 ft	40	93.2		25+	MEDIUM DENSE	VERY STIFF
- 7 m	40	93.2		25+	MEDIUM DENSE	VERY STIFF
-	39	84.2		24	MEDIUM DENSE	VERY STIFF
- 24 ft	38	82.1		23	MEDIUM DENSE	VERY STIFF
-	45	97.2		25+	MEDIUM DENSE	VERY STIFF
-	46	99.4		25+	MEDIUM DENSE	VERY STIFF
- 25 ft	53	114.5		25+	DENSE	HARD
-	62	133.9		25+	DENSE	HARD
-	69	149.0		25+	DENSE	HARD
- 26 ft	72	155.5		25+	DENSE	HARD
-						
- 8 m						
- 27 ft						
-						
-						
- 28 ft						
-						
-						
- 29 ft						
-						
-						
- 9 m						

APPENDIX IV

AECOM Boring Logs



AECOM
Marin County
Bolinas Lagoon Restoration

EXPLANATION

Geotechnical Boring (AECOM, March - April 2017)

FIGURE 1

Project Site and Geotechnical Boring Location Plan, June 2017

Project: Bolinas Lagoon North End Restoration
Project Location: Marin County, CA
Project Number: 60393194

Key to Log of Soil Boring

Elevation feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Sampling Resistance blows/foot	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight (pcf)	Fines Content (% <200 Sieve)	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to specified datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Sampling Resistance:** Number of blows required to advance driven sampler 12 inches beyond first 6-inch interval, or distance noted, using a 140-lb hammer with a 30-inch drop; or down-pressure for pushed sampler.

6 **Recovery:** Percentage of driven or pushed sample length recovered; "NA" indicates data not recorded.

7 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

8 **Material Description:** Description of material encountered; may include density/consistency, moisture, color, and grain size.

9 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.

10 **Dry Unit Weight:** Density of soil as measured in the laboratory, in pounds per cubic foot

11 **Fines Content** Percentage passing the #200 sieve as measured in the laboratory

12 **Remarks and Other Tests:** Comments and observations regarding drilling or sampling made by driller or field personnel.

pp= Pocket Penetrometer [tsf]
T= Torvane Penetrometer [kg/sq. cm]
LL= Liquid Limit from Atterberg limit test [%] ASTM D4318
PL= Plastic Limit from Atterberg limit test [%] ASTM D4318
UC: Unconfined Compressive Strength test [psf] ASTM D2166
TX-UU: Unconsolidated, Undrained Triaxial test [psf] ASTM D2850
Consol Consolidation Test performed ASTM D2435

TYPICAL MATERIAL GRAPHIC SYMBOLS

TOPSOIL/ASPHALT as indicated

POORLY GRADED GRAVEL (GP)

CLAYEY GRAVEL (GC)

SILTY GRAVEL with SAND (GM)

CLAYEY GRAVEL with SAND (GC)

SILTY SAND (SM)

SILTY SAND with GRAVEL (SM)

CLAYEY SAND (SC)

CLAYEY SAND with GRAVEL (SC)

SANDY SILT (ML)

ELASTIC SILT with SAND (MH)

SANDY ELASTIC SILT (MH)

ORGANIC ELASTIC SILT (OH)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Standard Penetration Test (SPT)

2.0-in ID California Sampler

2.5-in ID California Sampler

Shelby Tube Thin-Walled Sampler

HQ Rock Core

OTHER GRAPHIC SYMBOLS

First water encountered at time of drilling

Static water as measured

Change in material properties within a stratum

Inferred or transitional contact

GENERAL NOTES

1. Soil and rock descriptions and contact lines are interpretive. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced.

AECOM

Project: Bolinas Lagoon North End Restoration
Project Location: Marin County, CA
Project Number: 60393194

Key to Log of Soil Boring

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Sampling Resistance	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	Water Content, %	Fines Content (%<#200 Sieve)	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or other specified datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Sampling Resistance:** Number of blows required to advance driven sampler 12 inches beyond first 6-inch interval, or distance noted, using a 140-lb hammer with a 30-inch drop.

6 **Recovery:** Percentage of driven or pushed sample recovered relative to sampled interval; "NA" indicates data not recorded.

7 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

8 **Material Description:** Description of material encountered; in addition to classification and USCS, may include relative density or consistency, color, moisture, and grain size.

9 **Well Diagram:** Graphic depiction of well or piezometer installation; materials are listed in header block; graphic symbols are explained below.

10 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.

11 **Fines Content, %** Percent finer than #200 sieve, as measured in the laboratory

12 **Remarks and Other Tests:** Observations regarding drilling or sampling made by driller or field personnel. Other field and laboratory test results, using the following abbreviations:

TYPICAL MATERIAL GRAPHIC SYMBOLS

LEAN CLAY (CL)

LEAN CLAY with SAND (CL)

SANDY LEAN CLAY (CL)

SANDY LEAN CLAY with GRAVEL (CL)

SILTY CLAY (CL-ML)

LEAN to FAT CLAY (CL-CH)

LEAN to FAT CLAY with GRAVEL (CL-CH)

FAT CLAY (CH)

FAT SILTY CLAY (CH-MH)

FAT SILTY CLAY with GRAVEL (CH-MH)

SANDSTONE

SANDY SILTSTONE

SILTSTONE

CLAYSTONE

SHALE

MELANGE SHALE

TYPICAL WELL GRAPHIC SYMBOLS

2" PVC Solid Casing in Neat Cement Grout

2" PVC Solid Casing in Bentonite Pellets

2" PVC Solid Casing in #3 Sand

2" PVC 0.020-in Slotted Casing in #3 Sand

#3 Sand in hole

Project: Bolinas Lagoon North End Restoration **Project Location:** Marin County, CA **Project Number:** 60393194	# Log of Soil Boring B-1

Date(s) Drilled	**3/27/2017-3/28/2017**	Logged By	**S. Janowski**	Checked By	**J. Tabor**
Drilling Method	**Hand auger to 5'; 8-in hollow stem auger (HSA) thereafter**	Drill Bit Size/Type	**4" hand auger; 8" OD HSA**	Total Depth of Borehole	**66.5 feet**
Drill Rig Type	**CME 55 Truck-mounted rig (TMR)**	Drilling Contractor	**Pitcher Drilling Company**	NAVD 88 Ground Surface Elevation	**Approximate 28-ft**
Groundwater Level(s)	**10' while drilling**	Sampling Method(s)	**SPT, 2" Modified California**	Hammer Data	**Automatic hammer; 140 lbs, 30-inch drop**
Borehole Completion	**2" PVC piezometer installed**			Coordinate Location	**N 2170545 E 5927279**

Elevation, feet	Depth, feet	Samples: Type	Samples: Number	Samples: Sampling Resistance	Samples: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	Water Content, %	Fines Content (%<#200 Sieve)	REMARKS AND OTHER TESTS
	0						6-inch thick TOPSOIL				**WELL: 12" steel Christy box installed at surface**
							SANDY LEAN CLAY (CL); moist; dark brown (10YR3/3); 5% GRAVEL to 3/4"; 43% fine-grained SAND; 52% low plasticity FINES; rootlets --ALLUVIUM--				**WELL: 2" PVC solid casing and neat cement grout to surface**
25											
	5		1-2 1-3	1 2 2	100		Becomes very soft		22.3	52	pp=1.0 tsf; TX-UU: Max. deviator stress=988 psf;confining pressure=450 psf
20											
	10		2	1 2 3	56		Becomes wet; mottled dark brown (10YR3/3) and dark gray (4/N); with 15% fine GRAVEL; 56% FINES		22.3	56	pp=1.25 tsf; Sample #2 bagged
15											
	15		3	1 3 5	0		SANDY LEAN CLAY (CL); medium to very stiff; wet; dark grayish brown (2.5Y4/2); 7% subangular GRAVEL to 3/4"; 41% fine- to coarse-grained SAND; 52% low plasticity FINES --OLDER ALLUVIUM--				No recovery: sampler replaced in hole and recovered; Sample #3 disturbed and bagged **WELL: 2' Bentonite Pellet seal** Water level measured at 16.1' after Sample #3 **WELL: #3 sand filter pack 18'-25.5'**
10											
	20		4-2 4-3	3 13 16	89				23.2	52	**WELL: 2" PVC 0.020 slotted screen**
5											
	25		5	14 16 14	67		Becomes dense; dark greenish gray (5G4/1)				**WELL: Neat cement grout 25.5' to 66.5'**
0							CLAYEY SAND (SC); medium dense; moist; black (7.5YR2.5/1); 60% fine-grained SAND; 40% low plasticity FINES --MERCED FM Tmc--				
	30										

Project: Bolinas Lagoon North End Restoration
Project Location: Marin County, CA
Project Number: 60393194

Log of Soil Boring B-1

Elevation feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	Water Content, %	Fines Content (%<#200 Sieve)	REMARKS AND OTHER TESTS
	30		6	5 6 7	100		CLAYEY SAND (SC); medium dense; moist; black (7.5YR2.5/1); 60% fine-grained SAND; 40% low plasticity FINES. Becomes dark greenish gray (10GY4/1) at 31' --MERCED FM Tmc-- *(continued)*				No rock fabric observed in sample
-5							SILTY SAND (SM); dense to medium stiff; moist; greenish gray (10GY5/1); 60% fine-grained SAND; 40% no plasticity FINES				
	35		7-2 7-3	8 16 25	100				19.9		TX-UU: Max. deviator stress=2581 psf;confining pressure=3200 psf
-10											
	40		8	16 18 22	0		Becomes light gray and brownish yellow (10YR7/2+6/6); 10% subrounded GRAVEL to 3/4"				No recovery: sample recovered from slough collector on sampler and bagged
-15											
	45		9-2 9-3	12 14 16	100		SANDY CLAYSTONE; very stiff; moist; dark greenish gray (10BG4/1); 20% fine-grained SAND; 80% medium to high plasticity FINES; completely altered; very to extremely weak				pp=3.25 tsf Hard drilling
-20											
	50		10-2 10-3	12 22 40	100		Becomes hard; dark greenish gray (10Y4/1); 60% FINES		19.3	60	Hard drilling
-25											
	55										
-30											
	60		11	17 24 29	89						pp=>4.5 tsf
-35											
	65										

Elevation feet	Depth, feet	Type	Number	Sampling Resistance	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	Water Content, %	Fines Content (%<#200 Sieve)	REMARKS AND OTHER TESTS
	65		12	17 19 27	100		SANDY CLAYSTONE; hard; moist; dark greenish gray (10Y4/1); 20% fine-grained SAND; 80% medium to high plasticity FINES; completely altered; very to extremely weak --MERCED FM Tmc-- *(continued)*				pp=>4.5 tsf
							TOTAL DEPTH = 66.5 FEET **Grout bottom of hole 3/27/2017, Well install 3/28/2017**				
-40											
	70										
-45											
	75										
-50											
	80										
-55											
	85										
-60											
	90										
-65											
	95										
-70											
	100										

Project: Bolinas Lagoon North End Restoration
Project Location: Marin County, CA
Project Number: 60393194

Log of Soil Boring B-6

Date(s) Drilled	**4/20/2017**	Logged By	**S. Janowski**	Checked By	**J. Tabor**
Drilling Method	**Hand auger to 5'; rotary wash thereafter**	Drill Bit Size/Type	**4" hand auger; 4" drag and tricone bits**	Total Depth of Borehole	**60.5 feet**
Drill Rig Type	**CME 850 Track-mounted rig**	Drilling Contractor	**Pitcher Drilling Company**	NAVD 88 Ground Surface Elevation	**Approximate 13-ft**
Groundwater Level(s)	**1.9' while drilling**	Sampling Method(s)	**SPT, 2" & 2.5" Modified California, Shelby tube**	Hammer Data	**Automatic hammer; 140 lbs, 30-inch drop**
Borehole Completion	**2" PVC piezometer installed in an adjacent HSA hole**			Coordinate Location	**N 2170099 E 5927493**

Elevation, feet	Depth, feet	SAMPLES: Number	Sampling Resistance	Recovery, %	MATERIAL DESCRIPTION	Water Content, %	Fines Content (%<#200 Sieve)	REMARKS AND OTHER TESTS
	0				6-inch thick TOPSOIL with vegetation			
					SILTY CLAY (CL-ML); very soft; wet; black (10YR2/1); 12% fine-grained SAND; 88% medium plasticity FINES --LAGOON DEPOSIT--			
10								
	5	1-2	0 0 0	50		38.9 / 35.6	88	pp=0.25 tsf; T=2.5 kg/sq.cm; pp=0.5 tsf; T=2.7 kg/sq.cm; Switch to rotary wash; advance 5" casing to 4'; TX-UU: Max. deviator stress=699 psf;confining pressure=450 psf; LL=47 PL=22 Consol
5		2	25 psi	100				
					CLAYEY GRAVEL (GC); wet; dark gray			
	10							
		3	1 1 1	39	FAT SILTY CLAY with SAND and GRAVEL (CH-MH); soft; wet; greenish black (10Y2.5/1); 20% decomposed blue green sandstone GRAVEL to 3/4"; 30% fine-grained SAND; 50% high plasticity FINES --Terrace Deposits (Qt)--			pp=0.25 tsf; T=1.5 kg/sq.cm
0								
	15	4-2 4-3	0 2 3	83	No decomposed GRAVEL in visible portion of sample	23.5	50	pp=0.75 tsf; T=1.0 kg/sq.cm; TX-UU: Max. deviator stress=1732 psf;confining pressure=1350 psf
-5								
	20	5-2	11 18 16	67	SILTY GRAVEL with SAND (GM); medium dense; moist; olive gray (5Y4/2); 40% subangular to subrounded GRAVEL to 3/4"; 35% fine- to medium-grained SAND; 25% no to low plasticity FINES			Lithology change in Sample 5-2; photo
-10					CLAYEY SAND with GRAVEL (SC); very stiff to hard; moist; dark yellowish brown (10YR5/6); 26% partially decomposed GRAVEL to 1/2"; 30% fine-grained SAND; 44% low plasticity FINES			
	25	6	8 10 12	72		17.0	44	pp=3.0 - >4.5 tsf
-15								
	30	7-2	10 24	100	Becomes hard; 25% subangular GRAVEL to 3/4"; 20% fine- to medium-grained SAND; 55% low plasticity FINES			pp=4.25 tsf

AECOM

Project: Bolinas Lagoon North End Restoration	**Log of Soil Boring B-6**
Project Location: Marin County, CA	Sheet 2 of 2
Project Number: 60393194	

Elevation feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	Water Content, %	Fines Content (%<#200 Sieve)	REMARKS AND OTHER TESTS
	30		7-3	27			CLAYEY SAND with GRAVEL (SC); hard; moist; dark yellowish brown (10YR5/6); 30% subangular GRAVEL to 3/4"; 24% fine- to medium-grained SAND; 46% low plasticity FINES --Terrace Deposits (Qt)-- *(continued)*				
-20							Becomes greenish black (10BG2.5/1)				
	35		8	7 13 15	100				16.9	46	pp=4.0 tsf
											Rig chatter
-25							Becomes subrounded to rounded GRAVEL to 1"				
	40		9	16 19 20	100						
-30							2" GRAVEL clast blocked shoe of sampler				
	45		10	40 45 50/5"	12						Sample bagged
-35							LEAN CLAY with SAND (CL); hard; moist; black (2.5/1); 5% subrounded GRAVEL to 1/4"; 20% fine- to medium-grained SAND; low plasticity FINES				
	50		11-1 11-2 11-3	17 27 37	100		Charcoal-rich zone, bagged				pp=4.5 tsf; Sample 11-1 bagged
-40											
	55						SHALE; dark greenish gray (5G4/1); highly weathered; very weak; friable; pervasively sheared --MERCED FM Tmc?--				Possible fault contact; no change in drilling performance between samples 11 and 12 to indicate contact
-45											
	60		12	20 27 30	100						
							TOTAL DEPTH = 60.5 FEET **Grout to surface and drill an adjacent HSA hole to 13' for installation on 4/20/2017**				
-50											
	65										

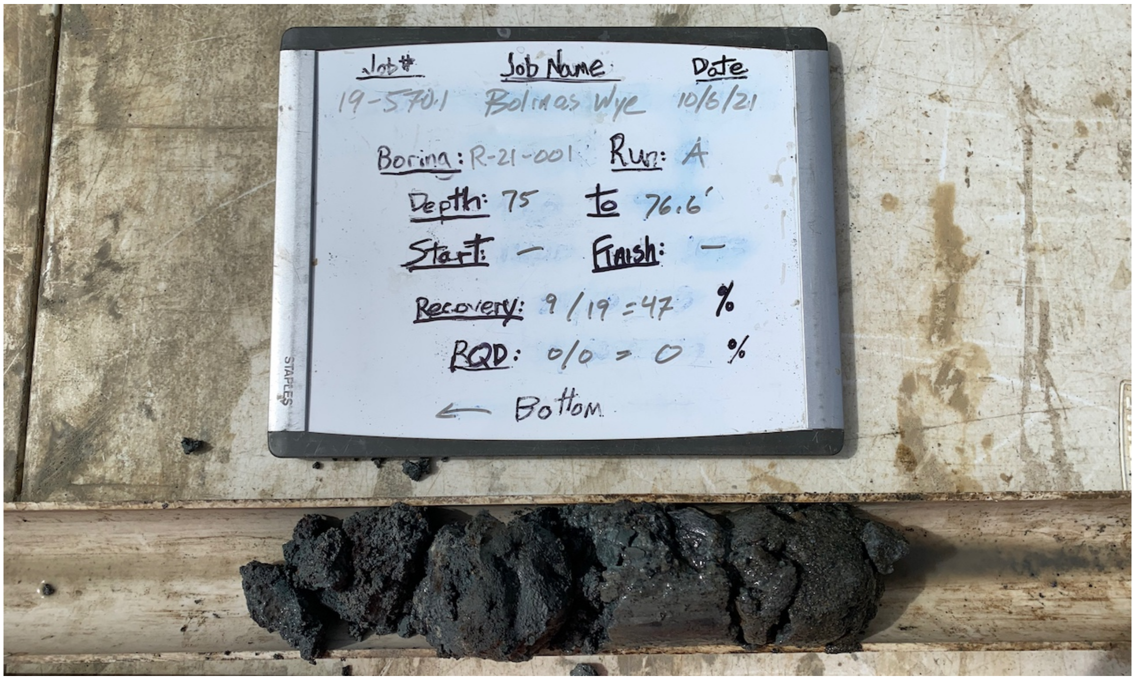
AECOM

APPENDIX V

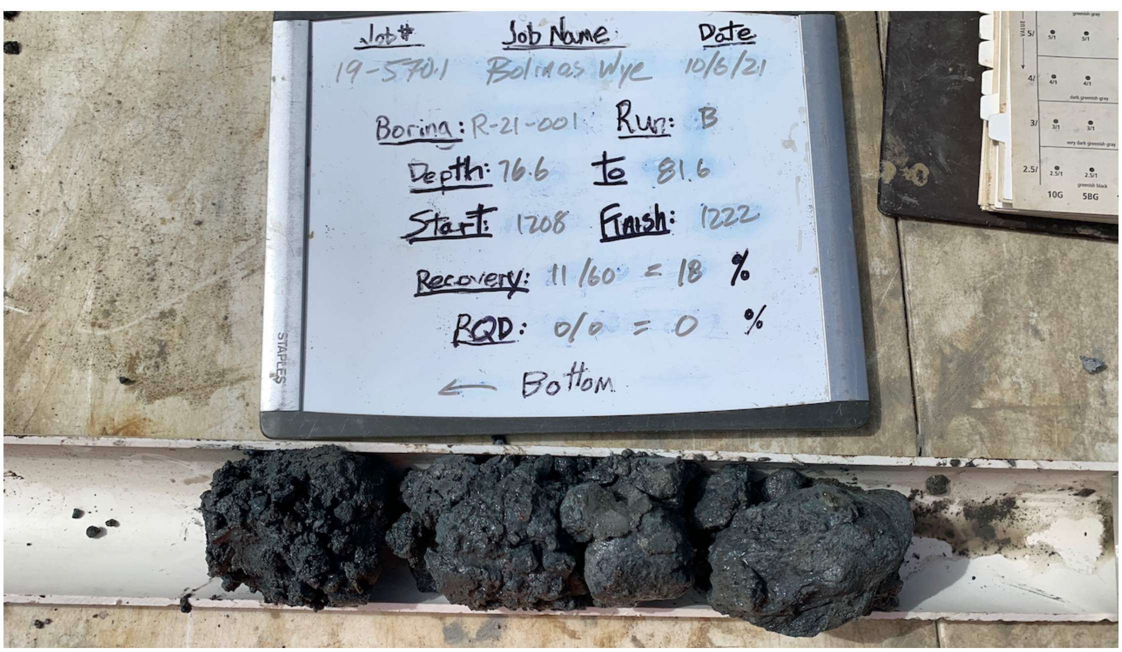
Core Photos

CORE LOGS

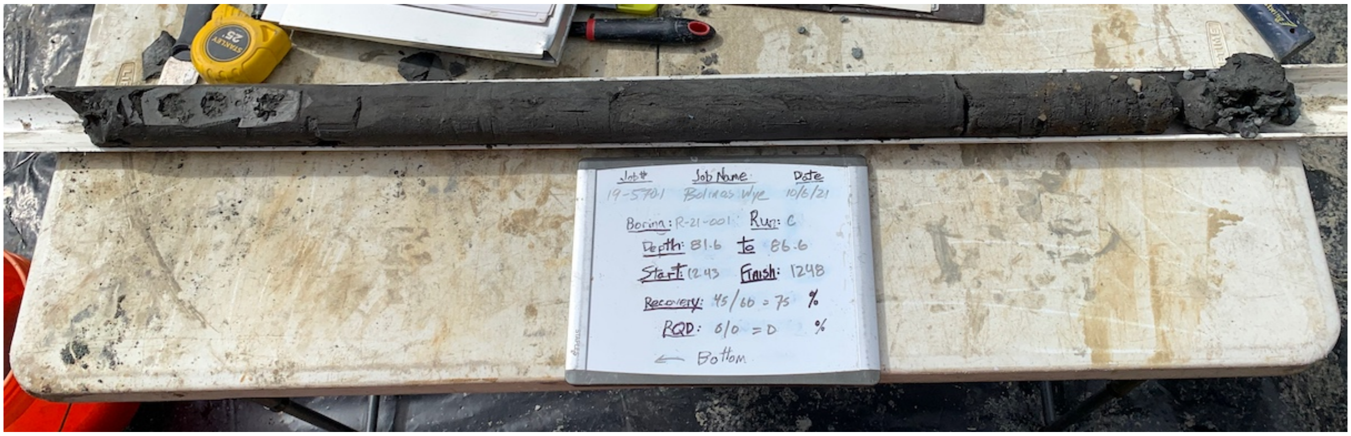
Boring R-21-001; Depth (ft) 75 – 76.6



Boring R-21-001; Depth (ft) 76.6 – 81.6



Boring R-21-001; Depth (ft) 81.6 – 86.6



Boring R-21-001; Depth (ft) 86.6 – 91

APPENDIX VI

Field Exploration and Testing
Laboratory Test Results

Job: **Bolinas Lagoon Wye Wetlands**
Job No: **19-570.1**
Date: **12/5/22**

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Laboratory Test Summary

Boring I.D.	Sample I.D.	Sample Depth (ft)	USCS Class.	Blow Count N(bpf)	Moisture/Density		Classification						Consolidation Test Completed	Strength				Corrosion Test			
					Dry Density (pcf)	Moist. Content (%)	Atterberg Limits			Gravel (%)	Sand (%)	Fines (%)		Uncon. Comp. (psf)	Point Load (psi)	Direct Shear		pH	Min. Resist. (ohm-cm)	Chloride (ppm)	Sulfate (ppm)
							Liquid Limit	Plastic Limit	Plasticity Index							Phi (deg)	Cohesion (psf)				
R-21-001	2A	5.5	CL	11	96	29				0	25	75									
R-21-001	3A	8.5	CL	22	108	20								2,808							
R-21-001	4A-2	12.5	CL	25	110	20															
R-21-001	5A	16.0	SC	29	114	18						48									
R-21-001	6B	20.5	SC	22			21	14	7												
R-21-001	6A	21.0	SC	22	113	18				1	54	45									
R-21-001	8A	24.0	SC	12								46									
R-21-001	9A	26.0	CL	34	118	16								4,565							
R-21-001	10A	31.0	SC	50	123	13				33	50	17									
R-21-001	14A	46.0	SC	70	133	12															
R-21-001	17A	61.0	SC	58	120	16															
R-21-001	RUNC	81.6	ROCK	-											500						
A-21-002	1A	3.5	CL	5								74									
R-21-003	2A	6.0	CL	26	109	15								5,198				5.47	3,750	7.3	18.4
R-21-003	3B	8.0	SC	11						30	31	39									
R-21-003	5B	15.5	SC	23			35	22	13												
R-21-003	5A	16.0	SC	23	117	18				32	46	22									
R-21-003	8A	22.5	SC	32	118	17															
R-21-009	9C/B	25.0	CL	27														6.76	1,820	8.1	19.0
R-21-003	10A	31.0	CL	28			48	25	23												
R-21-003	11A	36.5	SC	88												39.4	800				
R-21-003	12A	41.5	SC	84								45									
R-21-003	14A	50.5	ROCK	50	119	16								10,195							
A-21-004	3A	7.5	CL	-						5	34	61									
A-21-004	4A	11.0	CL	7	99	24								446							
A-21-004	5A	15.0	CL	-									YES								
A-21-004	6B	20.5	SC	15								26									
A-21-004	7A	26.0	CL	21						0	40	60									
A-22-005	1A	3.5	SC	16	112	13				38	42	20									
A-22-005	4A	10.0	CL	-									YES								
A-22-005	5A	16.0	CL	4	95	28				2	33	65									
A-22-005	6B	20.5	CL	12			33	17	16												
A-22-005	7A	26.0	CL	23	111	20	29	20	9												
A-22-005	8A	31.0	SC	45	113	19															

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetland
CAInc File No: 19-570.1
Date: 10/26/21
Technician: LAD

MOISTURE-DENSITY TESTS - D2216/D7263

	1	2	3	4	5
Sample No.	R-21-001-2A	R-21-001-3A	R-21-001-4A-2	R-21-001-5A	R-21-001-6A
USCS Symbol	CL	CL	CL	SC	SC
Depth (ft.)	5.5	8.5	12.5	16	21
Sample Length (in.)	5.651	5.493	5.515	5.640	5.309
Diameter (in.)	2.371	2.397	2.397	2.365	2.396
Sample Volume (ft^3)	0.01444	0.01435	0.01440	0.01434	0.01385
Total Mass Soil+Tube (g)	813.0	1125.6	860.3	1159.9	1110.2
Mass of Tube (g)	0.0	278.9	0.0	279.7	275.7
Tare No.	P2	C4	153	R17	R16
Tare (g)	126.5	13.6	14.2	130.0	129.0
Wet Soil + Tare (g)	406.1	78.5	91.3	415.5	350.5
Dry Soil + Tare (g)	343.6	67.6	78.7	371.4	317.4
Dry Soil (g)	217.1	54.0	64.5	241.4	188.4
Water (g)	62.5	10.9	12.7	44.1	33.1
Moisture (%)	**28.8**	**20.2**	**19.6**	**18.3**	**17.6**
Dry Density (pcf)	**96.4**	**108.3**	**110.1**	**114.4**	**113.0**

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetland
CAInc File No: 19-570.1
Date: 11/2/21
Technician: LAD

MOISTURE-DENSITY TESTS - D2216/D7263

	1	2	3	4	5
Sample No.	R-21-001-9A	R-21-001-10A	R-21-001-14A	R-21-001-17A	R-21-003-2A
USCS Symbol	CL	SC	SC	SC	CL
Depth (ft.)	26	31	46	61	5.5
Sample Length (in.)	4.696	4.651	4.949	5.803	5.462
Diameter (in.)	2.403	2.399	1.395	1.410	2.376
Sample Volume (ft^3)	0.01233	0.01217	0.00438	0.00524	0.01402
Total Mass Soil+Tube (g)	1033.4	1044.5	410.2	459.9	801.4
Mass of Tube (g)	272.9	273.7	116.4	130.1	0.0
Tare No.	G23	P10	100	133	H22
Tare (g)	13.5	130.8	14.0	13.9	13.5
Wet Soil + Tare (g)	63.6	382.8	66.1	76.9	67.9
Dry Soil + Tare (g)	56.8	353.1	60.6	68.2	60.6
Dry Soil (g)	43.4	222.3	46.7	54.3	47.1
Water (g)	6.8	29.7	5.5	8.7	7.3
Moisture (%)	**15.7**	**13.4**	**11.7**	**16.0**	**15.4**
Dry Density (pcf)	**117.6**	**123.2**	**132.5**	**119.5**	**109.2**

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetland
CAInc File No: 19-570.1
Date: 11/4/21
Technician: LAD

MOISTURE-DENSITY TESTS - D2216/D7263

	1	2	3	4	5
Sample No.	R-21-003-5A	R-21-003-8A	R-21-003-14A	A-21-005-1A	A-21-005-5A
USCS Symbol	SC	SC	Rock	SC	CL
Depth (ft.)	16	22.5	50.5	3.5	16
Sample Length (in.)	5.405	6.003	5.484	4.017	5.587
Diameter (in.)	2.385	2.382	2.398	2.396	2.389
Sample Volume (ft^3)	0.01397	0.01548	0.01434	0.01048	0.01449
Total Mass Soil+Tube (g)	1147.4	1239.3	894.4	869.0	1077.0
Mass of Tube (g)	272.0	276.0	0.0	273.1	275.0
Tare No.	2012.0	B11	145	2008	2003
Tare (g)	122.5	13.9	14.2	122.8	123.1
Wet Soil + Tare (g)	419.0	89.6	89.4	437.1	337.9
Dry Soil + Tare (g)	373.8	78.8	79.3	402.3	291.1
Dry Soil (g)	251.3	64.9	65.1	279.5	168.0
Water (g)	45.2	10.8	10.1	34.8	46.8
Moisture (%)	**18.0**	**16.7**	**15.5**	**12.5**	**27.9**
Dry Density (pcf)	**117.1**	**117.6**	**119.1**	**111.5**	**95.4**

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetland
CAInc File No: 19-570.1
Date: 10/25/21
Technician: KBH

MOISTURE-DENSITY TESTS - D2216/D7263

	1	2	3	4	5
Sample No.	A-21-005-7A	A-21-005-8A			
USCS Symbol	CL	SC			
Depth (ft.)	26	31			
Sample Length (in.)	5.405	5.974			
Diameter (in.)	2.377	2.386			
Sample Volume (ft^3)	0.01388	0.01546			
Total Mass Soil+Tube (g)	1117.2	1218.7			
Mass of Tube (g)	279.3	279.9			
Tare No.	159	G25			
Tare (g)	14.0	13.5			
Wet Soil + Tare (g)	95.1	71.0			
Dry Soil + Tare (g)	81.9	61.8			
Dry Soil (g)	67.8	48.4			
Water (g)	13.3	9.1			
Moisture (%)	**19.5**	**18.9**			
Dry Density (pcf)	**111.3**	**112.7**			

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/10/21
Technician: LAD

200 Wash - ASTM D1140
Method A

Max Particle Size (100% Passing)	Standard Sieve Size	Recommended Min Mass of Test Specimens
2 mm or less	No. 10	20 g
4.75 mm	No. 4	100 g
9.5 mm	3/8 "	500 g
19.0 mm	3/4 "	2.5 kg
37.5 mm	1 1/2 "	10 kg
75.0 mm	3 "	50 kg

Table from 6.2 of ASTM D1140

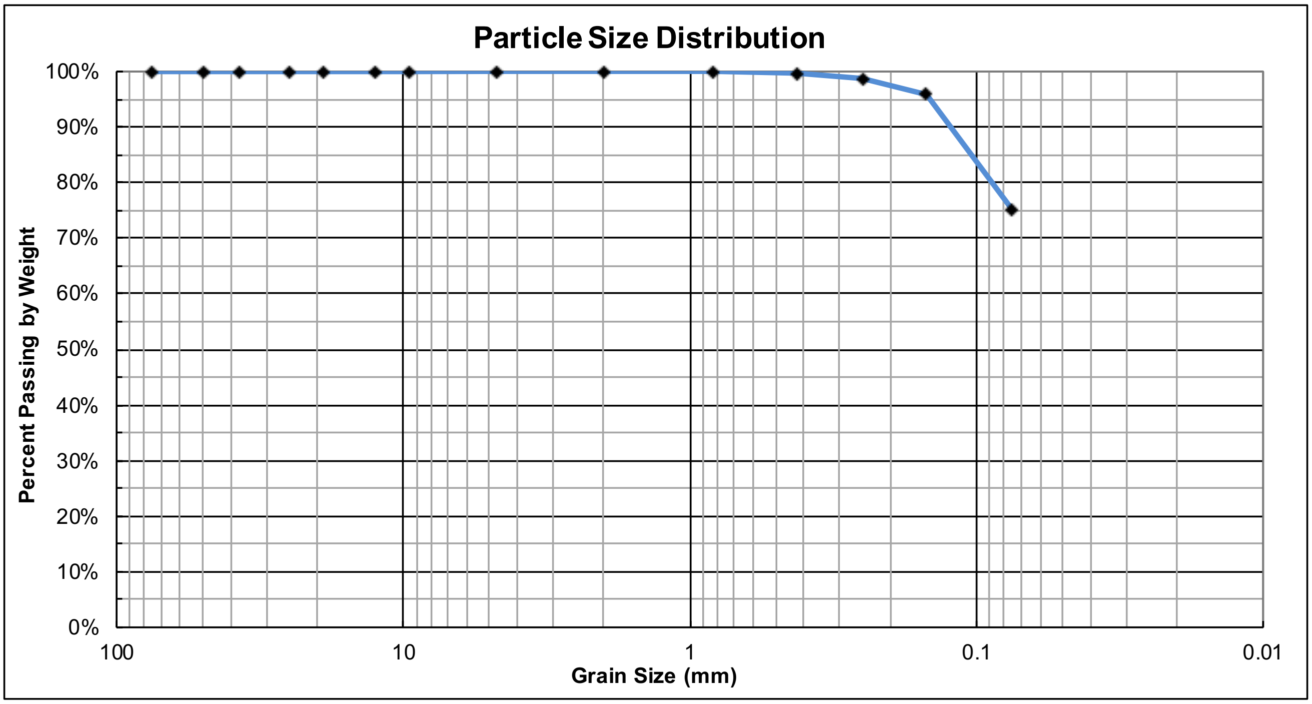
Sample No.	R-21-001-5A	R-21-001-8A	A-21-002-1A	R-21-003-12A	A-21-004-6B
USCS Symbol	SC	SC	CL	SC	SC
Depth (ft.)	16	24	3.5	41	20.5
Tare No.	R17	1006	1012	2020	2323
Tare (g)	130	125.2	126.5	124.4	129.7
Dry Soil + Tare (g)	371.4	304.3	312.4	356	336.6
Dry Mass before (g)	241.4	179.1	185.9	231.6	206.9
Dry Mass after (g)	124.5	96.9	47.5	126.5	153.6
Percent Fines (%)	48	46	74	45	26

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/8/21
Technician: LAD
Sample ID: R-21-001-2A
Depth (ft): 5.5
USCS Classification: Lean CLAYwith SAND (CL)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	0	0	0	25	
0	**0**		**25**			**75**

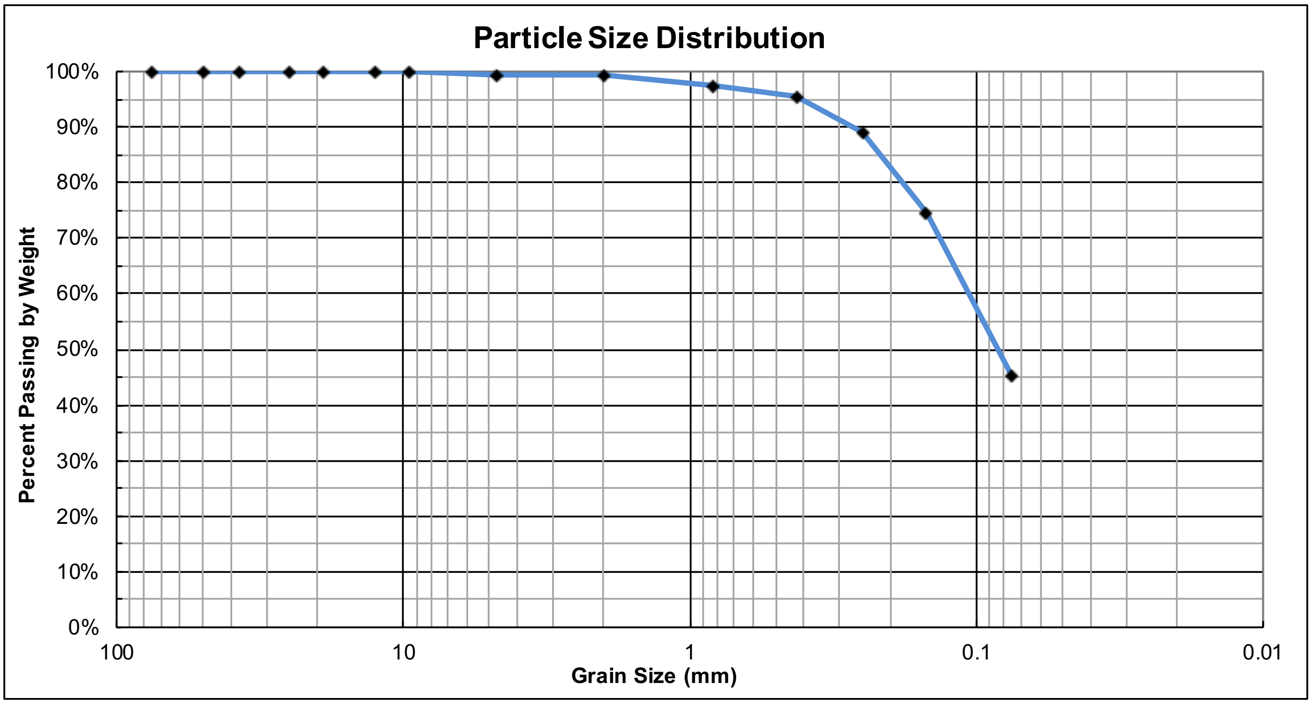
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	0.0	100%
		#4	4.75	0.1	100%
Sand	Coarse	**#10**	2.00	0.2	100%
	Medium	**#20**	0.825	0.2	100%
		#40	0.425	0.7	100%
	Fine	**#60**	0.250	2.8	99%
		#100	0.150	8.7	96%
Silt/Clay		**#200**	0.075	54.0	75%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/9/21
Technician: LAD
Sample ID: R-21-001-6A
Depth (ft): 21
USCS Classification: CLAYEY SAND (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	1	0	4	50	
0	**1**		**54**			**45**

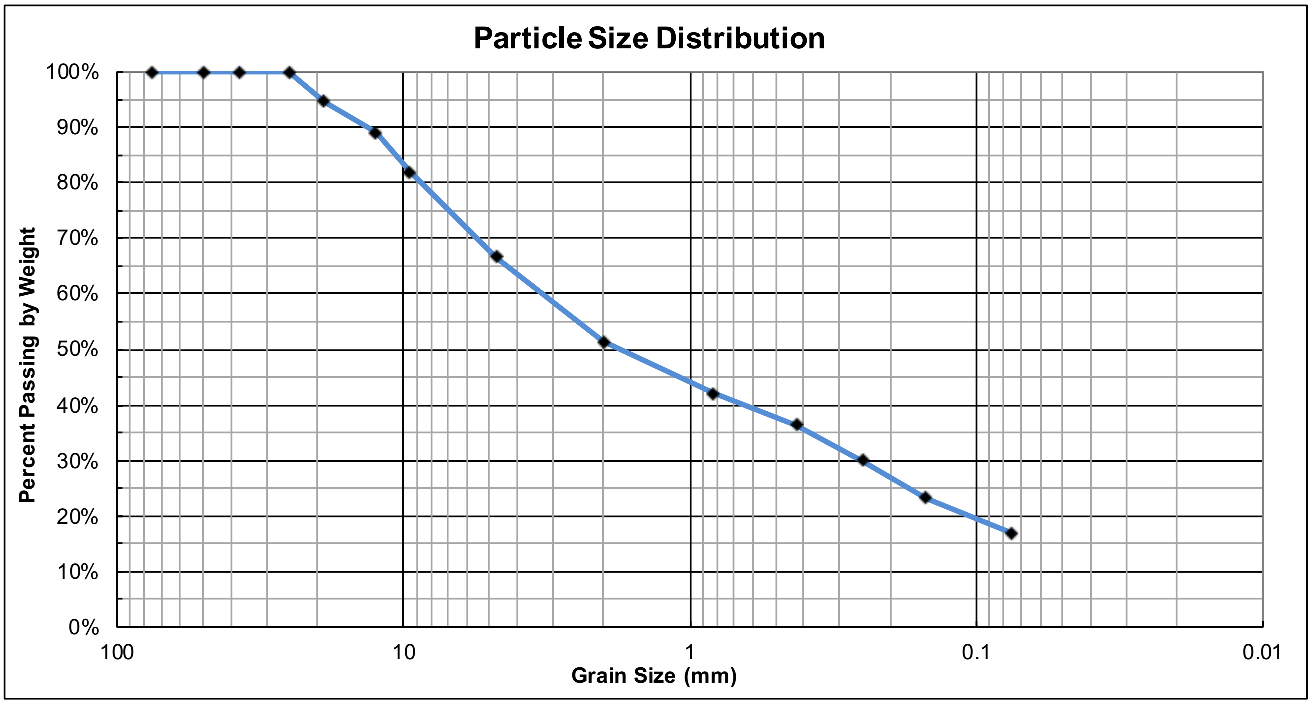
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	0.0	100%
		#4	4.75	1.3	99%
Sand	Coarse	**#10**	2.00	1.2	99%
	Medium	**#20**	0.825	5.0	97%
		#40	0.425	8.7	95%
	Fine	**#60**	0.250	20.6	89%
		#100	0.150	48.0	75%
Silt/Clay		**#200**	0.075	103.5	45%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/5/21
Technician: MNA
Sample ID: R-21-001-10A
Depth (ft): 31
USCS Classification: CLAYEY SAND with GRAVEL (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	5	28	16	15	19	
0	**33**		**50**			**17**

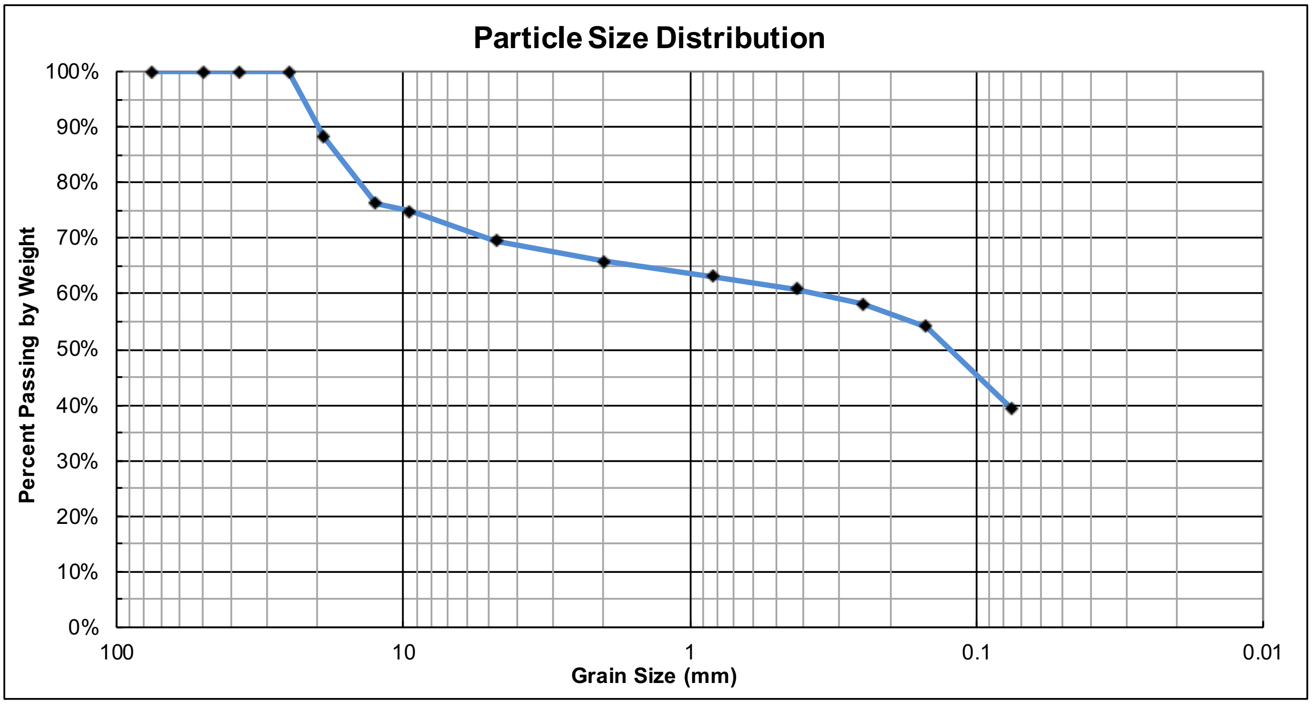
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	11.9	95%
	Fine	**1/2"**	12.5	24.3	89%
		3/8"	9.50	40.1	82%
		#4	4.75	74.0	67%
Sand	Coarse	**#10**	2.00	108.2	51%
	Medium	**#20**	0.825	128.9	42%
		#40	0.425	141.2	36%
	Fine	**#60**	0.250	155.5	30%
		#100	0.150	170.7	23%
Silt/Clay		**#200**	0.075	184.7	17%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford
& Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 10/29/21
Technician: KBH
Sample ID: R-21-003-3B
Depth (ft): 8
USCS Classification: CLAYEY SAND with GRAVEL (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	12	18	4	5	22	
0	**30**		**31**			**39**

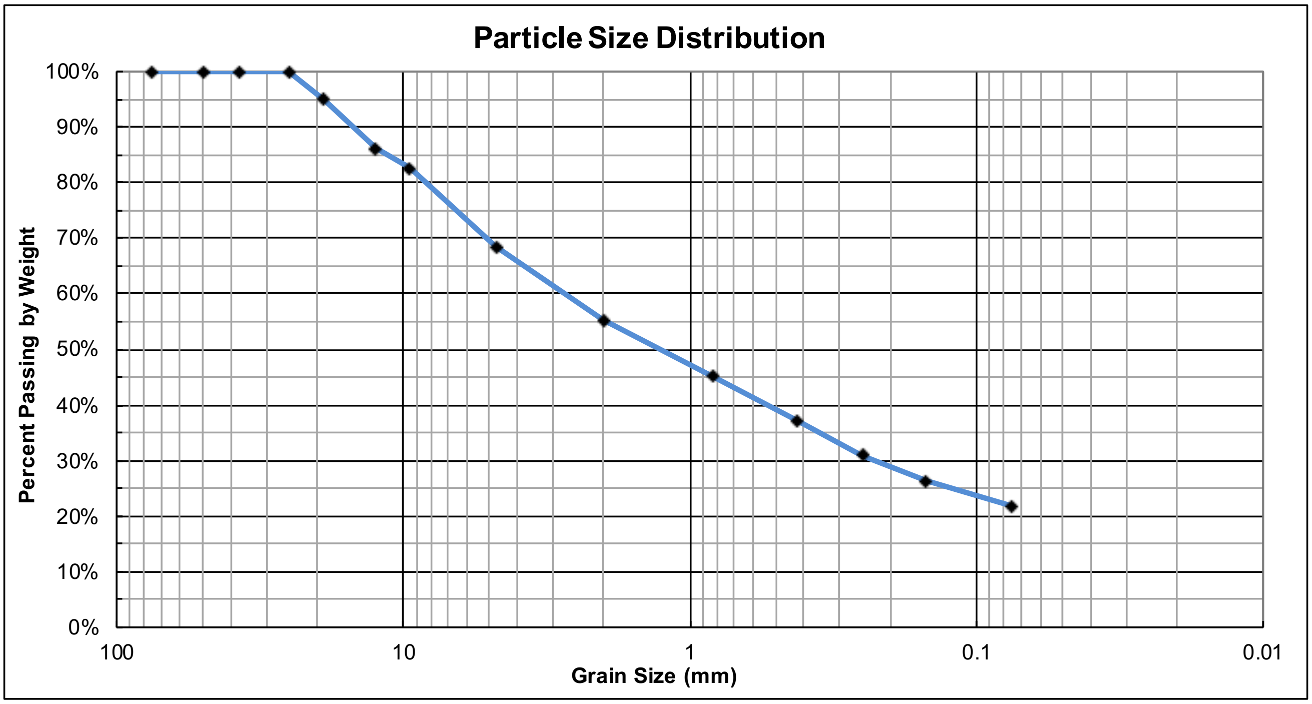
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	34.8	88%
	Fine	**1/2"**	12.5	70.2	76%
		3/8"	9.50	74.6	75%
		#4	4.75	90.2	70%
Sand	Coarse	**#10**	2.00	101.0	66%
	Medium	**#20**	0.825	109.2	63%
		#40	0.425	115.9	61%
	Fine	**#60**	0.250	124.2	58%
		#100	0.150	136.0	54%
Silt/Clay		**#200**	0.075	180.1	39%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/8/21
Technician: LAD
Sample ID: R-21-003-5A
Depth (ft): 16
USCS Classification: CLAYEY SAND with GRAVEL (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	5	27	13	18	15	
0	**32**		**46**			**22**

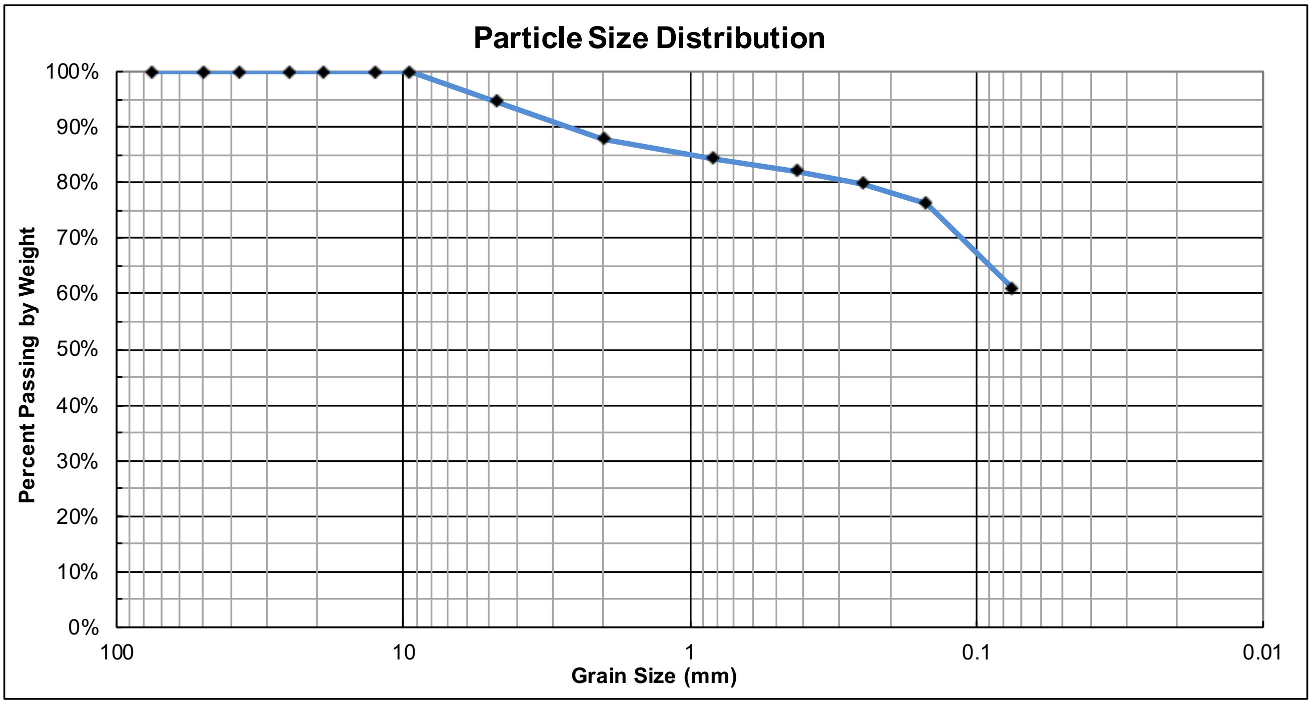
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	12.7	95%
	Fine	**1/2"**	12.5	34.8	86%
		3/8"	9.50	43.7	83%
		#4	4.75	79.4	68%
Sand	Coarse	**#10**	2.00	112.6	55%
	Medium	**#20**	0.825	138.0	45%
		#40	0.425	157.8	37%
	Fine	**#60**	0.250	173.4	31%
		#100	0.150	185.3	26%
Silt/Clay		**#200**	0.075	196.5	22%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/5/21
Technician: MNA
Sample ID: A-21-004-3A
Depth (ft): 7.5
USCS Classification: SANDY Lean CLAY (CL)

ASTM 6913 - Method A



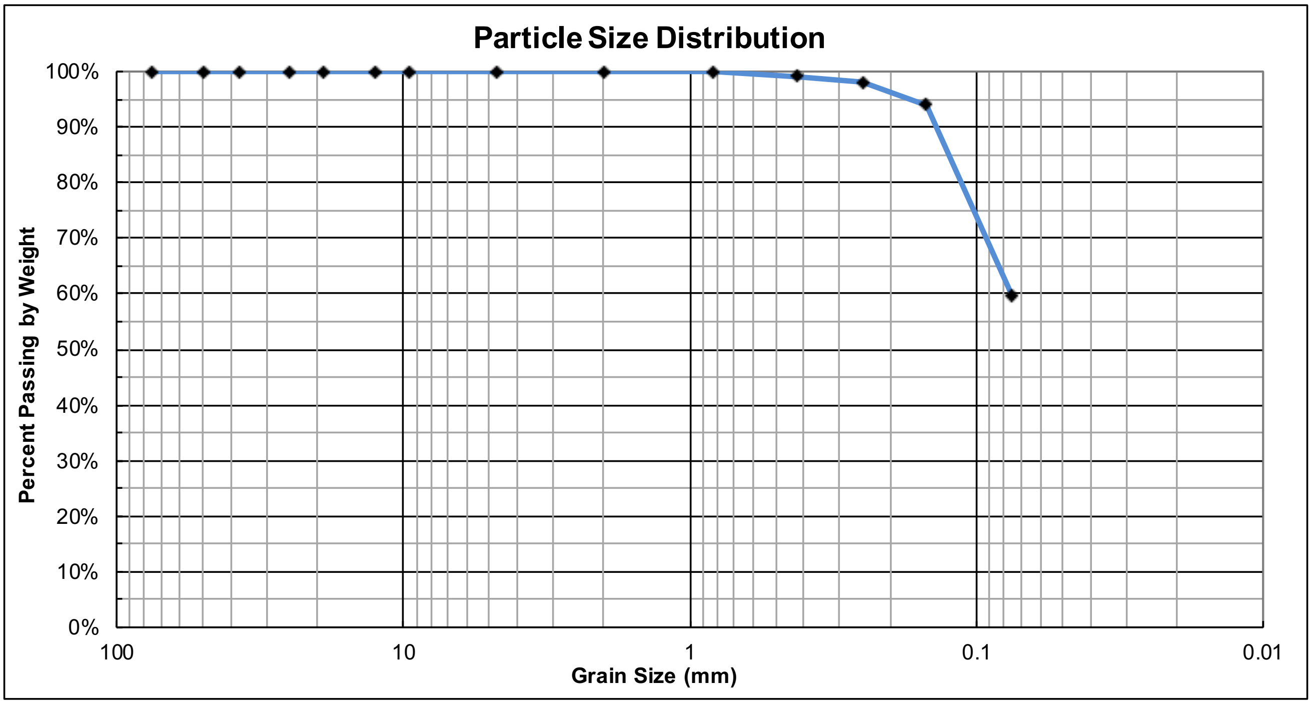
% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	5	7	6	21	
0	**5**		**34**			**61**

		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	0.0	100%
		#4	4.75	10.2	95%
Sand	Coarse	**#10**	2.00	22.8	88%
	Medium	**#20**	0.825	29.5	84%
		#40	0.425	33.5	82%
	Fine	**#60**	0.250	38.0	80%
		#100	0.150	44.4	76%
Silt/Clay		**#200**	0.075	73.2	61%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/8/21
Technician: LAD
Sample ID: A-21-004-7A
Depth (ft): 26
USCS Classification: SANDY Lean CLAY (CL)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	0	0	1	39	
0	**0**		**40**			**60**

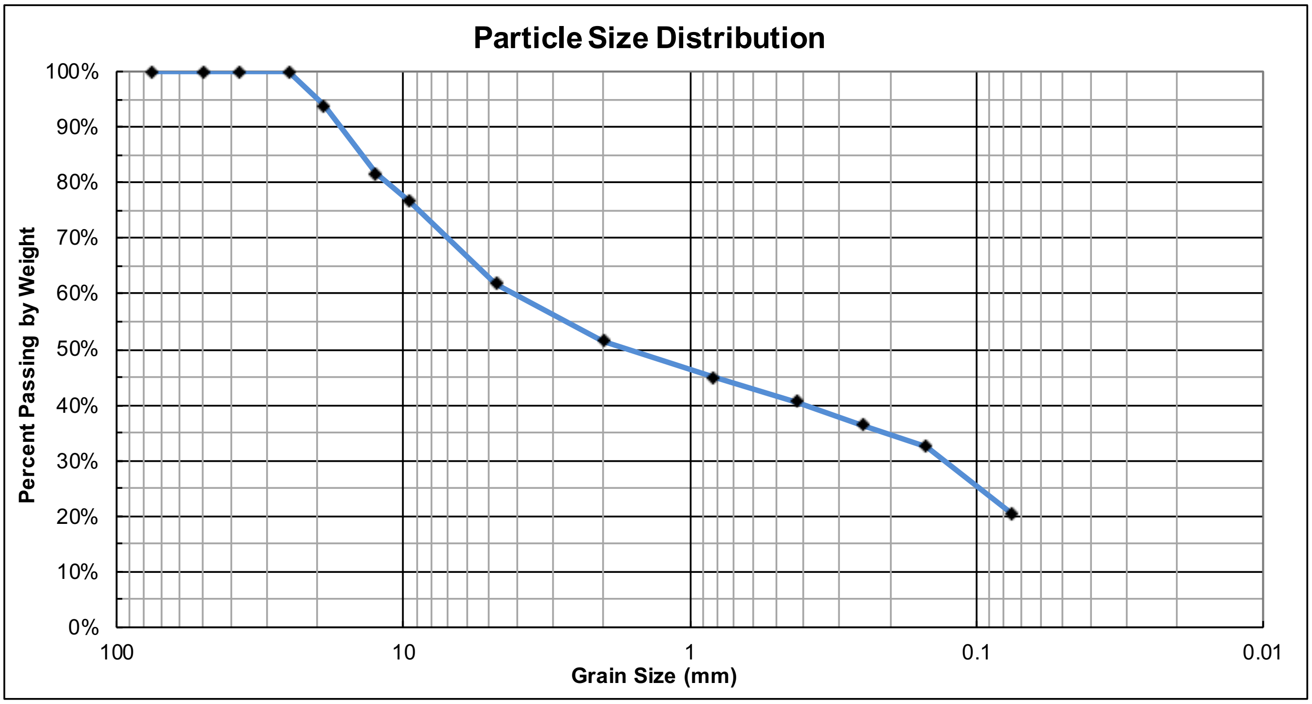
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	0.0	100%
		#4	4.75	0.0	100%
Sand	Coarse	**#10**	2.00	0.0	100%
	Medium	**#20**	0.825	0.0	100%
		#40	0.425	1.7	99%
	Fine	**#60**	0.250	3.9	98%
		#100	0.150	11.5	94%
Silt/Clay		**#200**	0.075	77.5	60%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/5/21
Technician: MNA
Sample ID: A-21-005-1A
Depth (ft): 3.5
USCS Classification: CLAYEY SAND with GRAVEL (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	6	32	10	11	21	
0	**38**		**42**			**20**

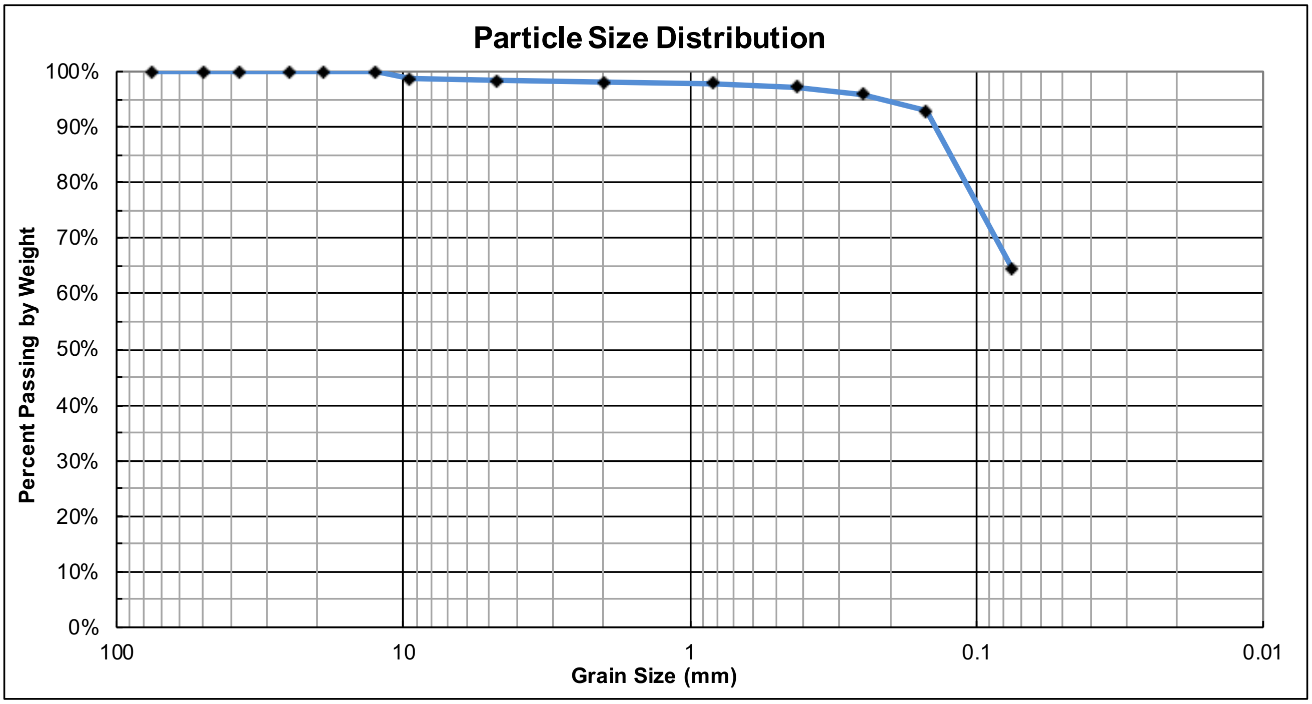
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	17.4	94%
	Fine	**1/2"**	12.5	51.4	82%
		3/8"	9.50	65.5	77%
		#4	4.75	106.5	62%
Sand	Coarse	**#10**	2.00	135.3	52%
	Medium	**#20**	0.825	153.8	45%
		#40	0.425	165.9	41%
	Fine	**#60**	0.250	177.9	36%
		#100	0.150	188.4	33%
Silt/Clay		**#200**	0.075	222.5	20%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/8/21
Technician: LAD
Sample ID: A-21-005-5A
Depth (ft): 16
USCS Classification: SANDY Lean CLAY (CL)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	2	0	1	32	
0	**2**		**33**			**65**

		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	2.3	99%
		#4	4.75	2.7	98%
Sand	Coarse	**#10**	2.00	3.2	98%
	Medium	**#20**	0.825	3.7	98%
		#40	0.425	4.8	97%
	Fine	**#60**	0.250	6.9	96%
		#100	0.150	11.9	93%
Silt/Clay		**#200**	0.075	59.6	65%

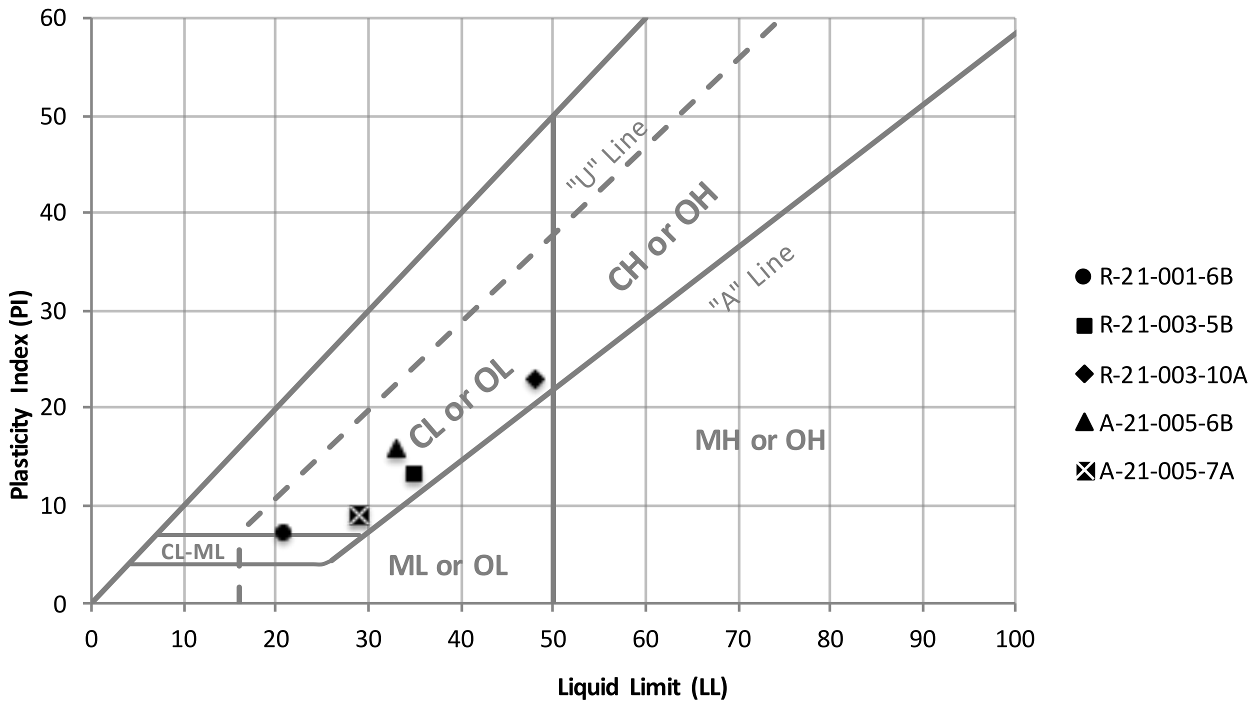
Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 10/26/2021-11/9/21
Technician: KBHCAP/MNA

Plastic Index - ASTM D4318

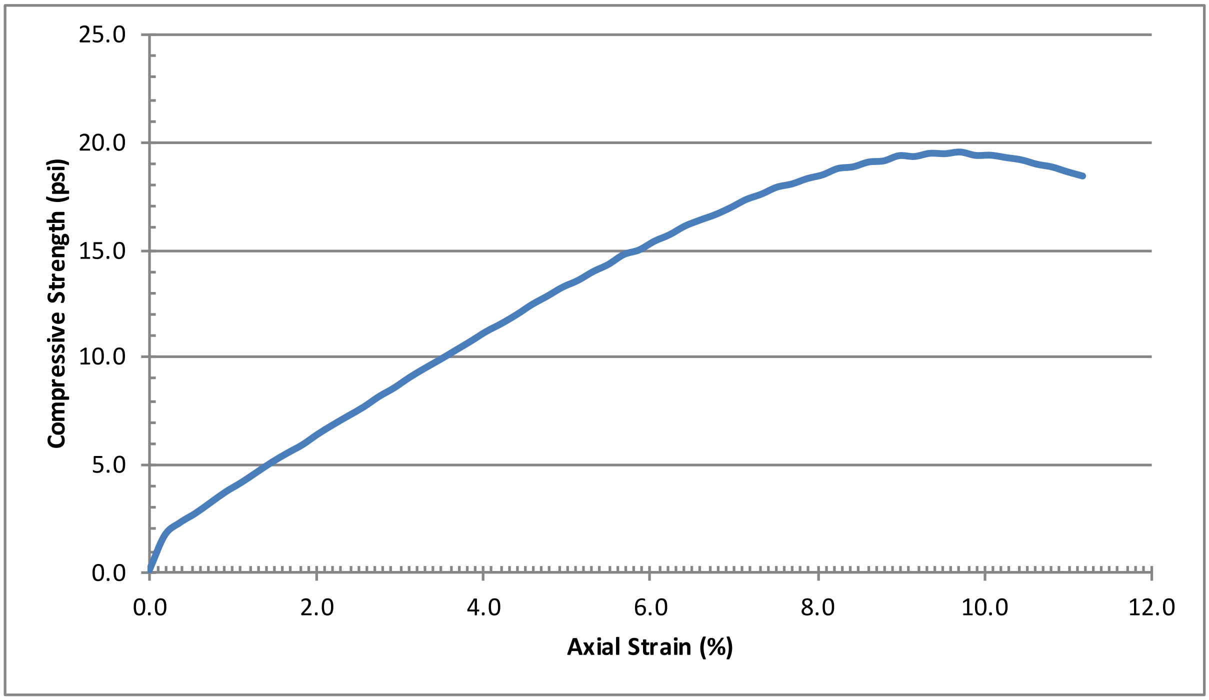
Sample ID	Depth (ft)	Liquid Limit	Plastic Limit	PI
R-21-001-6B	20.5	21	14	7
R-21-003-5B	15.5	35	22	13
R-21-003-10A	31	48	25	23
A-21-005-6B	20.5	33	17	16
A-21-005-7A	26	29	20	9



Plasticity Chart

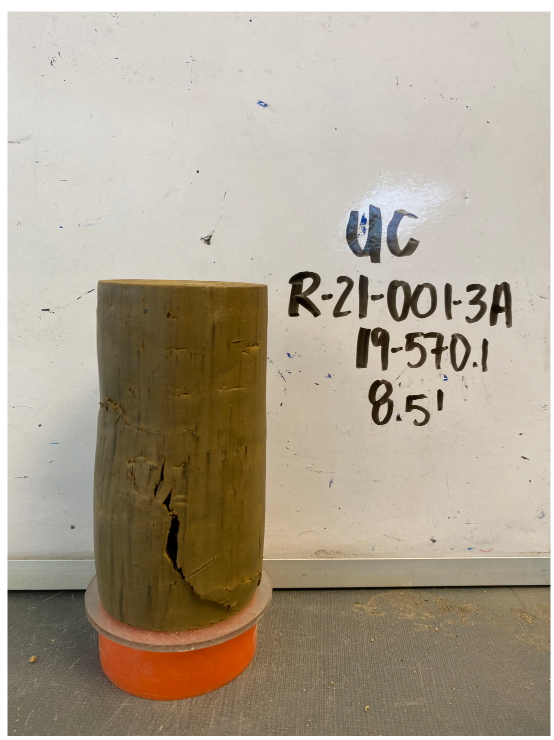
Project Name: Bolinas Lgoon Wye Wetlands
CAInc File No: 19-570.1
Date: 10/19/21
Technician: LAD
Sample ID: R-21-001-3A Depth (ft): 8.5
USCS Classification: CL

UNCONFINED COMPRESSION TEST - D2166



Dry Density (pcf)	**108.3**
Water Content (%)	**20.2**
Unconfined Compressive Strength (psi)	**19.5**
Unconfined Compressive Strength (psf)	**2808**
Average Height (in)	5.493
Average Diameter (in)	2.397
Rate of strain (%)	1.0
Strain at Failure (%)	9.7

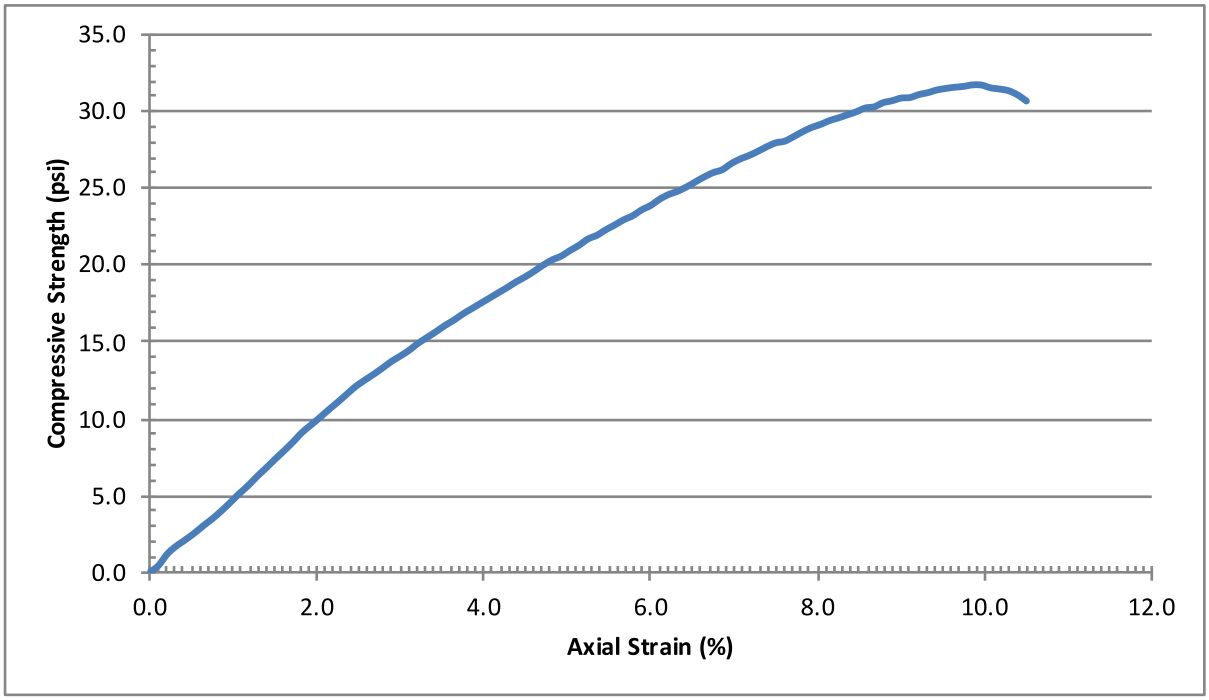
Notes:



Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

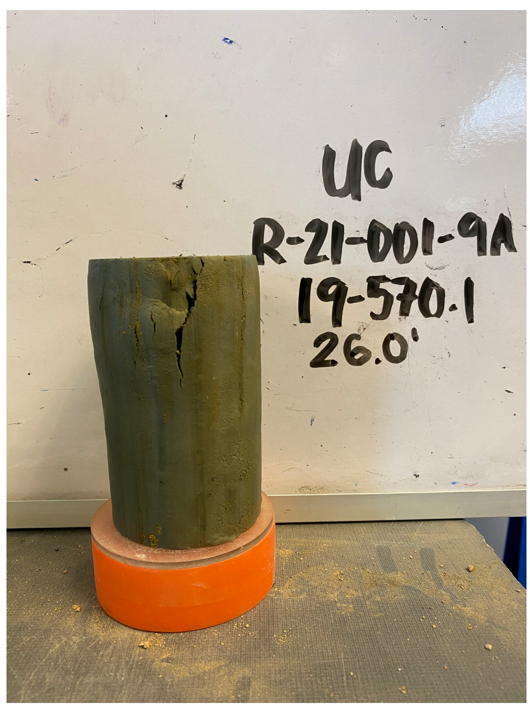
Project Name: Bolinas Lgoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/5/21
Technician: LAD
Sample ID: R-21-001-9A Depth (ft): 26.0
USCS Classification: CL

UNCONFINED COMPRESSION TEST - D2166



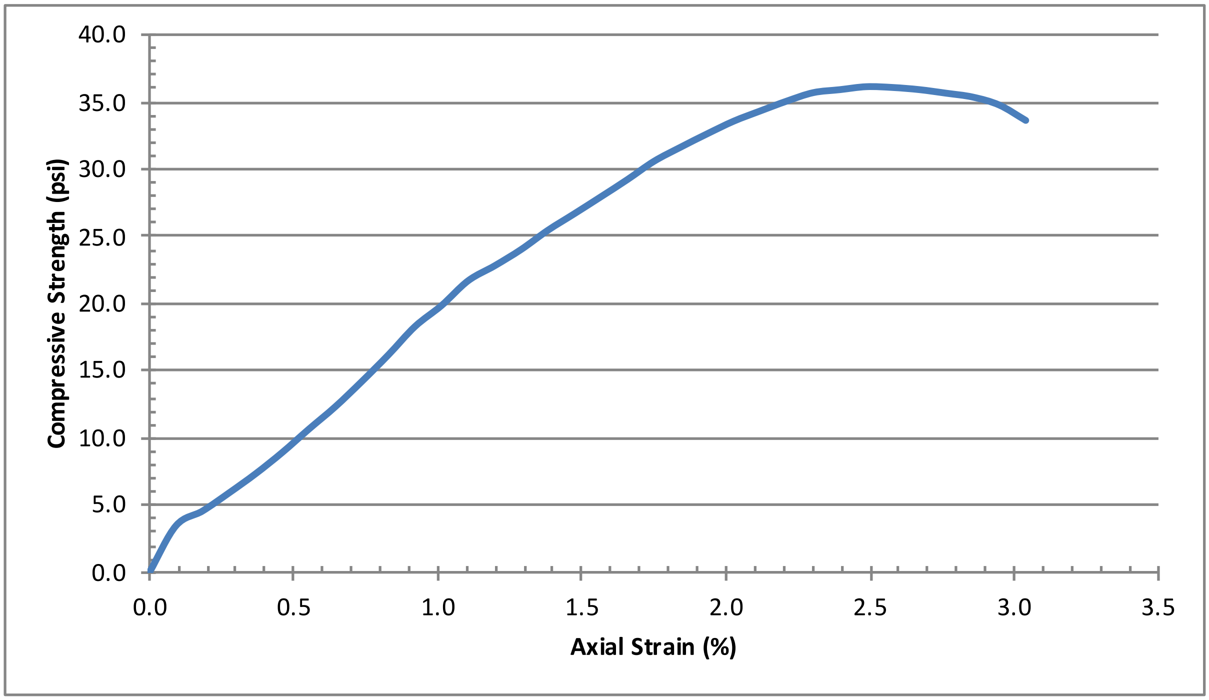
Dry Density (pcf)	**117.6**
Water Content (%)	**15.7**
Unconfined Compressive Strength (psi)	**31.7**
Unconfined Compressive Strength (psf)	**4565**
Average Height (in)	4.696
Average Diameter (in)	2.403
Rate of strain (%)	0.5
Strain at Failure (%)	9.9

Notes:



Project Name: Bolinas Lgoon Wye Wetlands
CAInc File No: 19-570.1
Date: 10/19/21
Technician: LAD
Sample ID: R-21-003-2A Depth (ft): 5.5
USCS Classification: CL

UNCONFINED COMPRESSION TEST - D2166

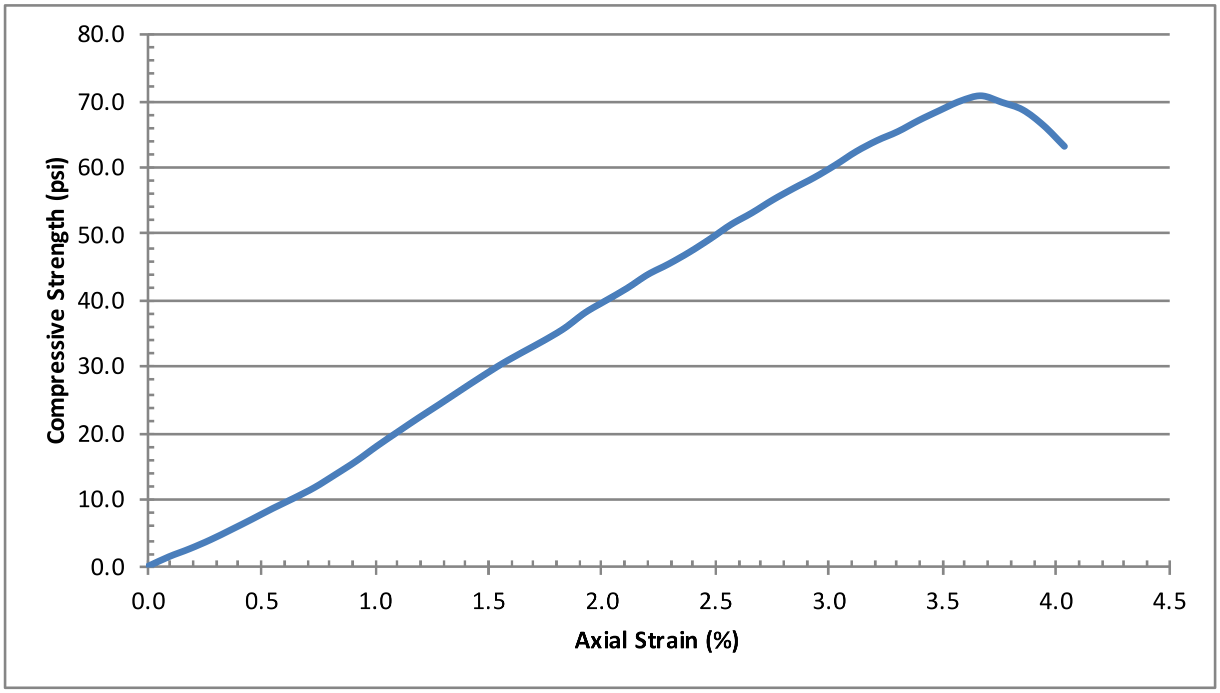


Dry Density (pcf)	**109.2**
Water Content (%)	**15.4**
Unconfined Compressive Strength (psi)	**36.1**
Unconfined Compressive Strength (psf)	**5198**
Average Height (in)	5.462
Average Diameter (in)	2.376
Rate of strain (%)	0.5
Strain at Failure (%)	2.5

Notes:

Project Name: Bolinas Lgoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/4/21
Technician: LAD
Sample ID: R-21-003-14A Depth (ft): 50.5
USCS Classification: Rock

UNCONFINED COMPRESSION TEST - D2166

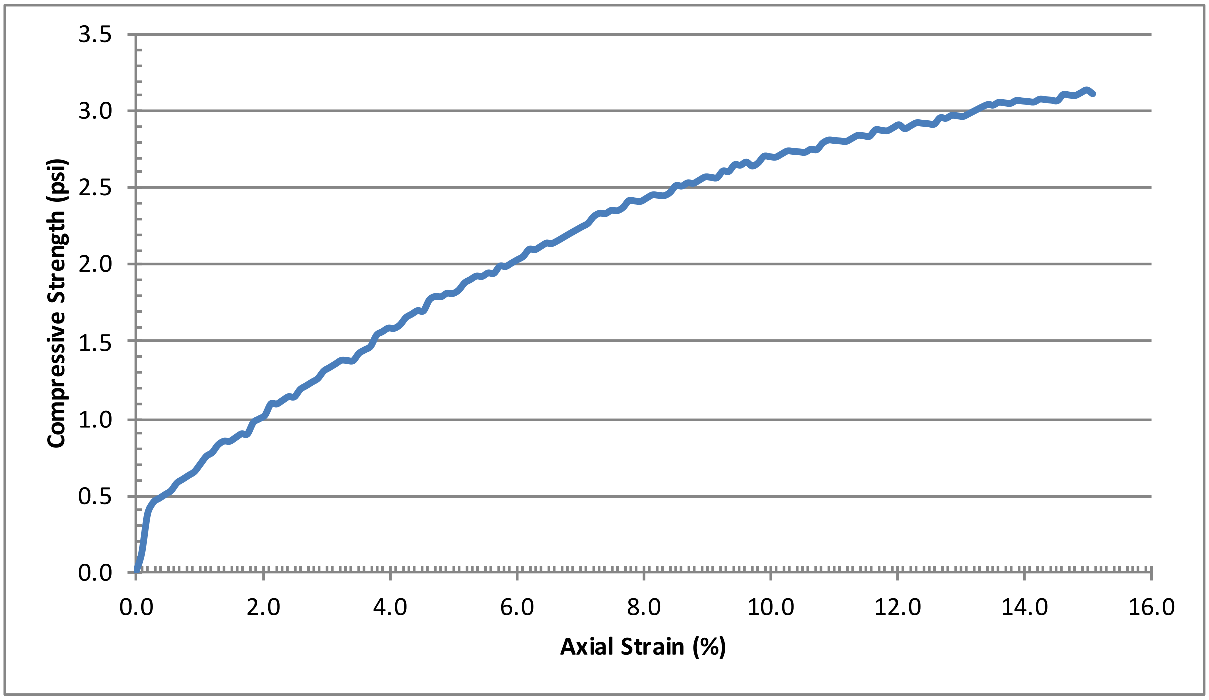


Dry Density (pcf)	**119.1**
Water Content (%)	**15.5**
Unconfined Compressive Strength (psi)	**70.8**
Unconfined Compressive Strength (psf)	**10195**
Average Height (in)	5.484
Average Diameter (in)	2.398
Rate of strain (%)	0.5
Strain at Failure (%)	3.7

Notes:

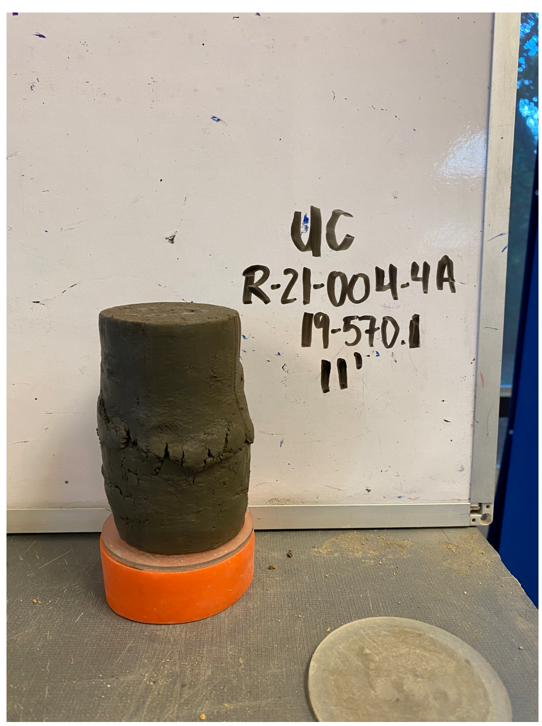
Project Name: Bolinas Lgoon Wye Wetlands
CAInc File No: 19-570.1
Date: 10/19/21
Technician: LAD
Sample ID: A-21-004-4A Depth (ft):
11.0 USCS Classification: CL

UNCONFINED COMPRESSION TEST - D2166



Dry Density (pcf)	**99.4**
Water Content (%)	**24.1**
Unconfined Compressive Strength (psi)	**3.1**
Unconfined Compressive Strength (psf)	**446**
Average Height (in)	5.440
Average Diameter (in)	2.406
Rate of strain (%)	1.4
Strain at 15%	

Notes:



Project Name: Bolinas Lagoon Wye Wetlands
CAInc File No: 19-570.1
Date: 11/10/21
Technician: MNA

Boring	Top Hole Elev. (feet)	Core Run	Depth (feet)	Elev. (feet)	Core Diameter (inches)	Failure Load (P) (lbf)	Point Load Index (I_S) (psi)	Correlated Uniaxial Compressive Strength (psi)	Remarks/Notes
R-21-001	20	**C**	82.8	Unknown	2.351	114.2	21	500	Vertical Break

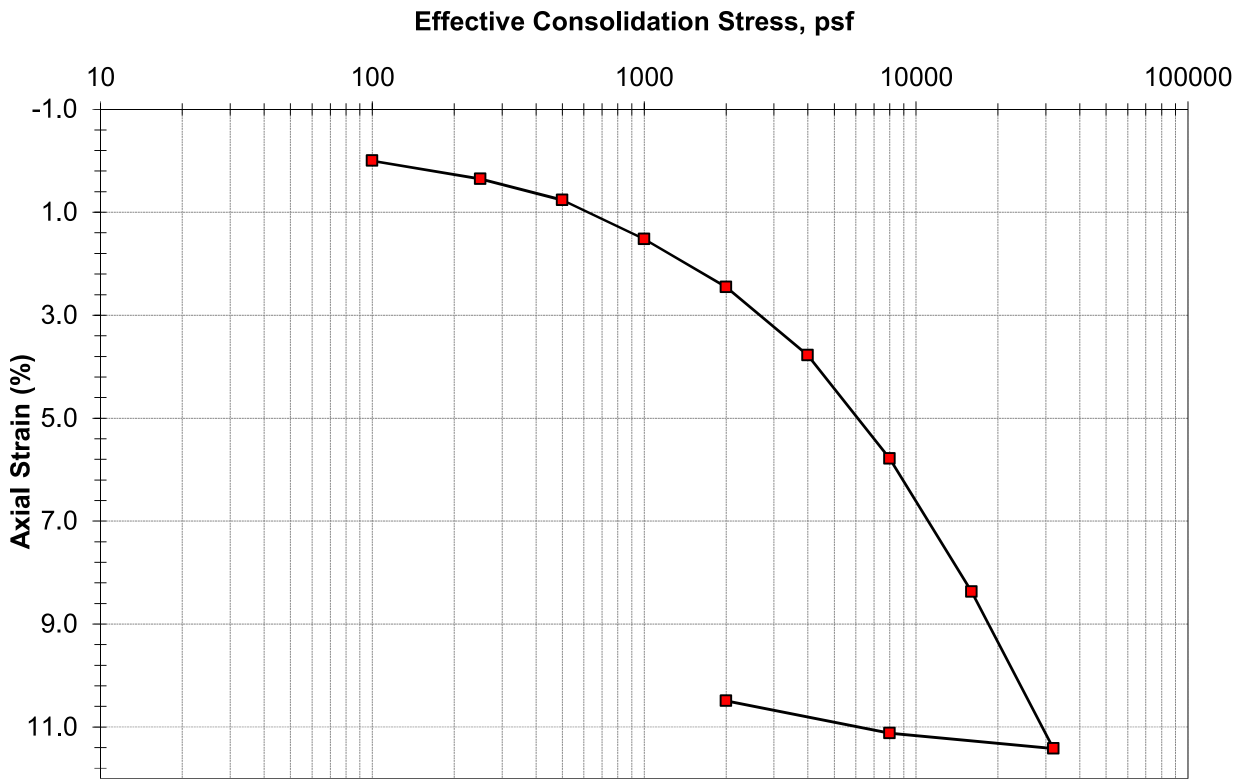
Uniaxial compressive strength values based on point load test data and correlations derived from Bieniawski (1975); "Rock Mechanics for Underground Mining", Brady & Brown, 1985 (page 98-99).

Equation to Determine Uniaxial Compressive Strength:

Uniaxial Compressive Strength = $\sigma_c = (14 + 0.175D)I_s$
Point Load Index = $I_s = P/D^2$

CONSOLIDATION TEST - ASTM D2435
STRESS VERSUS STRAIN

Project Name	Bolinas Lagoon
Geocon Project Number	S9763-05-233
Boring Number	A-21-004
Sample Number	A-21-004 (15-17'), 16.5'
Sample Description	Dark greenish gray Sandy lean CLAY



Axial Load, psf	Void Ratio	Axial Strain, %
initial	0.771	0.00
100	0.771	0.00
250	0.765	0.35
500	0.758	0.76
1000	0.744	1.52
2000	0.728	2.45
4000	0.704	3.78
8000	0.669	5.79
16000	0.623	8.37
32000	0.569	11.42
8000	0.574	11.12
2000	0.585	10.49

Measurement	Initial	Final
Height (in.)	0.750	0.666
Moisture Content (%)	27.5	21.1
Dry Density (pcf)	95.5	107.5
Saturation (%)	97	100

Note:
Gs = 2.71 (assumed)

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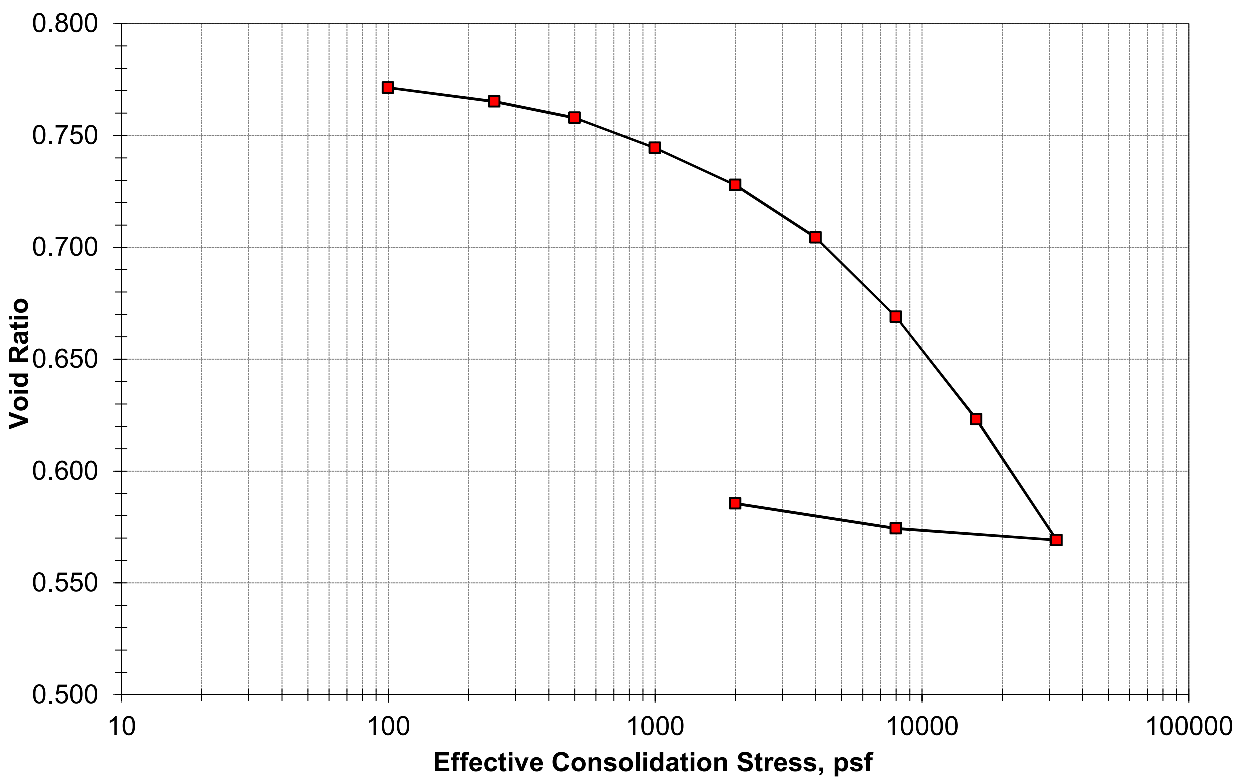
CONSOLIDATION TEST - ASTM D2435

STRESS VERSUS VOID RATIO

Project Name	Bolinas Lagoon
Geocon Project Number	S9763-05-233
Boring Number	A-21-004
Sample Number	A-21-004 (15-17'), 16.5'
Sample Description	Dark greenish gray Sandy lean CLAY



Axial Load, psf	Void Ratio	Axial Strain, %
initial	0.771	0.00
100	0.771	0.00
250	0.765	0.35
500	0.758	0.76
1000	0.744	1.52
2000	0.728	2.45
4000	0.704	3.78
8000	0.669	5.79
16000	0.623	8.37
32000	0.569	11.42
8000	0.574	11.12
2000	0.585	10.49

Measurement	Initial	Final
Height (in.)	0.750	0.666
Moisture Content (%)	27.5	21.1
Dry Density (pcf)	95.5	107.5
Saturation (%)	97	100

Note:
Gs = 2.71 (assumed)

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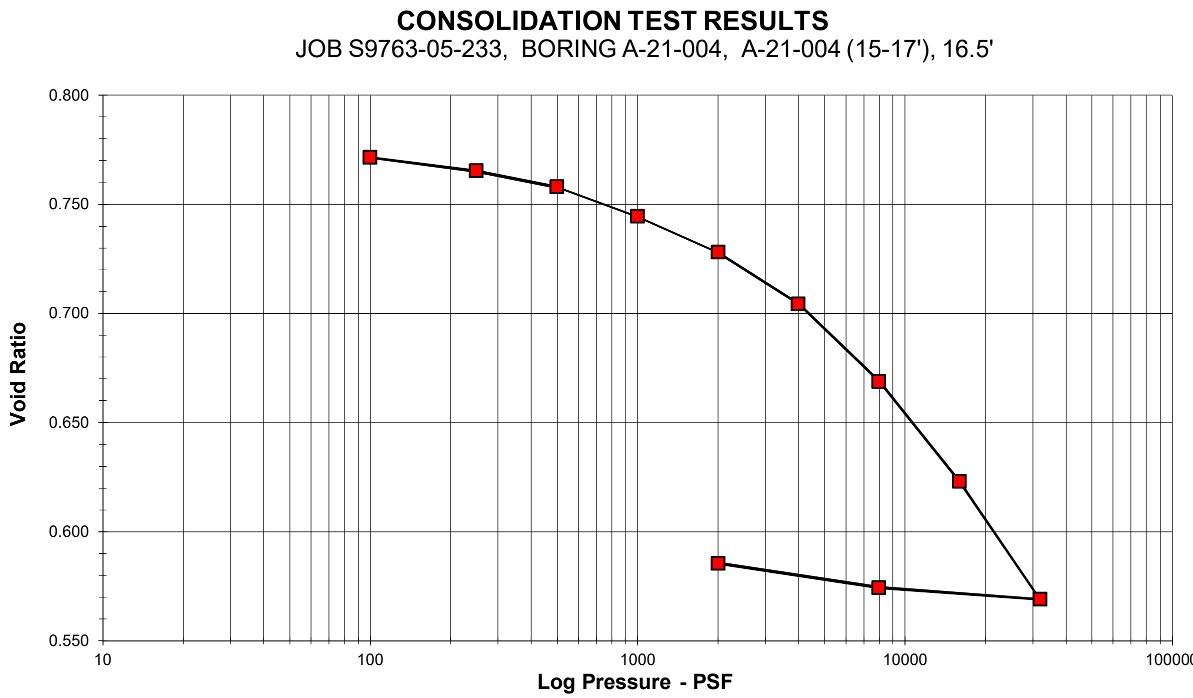
CONSOLIDATION TEST - ASTM D2435

Project Name: Bolinas Lagoon
Project Number: S9763-05-233 Sample Number: A-21-004 A-21-004 (15-



Axial Load (psf)	Void Ratio	Axial Strain (%)	m_V, coef of vol Compres (in^2/lb)	c_C, Comp Index	50% Consolidation: t_{50}, Time to Consol (min)	50% Consolidation: C_V, Coeff of Consol (ft^2/yr)	90% Consolidation: t_{90}, Time to Consol (min)	90% Consolidation: C_V, Coeff of Consol (ft^2/yr)
initial	0.771	0.00						
100	0.771	0.00						
250	0.765	0.35						
500	0.758	0.76	0.0024	0.024	0.34	296.42	1.45	298.13
1000	0.744	1.52	0.0022	0.045	0.37	264.61	1.60	266.14
2000	0.728	2.45	0.0014	0.055	0.46	213.20	1.95	214.43
4000	0.704	3.78	0.0010	0.078	0.44	215.00	1.89	216.24
8000	0.669	5.79	0.0008	0.118	0.44	206.27	1.90	207.46
16000	0.623	8.37	0.0005	0.152	0.43	203.06	1.84	204.23
32000	0.569	11.42	0.0003	0.179	0.45	182.29	1.93	183.35
8000	0.574	11.12						
2000	0.585	10.49						

G_s = 2.71 (assumed)	COND AT START OF TEST	COND AT END OF TEST
HEIGHT (in.)	0.7500	0.6662
MOISTURE CONTENT (%)	27.5	21.1
DRY DENSITY (pcf):	95.5	107.5
SATURATION (%)	96.9	99.9

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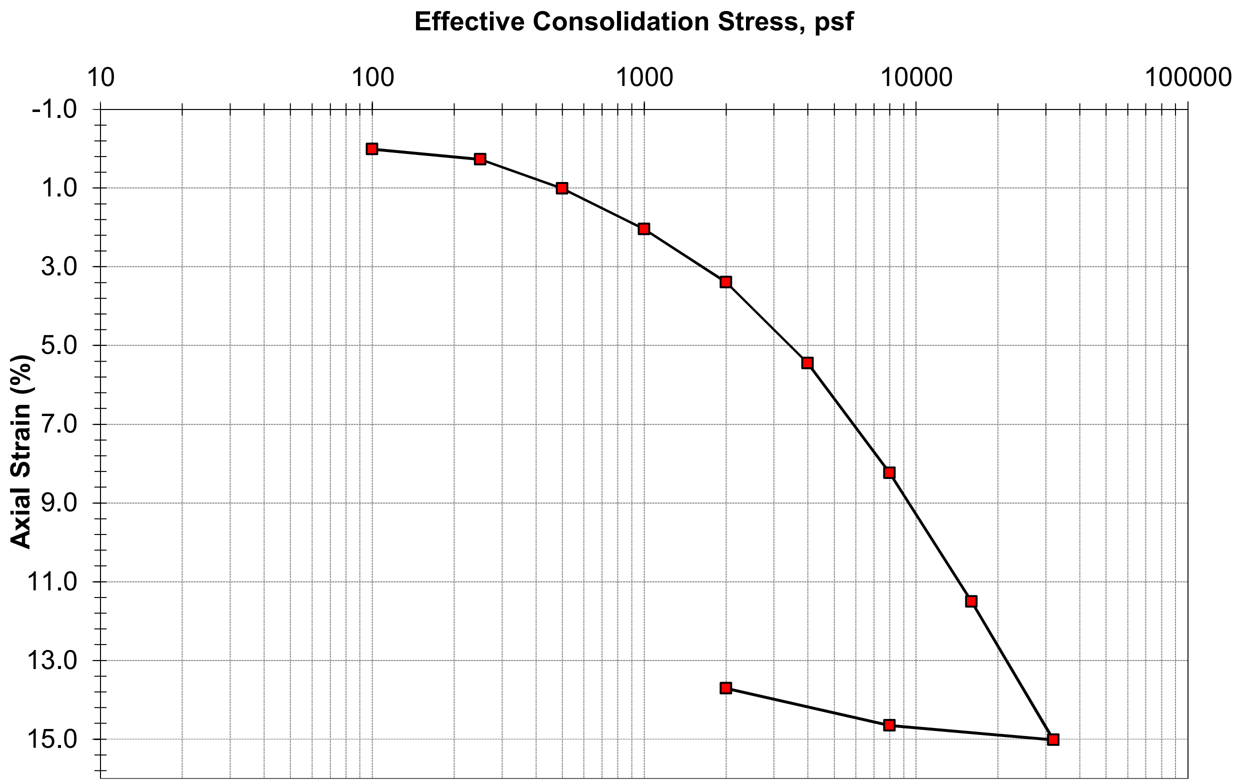
CONSOLIDATION TEST - ASTM D2435
STRESS VERSUS STRAIN

Project Name	Bolinas Lagoon
Geocon Project Number	S9763-05-233
Boring Number	A-21-005
Sample Number	A-21-005 (10-12')
Sample Description	Dark Green lean CLAY



Axial Load, psf	Void Ratio	Axial Strain, %
initial	0.829	0.00
100	0.829	0.01
250	0.824	0.27
500	0.811	1.01
1000	0.792	2.04
2000	0.767	3.40
4000	0.730	5.45
8000	0.678	8.24
16000	0.619	11.51
32000	0.555	15.02
8000	0.561	14.65
2000	0.579	13.71

Measurement	Initial	Final
Height (in.)	0.750	0.644
Moisture Content (%)	29.7	21.2
Dry Density (pcf)	91.5	106.6
Saturation (%)	96	100

Note:
Gs = 2.68 (assumed)

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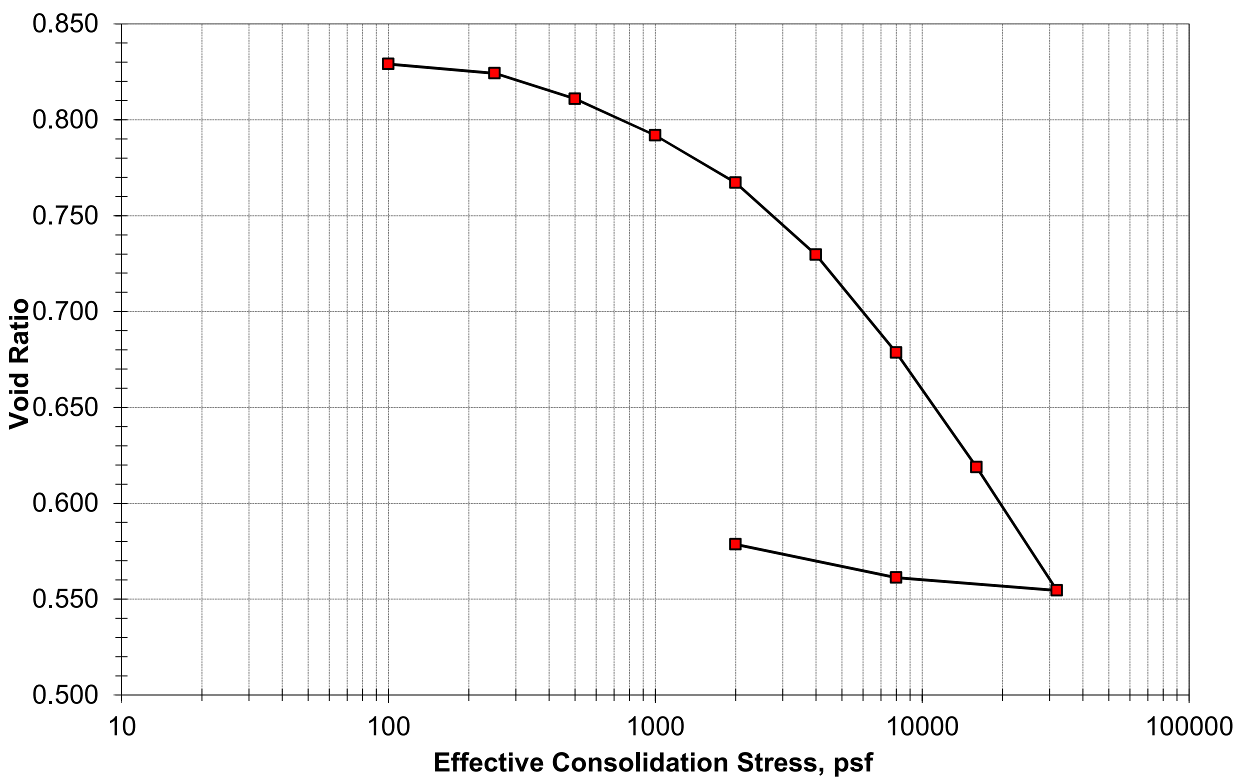
CONSOLIDATION TEST - ASTM D2435

STRESS VERSUS VOID RATIO

Project Name	Bolinas Lagoon
Geocon Project Number	S9763-05-233
Boring Number	A-21-005
Sample Number	A-21-005 (10-12')
Sample Description	Dark Green lean CLAY



Axial Load, psf	Void Ratio	Axial Strain, %
initial	0.829	0.00
100	0.829	0.01
250	0.824	0.27
500	0.811	1.01
1000	0.792	2.04
2000	0.767	3.40
4000	0.730	5.45
8000	0.678	8.24
16000	0.619	11.51
32000	0.555	15.02
8000	0.561	14.65
2000	0.579	13.71

Measurement	Initial	Final
Height (in.)	0.750	0.644
Moisture Content (%)	29.7	21.2
Dry Density (pcf)	91.5	106.6
Saturation (%)	96	100

Note:
Gs = 2.68 (assumed)

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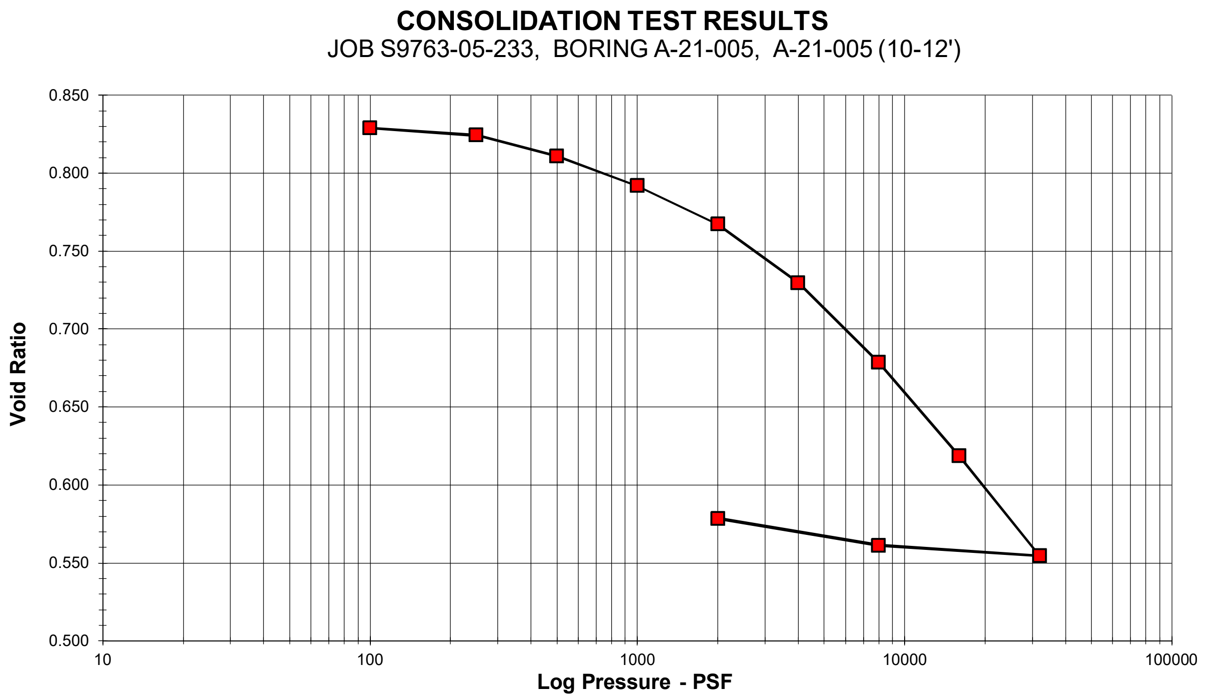
CONSOLIDATION TEST - ASTM D2435

Project Name: Bolinas Lagoon

Project Number: S9763-05-233 Sample Number: A-21-005 A-21-005 (10-1



Axial Load (psf)	Void Ratio	Axial Strain (%)	m_V, coef of vol Compres (in^2/lb)	c_C, Comp Index	50% Consolidation: t_{50}, Time to Consol (min)	50% Consolidation: C_V, Coeff of Consol (ft^2/yr)	90% Consolidation: t_{90}, Time to Consol (min)	90% Consolidation: C_V, Coeff of Consol (ft^2/yr)
initial	0.829	0.00						
100	0.829	0.01						
250	0.824	0.27						
500	0.811	1.01	0.0042	0.045	1.76	56.64	7.55	56.96
1000	0.792	2.04	0.0030	0.063	1.64	59.80	7.03	60.15
2000	0.767	3.40	0.0020	0.082	1.80	53.02	7.73	53.32
4000	0.730	5.45	0.0015	0.125	2.09	44.27	8.94	44.53
8000	0.678	8.24	0.0011	0.170	2.30	38.22	9.84	38.44
16000	0.619	11.51	0.0006	0.199	2.09	39.32	8.95	39.55
32000	0.555	15.02	0.0004	0.213	2.04	37.22	8.76	37.43
8000	0.561	14.65						
2000	0.579	13.71						

G_s = 2.68 (assumed)

	COND AT START OF TEST	COND AT END OF TEST
HEIGHT (in.)	0.7500	0.6439
MOISTURE CONTENT (%)	29.7	21.2
DRY DENSITY (pcf):	91.5	106.6
SATURATION (%)	96.0	99.9

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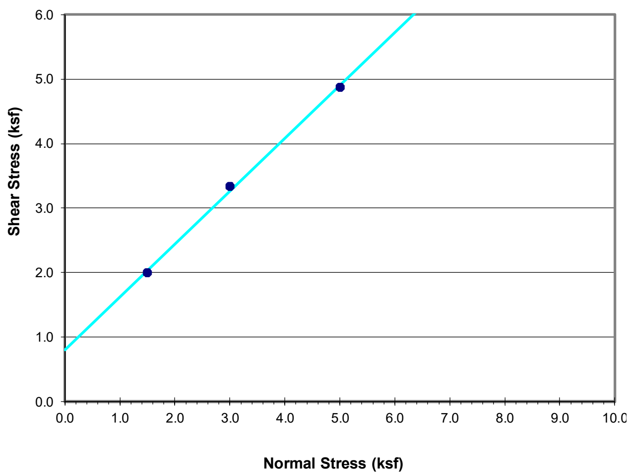
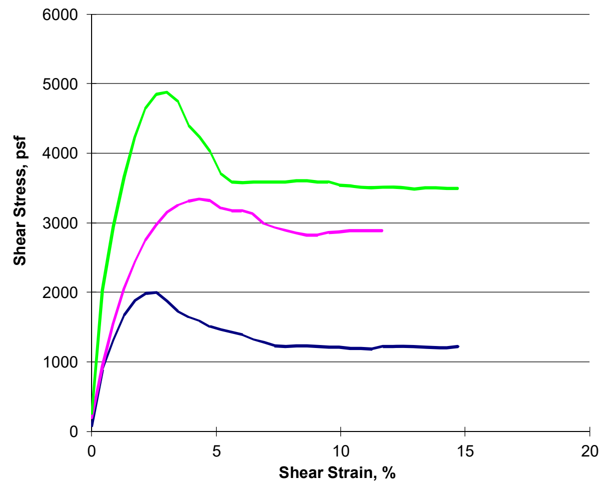
SHEAR STRENGTH	STRESS-STRAIN
	

Sample Description			
Boring Number	R-21-003-11A-36-36.5		
Sample Depth (feet)	5.00		
Material Description	Dark Grayish green Sandy Silty CLAY		
Initial Conditions at Start of Test			
Sample ID (psf)	**1500**	**3000**	**5000**
Height (inch)	1.00	1.00	1.00
Diameter (inch)	2.363	2.363	2.363
Moisture Content (%)	14.1	14.1	14.1
Wet Density (pcf)	136.0	133.7	137.0
Dry Density (pcf)	119.2	117.1	120.1
Estimated Specific Gravity	2.85	2.85	2.95
Saturation (%)	81.6	77.6	78.0
Shear Test Conditions			
Strain Rate (%/min)	0.105	0.109	0.107
Major Principal Stress at Failure (psf)	1995	3339	4878
Strain at Failure (%)	2.60	4.32	3.03
Test Results			
ϕ, degrees	**39.4**		
c, psf	**800**		

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Direct Shear Strength Test (ASTM D3080)

Project: Bolinas Lagoon 19-570.1
Location: El Dorado County, CA
Number: S9763-05-233
Figure:

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 11/03/2021
Date Submitted 10/28/2021

To: Carmelo Pagan
Crawford & Associates, Inc.
1100 Corporate Way Suite 230
Sacramento, CA 95831

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager \

The reported analysis was requested for the following location:
Location : 19-570.1 BOLINAS Site ID : R21-003-2A,5.5.
Thank you for your business.

* For future reference to this analysis please use SUN # 86053-179352.

EVALUATION FOR SOIL CORROSION

Soil pH	5.47		
Minimum Resistivity	3.75	ohm-cm (x1000)	
Chloride	7.3 ppm	00.00073	%
Sulfate	18.4 ppm	00.00184	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 12/22/2022
Date Submitted 12/19/2022

To: Kennedy Hauder
Crawford & Associates, Inc.
4701 Freeport Blvd
Sacramento, CA 95822

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 19-570.1 BOLINAS Site ID : R-21-003-9C/A.
Thank you for your business.

* For future reference to this analysis please use SUN # 88763-184445.

EVALUATION FOR SOIL CORROSION

Soil pH	6.76	
Minimum Resistivity	1.82 ohm-cm (x1000)	
Chloride	8.1 ppm	00.00081 %
Sulfate	19.0 ppm	00.00190 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

APPENDIX VII

Calculation Package

INTRODUCTION

This appendix presents our foundation design calculations that include geotechnical design parameters, assumptions, methodology, and summaries/results of our pile compression resistance, tension resistance, lateral resistance, settlement, negative skin friction and group reduction analyses.

Our pile foundation analysis and recommendations are in accordance with the AASHTO LRFD Bridge Design Specifications (8th Edition) with Caltrans Amendments.

The contents of this appendix are presented in the following order:

A. Geotechnical Design Parameters
B. Seismicity
Shear Wave Velocity
Liquefaction
C. Deep Foundations
Compressive Resistance
Tension (Uplift) Resistance
Lateral Resistance
Settlement
Negative Skin Friction
Pile Group Reduction
D. Approach Embankment Settlement

A. GEOTECHNICAL DESIGN PARAMETERS

The idealized geotechnical engineering properties and strength/bearing characteristics of foundation materials selected for use in this report have been derived/established from a combination of:

- visual logging of earth materials and drilling procedures by a staff engineer;
- earth materials classification based on laboratory test results (as applicable);
- unit weight values based on laboratory test results and/or published correlations;
- friction angles based on published blow count correlations;
- undrained shear strength (cohesion) values based on unconfined compressive strength test results, pocket penetrometer data, and/or published blow count correlations;
- average N_{SPT} values recorded in the soil borings and corrected for hammer efficiency and overburden pressure (as applicable);
- design groundwater at elevation 18 ft; and
- engineering experience and judgment based on past projects with a similar geologic environment/profile.

The idealized geotechnical parameters used in our analysis are shown in Tables VII-1 to VII-4.

Table VII-1: Pier 1 Idealized Geotechnical Parameters (R-21-001)

Elevation (ft)	Soil Description	N_{60}	Soil Type		Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Strain Factor, E50 (dim.)	p-y Modulus, k (pci)	RQD (%)	Rock Mass Modulus (psi)	Uniaxial Strength (psi)	Strain Factor, k rm (dim.)	Poisson Ratio
			Shaft	L-Pile										
20 to 2	Stiff to Very Stiff Clay	10 to 23	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	125* / 62	---	2,000	0.006	---	---	---	---	---	---
2 to -5	Medium Dense Clayey Sand	12 to 25	Clay (FHWA)	Soft Clay (Matlock)	57	---	450**	0.02	---	---	---	---	---	---
-5 to -9	Hard Clay	31	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	67	---	3,500	0.0055	---	---	---	---	---	---
-9 to -38	Very Dense Clayey Sand with Gravel	46 to 97	Sand (FHWA)	Sand (Reese)	67	38	---	---	125	---	---	---	---	---
-38 to -56	Weathered Rock	80 to 100+	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	138	---	4,500	0.005	---	---	---	---	---	---
-56 to -64	Weathered Rock	82 to 100+	Decomposed Rock IGM	Weak Rock	138	---	---	---	---	0	26,000	100	0.0005	0.19
-64 to -73	Weathered Rock	100+	Decomposed Rock IGM	Weak Rock	138	---	---	---	---	0	26,000	300	0.0005	0.19

Notes: Elevations are based on project datum.
*125 pcf above groundwater
**Residual Shear Strength
Design groundwater at elev. 18 ft.

Table VII-2: Pier 2 Idealized Geotechnical Parameters (R-21-001 and R-21-003)

Elevation (ft)	Soil Description	N_{60}	Soil Type		Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Strain Factor, E50 (dim.)	p-y Modulus, k (pci)	RQD (%)	Rock Mass Modulus (psi)	Uniaxial Strength (psi)	Strain Factor, k rm (dim.)	Poisson Ratio
			Shaft	L-Pile										
20 to 13	Very Stiff Clay	23	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	125* / 62	---	2,200	0.006	---	---	---	---	---	---
13 to 2	Loose to Medium Dense Clayey Sand with Gravel	6 to 19	Clay (FHWA)	Soft Clay (Matlock)	52	---	1,200	0.02	---	---	---	---	---	---
2 to -8	Stiff Clay	18 to 37	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	57	---	1,500	0.007	---	---	---	---	---	---
-8 to -24	Hard Clay and Very Dense Clayey Sand	39 to 100+	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	67	---	3,500	0.0055	---	---	---	---	---	---
-24 to -38	Hard Clay to Decomposed Rock	100+	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	70	---	4,000	0.005	---	---	---	---	---	---
-38 to -56	Weathered Rock	57 to 100+	Clay (FHWA)	Stiff Clay w/o Free Water (Reese)	138	---	4,500	0.005	---	---	---	---	---	---
-56 to -64	Weathered Rock	82 to 100+	Decomposed Rock IGM	Weak Rock	138	---	---	---	---	0	26,000	100	0.0005	0.19
-64 to -73	Weathered Rock	100+	Decomposed Rock IGM	Weak Rock	138	---	---	---	---	0	26,000	300	0.0005	0.19

Notes: Elevations are based on project datum.
*125 pcf above groundwater
Design groundwater at elev. 18 ft.

Table VII-3: North Approach Idealized Geotechnical Parameters (A-21-004, D-21-006, D-21-007)

Depth (ft)	Soil Description	Total Unit Weight (lb/ft^3)	Es (lb/ft^2)	OCR	Cc	Cr	Cv (ft^2/yr)	Poisson Ratio
0 to 7	Stiff Clay	126	---	5	0.21	0.014	210	0.42
7 to 11	Loose Clayey Sand with Gravel	115	150	---	---	---	---	---
11 to 19	Medium Dense Clayey Sand with Gravel	125	200	---	---	---	---	---
19 to 30	Interbedded Clay and Clayey Sand	126	280	5	0.21	0.014	210	0.42

Notes: Elevations are based on project datum.
Design groundwater at elev. 18 ft.

Table VII-4: South Approach Idealized Geotechnical Parameters (A-21-005, B6)

Depth (ft)	Soil Description	Total Unit Weight (lb/ft^3)	Es (lb/ft^2)	OCR	Cc	Cr	Cv (ft^2/yr)	Poisson Ratio
0 to 14	Stiff Clay	120	200	1	0.33	0.03	245	0.55
14 to 24	Medium Dense Clayey to Silty Sand	125	210	---	---	---	---	---
24 to 30	Dense to Very Dense Clayey Sand	130	1,000	---	---	---	---	---

Notes: Elevations are based on project datum.
Design groundwater at elev. 18 ft.

B. SEISMICITY

SHEAR WAVE VELOCITY

A correlated shear wave velocity (V_{S30}) in the upper 30 meters (100 ft) of the soil profile of each boring completed for this project element (borings R-21-001 and R-21-003) was determined based on correlations with SPT N-values corrected for hammer efficiency (N_{60}) using the equations outlined by Caltrans[1]. For a non-standard sampler (i.e., non-SPT sampler), the in-situ N-value was corrected to an *Equivalent SPT N-value* using guidance by Caltrans[2], then adjusted to provide an *Equivalent* N_{60} value.

The recommended V_{S30} of 319 meters per second (about 1,047 ft/sec) is the average V_{S30} of all the borings completed for this project element. This value corresponds to a "stiff soil" with 180 m/s < Vs < 360 m/s for the upper 100 ft of the soil profile. The V_{S30} value was determined for this site based on the subsurface data obtained from the 2021 test borings and correlations with SPT blow count N-values corrected for hammer efficiency using the equations outlined by Caltrans. For our evaluation, we used latitude 37.9352°N and longitude 122.6998°W for the site coordinates.

LIQUEFACTION

Liquefaction susceptibility of a soil deposit is a function of the soil grain size, relative density, percent fines, plasticity of the fines, degree of saturation, age of deposit, and earthquake ground motion. According to Caltrans guidelines, liquefaction potential is evaluated using the "Simplified procedure" to a depth of 70 ft in the soil profile below the channel bottom. The Caltrans guidelines cite Bray and Scancio (2006) criteria to determine liquefaction susceptibility of fine-grained soils when the Plasticity Index (PI) ≤ 12 or the [water content (wc) / liquid limit (LL)] > 0.85. Boulanger and Idriss (2006) recommend considering a soil to have clay-like behavior (i.e., not susceptible to liquefaction) when the PI ≥ 7. Predominately fine-grained (cohesive) soils such as clay and elastic silts would be considered subject to cyclic softening with a potential for reduction in shear strength rather than "classic" cyclically induced liquefaction associated with loose, saturated granular soils.

To evaluate the potential for soil liquefaction to occur at the project site, Crawford used the simplified procedure outlined by Youd et al. (2001)[3] and guidelines/modifications consistent with liquefaction evaluation outlined in the Caltrans Geotechnical Manual (Liquefaction Evaluation Module, January 2020), the 2021 boring data and laboratory test results, groundwater at elev. 18 ft, a site-to-fault distance of 0.4 miles, Magnitude (M) of 7.67, and a Peak Ground Acceleration (PGA) of 0.9g.

[1] California Department of Transportation, *Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations*, Appendix A, November 2012.
[2] Caltrans Geotechnical Manual, Sampler Size Conversions to SPT N-value, Soil Correlations Module (March 2021).
[3] Youd, T. L., et al, Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 10, October 2001, pp. 817-833.

Based on the analysis, potentially liquefiable granular soils are present at this site. Table VII-5 summarizes the potentially critical liquefiable soil zones (Factor of Safety < 1.0) based on the results of our analysis.

Table VII-5: Potentially Liquefiable Soil Zones/Layers

Boring ID	Potentially Liquefiable Soil Zones/Layers		Layer Thickness (ft)	Generalized Soil Description	Liquefaction Factor of Safety	Residual Soil Strength (psf)
	Depth (ft)	Elevation (ft)				
R-21-001	18 to 25	2 to -5	7	Clayey Sand	0.2 to 0.36	350 to 680
A-21-004	19 to 23	5 to 0	5	Clayey Sand and Poorly-graded Sand with Clay	0.18	360

While the potentially liquefiable layers are clayey sand, the low PI and high water content cause this layer to be considered liquefiable.

C. DEEP FOUNDATIONS

Recommendations are summarized below for 66-inch diameter Type II CIDH piles with 74-inch diameter permanent casing. Refer to Section 11 of the Foundation Report that summarizes the foundation data and loading conditions provided by the designer that were used in our pile analysis.

The soil parameters used in design are shown in Tables VII-1 and VII-2. Our pile foundation analysis and recommendations are in accordance with the AASHTO LRFD Bridge Design Specifications (8th Edition) with Caltrans Amendments.

COMPRESSIVE RESISTANCE

We used Shaft Version 2017.8.10 to evaluate compressive resistance of the piles. To evaluate axial compressive pile tip resistance and resistance in skin friction along the pile shaft, we used a geotechnical resistance factor (φ) of 0.7 at the Strength Limit State and a factor of 1.0 at the Extreme Limit States. The required nominal resistance was determined by comparing the highest Factored Strength Limit Load (φ = 0.7) with the highest Factored Extreme Event Load (φ = 1.0) provided by the designer. We then used the higher value as the required nominal resistance in our pile analysis.

Geotechnical resistance within the permanent steel casing zone was ignored. Overburden stress and geotechnical resistance within each Limit State scour zone was ignored. For the Strength and Extreme (Seismic) Limit States, the scour was above the pile cut-off elevation. For the Extreme (Tsunami) Limit State, geotechnical resistance was ignored at/above elev. -38 ft.

Skin friction contributions are only considered in our compressive resistance analysis. Actual contributions to skin friction vary depending on load transfer along the pile shaft.

The Shaft output graphs for axial (compressive) resistance for traditional scour and tsunami sour are attached to this appendix.

TENSION (UPLIFT) RESISTANCE

Tension (uplift) resistance is not applicable.

LATERAL RESISTANCE

We used LPile Version 2019.11.02 software to evaluate lateral pile capacity to evaluate CIDH piles with permeant casing.

For the Strength, and Extreme (Seismic) Limit States, Crawford applied the lateral loading of 300 kips, and 550 kips, respectively to determine the approximate displacement at the top of the pile. For the Service Limit State, Crawford applied a 0.25-inch displacement at the top of the pile to determine the associated shear load. For the proposed bridge, pile response in the longitudinal and transverse bridge directions was computed with an axial compression equal to the Service-I Limit State Load per Pile (300 kips) that is applied to the top of the pile.

For the Extreme (Tsunami) Limit State, Crawford applied the transverse and longitudinal lateral loading of 180 kips and 160 kips, respectively to determine the approximate displacement at the top of the pile. For the proposed bridge, pile response in the longitudinal and transverse bridge directions was computed with an axial compression equal to the Service-I Limit State Load per Pile (200 kips) that is applied to the top of the pile.

All lateral displacement was analyzed using a pinned (free-head) condition. The geotechnical factor of one (φ = 1.0) was used in our lateral load analysis. Mark Thomas provided a CTC pile spacing of 22 ft. We modeled the 66-inch CIDH piles with 42 US Standard #14 bars and 0.375-inch thick permanent casing. We show our LPile lateral pile analysis results, which includes the p-multiplier factors based on the 66-inch CIDH consistent with Table 10.7.2.4-1 of the *California Amendments to AASHTO BDS*., in Tables VII-6 through VII-8. The LPile output graphs for the lowest p-multiplier are included in this Appendix.

Table VII-6: Pier 1 Service, Strength, Extreme (Seismic) Limit States Pile Head Deflection vs. Lateral Load

Condition	Pile Row	P-multiplier	Pile Head Deflection (inches)		Lateral Load for 0.25-inch Deflection (kips)
			300 Kip Lateral Load	550 Kip Lateral Load	
Transverse (4B)	Row 1	0.88	1.2	4.0	162
	Row 2	0.7	1.6	5.1	143
Longitudinal (4B)	Row 1	1.0	1.0	3.4	176

Table VII-7: Pier 2 Service, Strength, Extreme (Seismic) Limit States Pile Head Deflection vs. Lateral Load

Condition	Pile Row	P-multiplier	Pile Head Deflection (inches)		Lateral Load for 0.25-inch Deflection (kips)
			300 Kip Lateral Load	550 Kip Lateral Load	
Transverse (4B)	Row 1	0.88	1.9	6.2	118
	Row 2	0.7	2.5	8.4	107
Longitudinal (4B)	Row 1	1.0	1.7	5.4	125

Table VII-8: Extreme (Tsunami) Limit State Pile Head Deflection vs. Lateral Load

Condition	Pile Row	P-multiplier	Pile Head Deflection (inches)	Lateral Load (kips)
Transverse (4B)	Row 1	0.88	19.3	180
	Row 2	0.7	21	180
Longitudinal (4B)	Row 1	1.0	15.1	160

SETTLEMENT

Immediate and consolidation settlement due to the new embankment is expected to occur above the pile cut-off elevations.

Based on the subsurface data obtained for this study, total settlement at each support under service load is estimated to be within the permissible 1.0-inch settlement for the recommended pile foundations. Since the piles will be embedded adequately into rock, a detailed assessment of the pile group settlement is not considered warranted (AASHTO C10.7.2.3.1).

NEGATIVE SKIN FRICTION

Static settlement due to the embankment loading is not anticipated to cause negative skin friction.

A thin layer of potentially liquefiable soil was encountered at Pier 1. All soils above the bottom of the liquefiable soil layers would apply downdrag (negative skin friction) to new pile foundations during design earthquake load conditions.

For the 66-inch CIDH piles under design earthquake load conditions, about 160 kips/pile downdrag at Pier 1 is estimated for the Strength and Extreme-Seismic Limit States. Static analysis procedures were used to estimate the negative skin friction (downdrag) along the pile shaft from the pile cut-off elevation to the bottom of the identified liquefiable layer (i.e., elev. -5.0 at Pier 1). Residual soil strengths were used in our pile analysis for soil layers identified as potentially liquefiable. The CIDH piles are designed to handle the downdrag loading.

PILE GROUP REDUCTION

The piles will be founded in rock layers; therefore, a group efficiency factor (η) of 1.0 was used in our compressive resistance pile analysis.

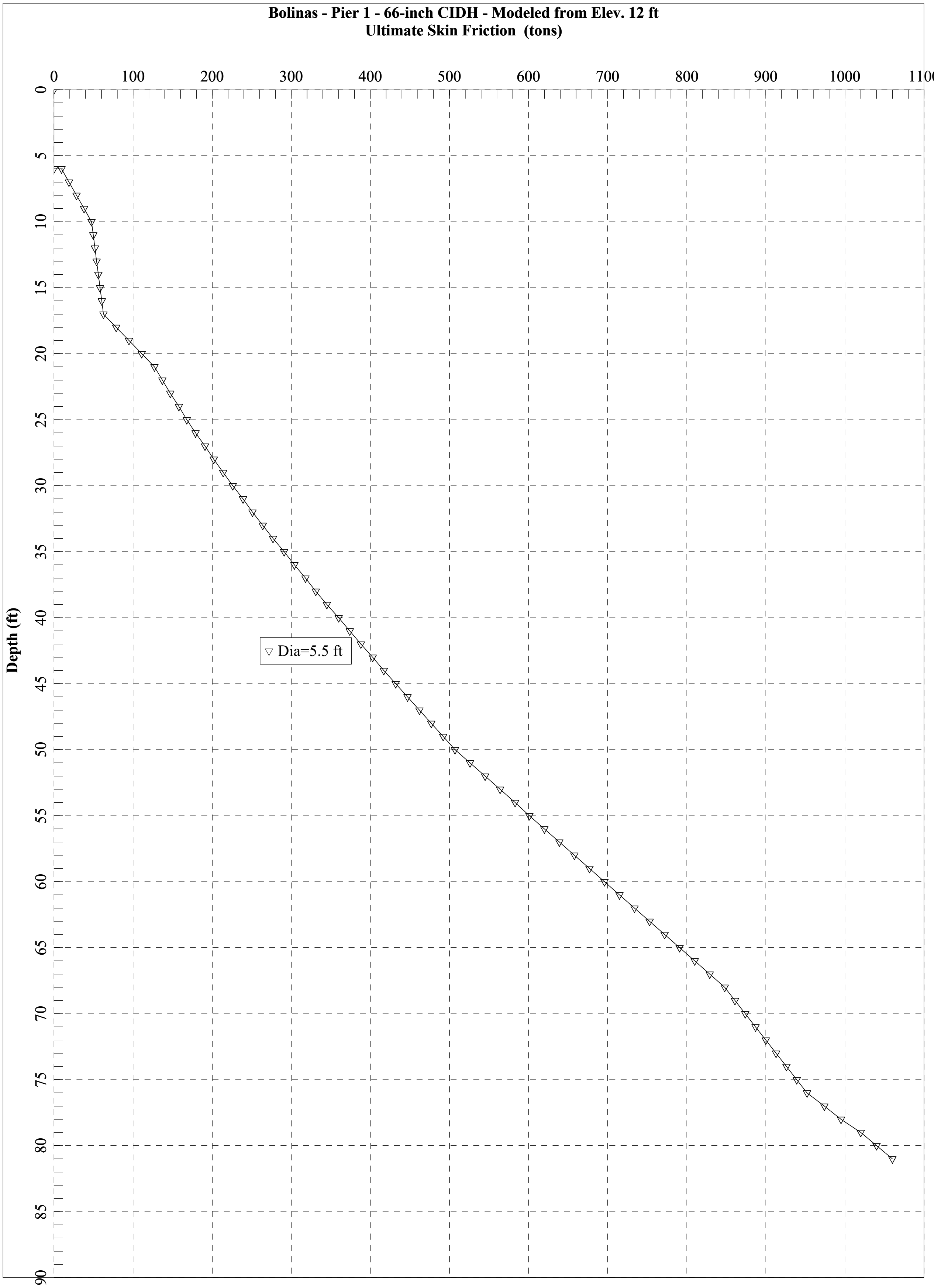
D. ROADWAY APPROACH SETTLEMENT

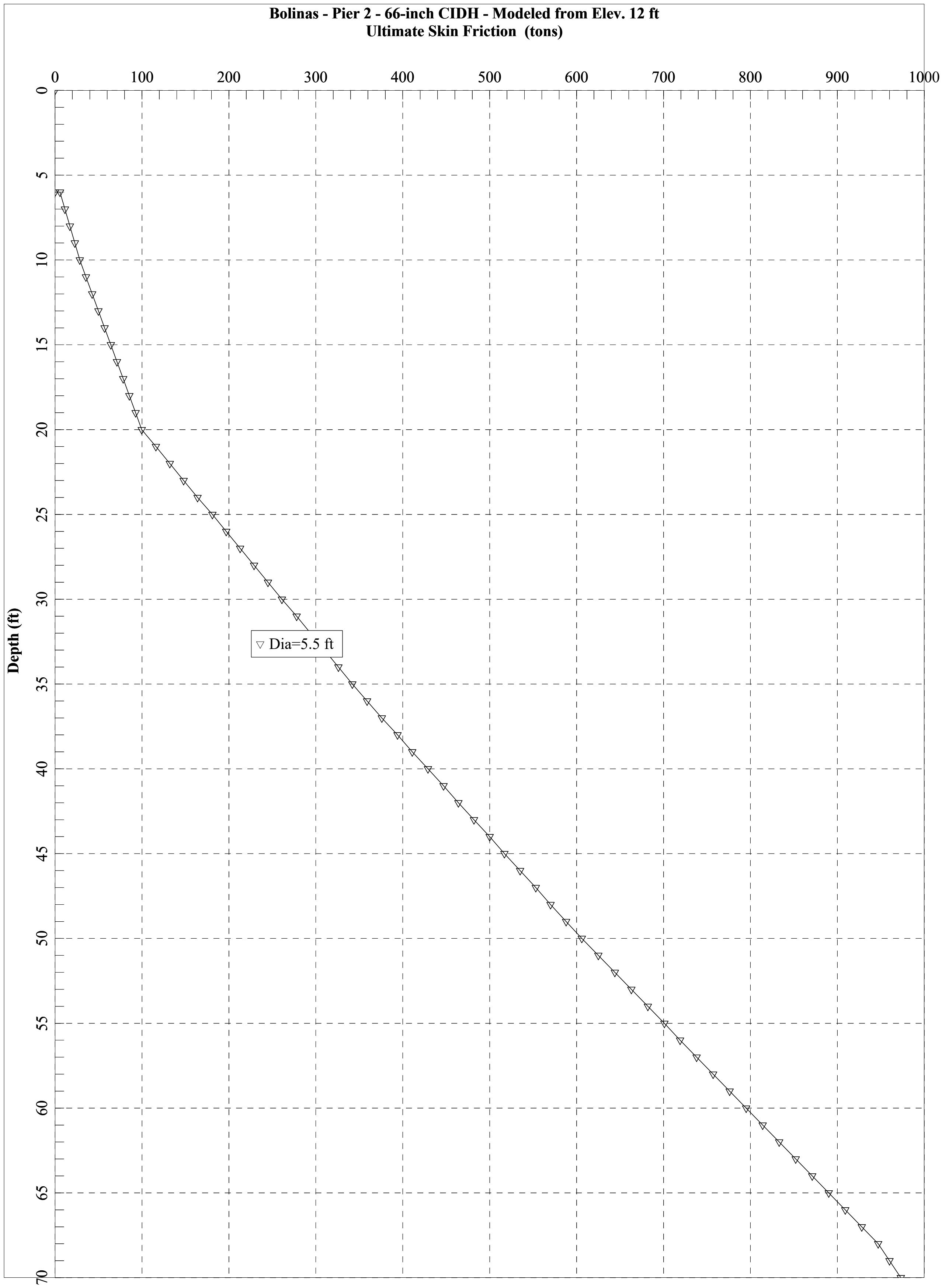
The generalized soil model parameters used in settlement analysis (Table VII-3 and VII-4) for this evaluation are based on the following:

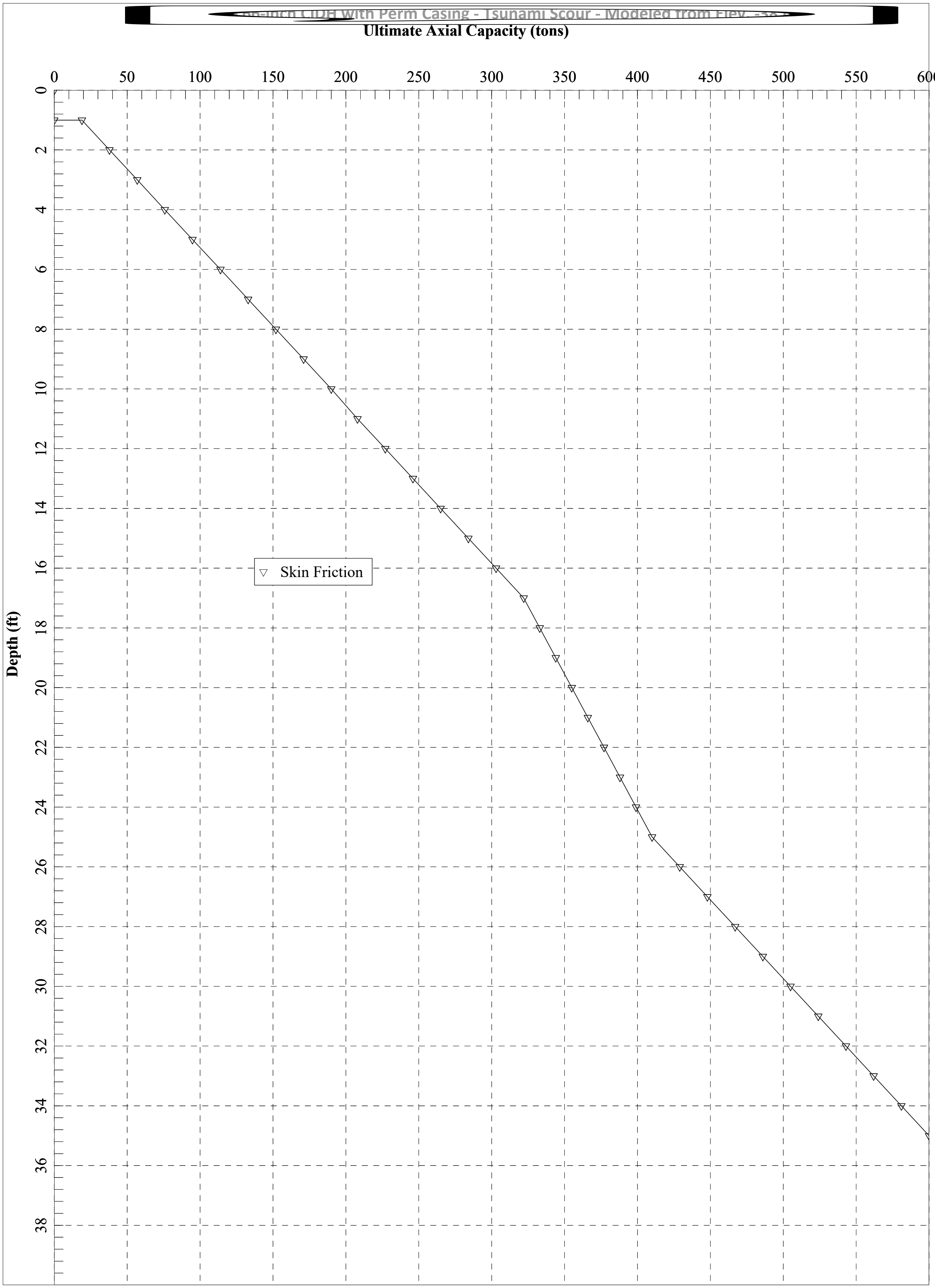
- 2021 test boring data and laboratory test results;
- published correlations with soil index properties (e.g., soil unit weight, natural water content, Plasticity Index, Liquid Limit, etc.);
- published correlations with Standard Penetration Test (SPT) blow count data (Bowles 5th edition and FHWA NHI-06-088 2006); and
- subsurface primarily consists of very soft to medium stiff cohesive and medium dense granular layers

For the analysis, we used Settle 3D 3.0 software developed by RocScience to evaluate total settlement using the anticipated fill. We utilized the Boussinesq stress distribution method based on the varied nature of the subsurface soil profiles. Settlement results are provided in Section 11.3.8 of the report.

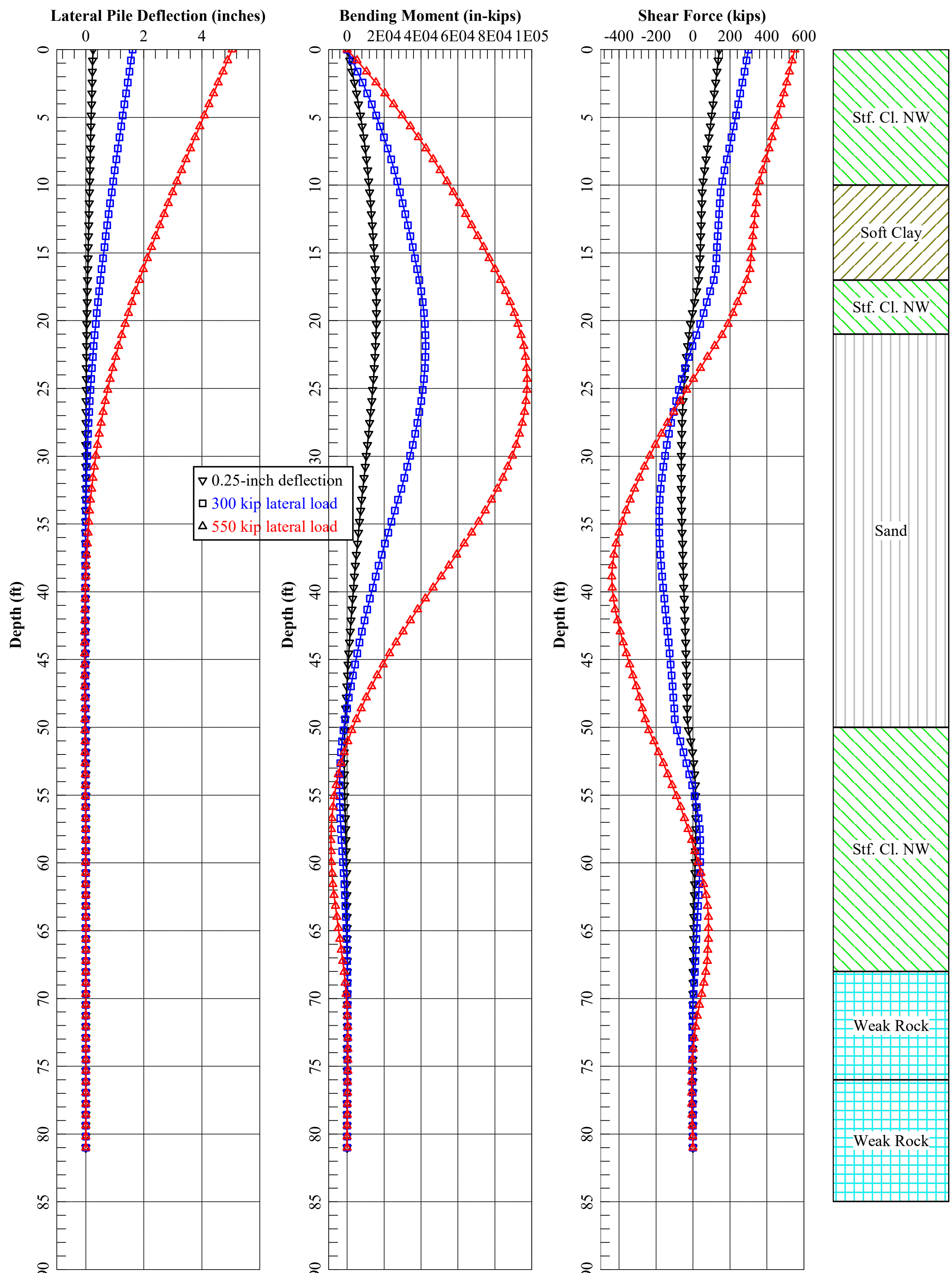
At this site, the majority of settlement from the embankment loading will consist of consolidation settlement within cohesive soil layers. The rate and magnitude of settlement from embankment loading will vary with lateral changes in thickness of compressible layers and with different loading conditions.


Bolinas - Pier 1 - 66-inch CIDH - Modeled from Elev. 12 ft
Ultimate Skin Friction (tons)
0
100
200
300
400
500
600
700
800
900
1000
1100
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
Dia=5.5 ft

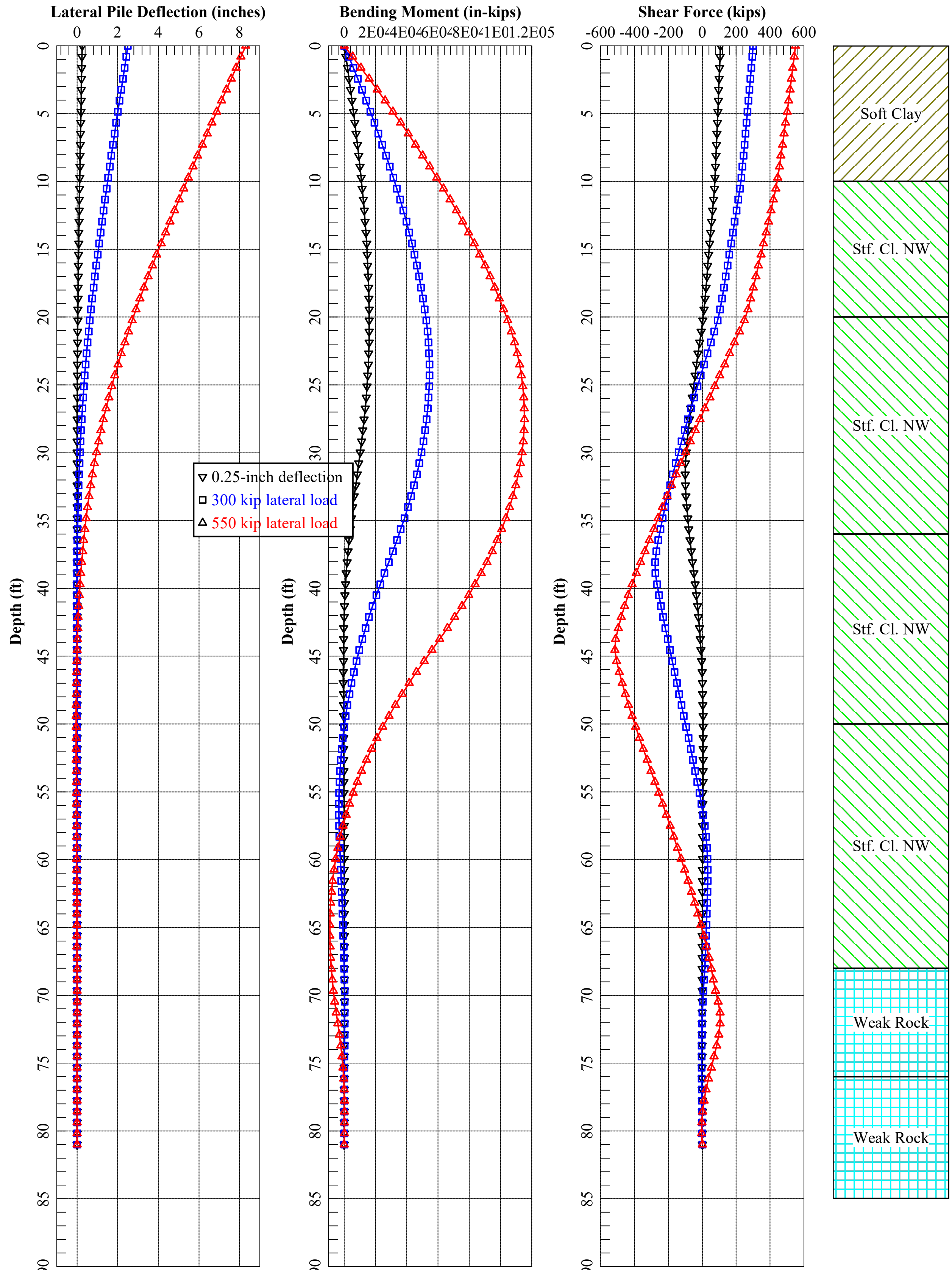

Bolinas - Pier 2 - 66-inch CIDH - Modeled from Elev. 12 ft
Ultimate Skin Friction (tons)
0
100
200
300
400
500
600
700
800
900
1000
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Dia=5.5 ft


inch CIDH with Perm Casing - Tsunami Scour - Modeled from Elev.
Ultimate Axial Capacity (tons)
0
50
100
150
200
250
300
350
400
450
500
550
600
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Skin Friction

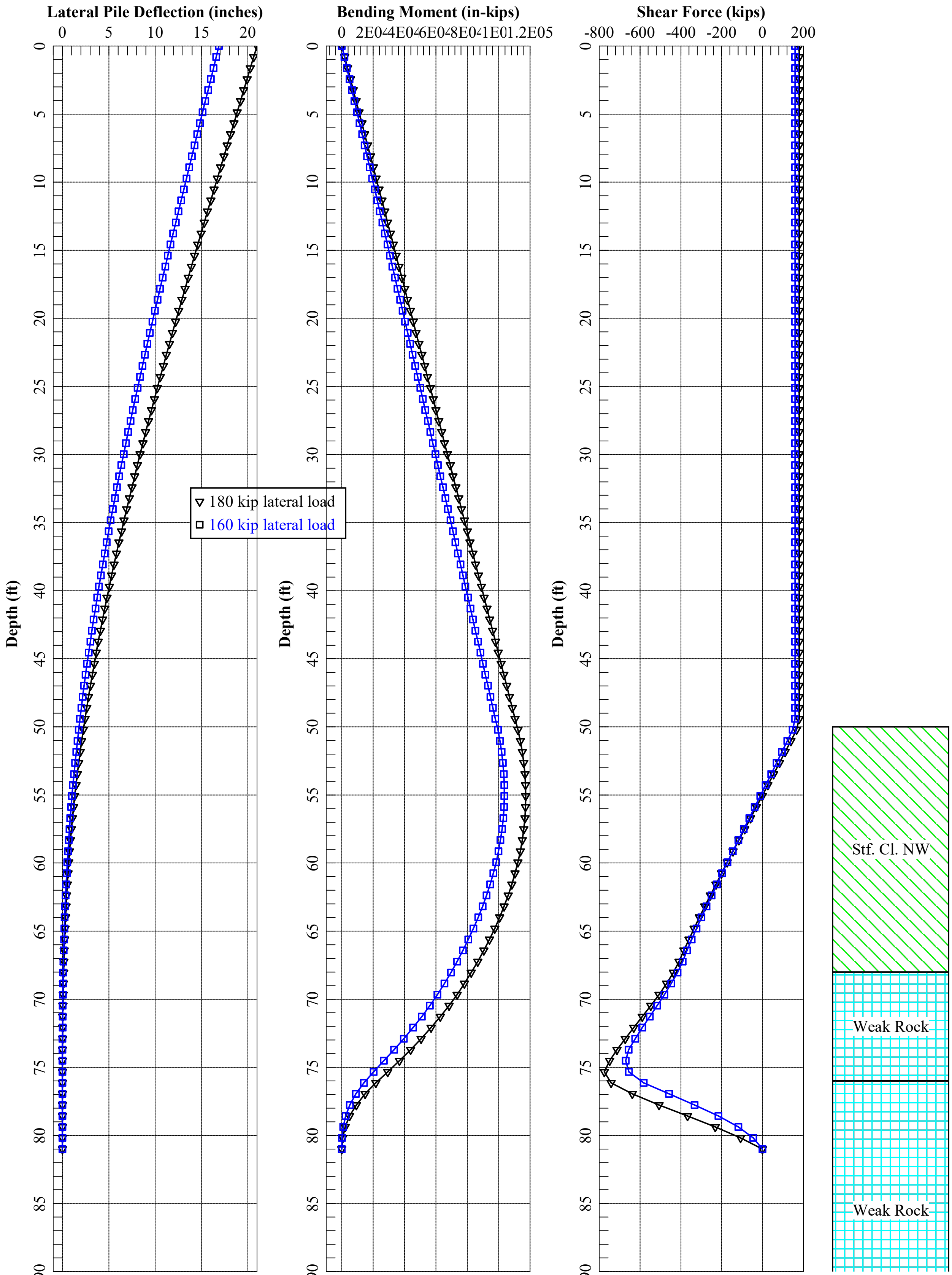
Bolinas - Pier 1 - 66-inch CIDH with Perm Casing - Modeled from elev. 12 ft - Pmult = 0.7



Bolinas - Pier 2 - 66-inch CIDH with Perm Casing - Modeled from Elev. 12 ft - Pmult = 0.7



Bolinas - Piers - Tsunami Scour - 66-inch CIDH with Perm Casing - Modeled from Elev. 12 ft - PMult = 0.7



APPENDIX VIII

Surface Fault Rupture Study

SURFACE FAULT RUPTURE STUDY

Bolinas Lagoon Wye Wetland Project
Bolinas, California

Prepared for:

Crawford & Associates, Inc.
Sacramento, CA

Prepared by:

Slate Geotechnical Consultants Inc.
Berkeley, CA

May 2022

Project No.

22-080-01

SLATE
GEOTECHNICAL CONSULTANTS

SLATE
GEOTECHNICAL CONSULTANTS

May 19, 2022
Project No. 22-080-01

Slate Geotechnical Consultants Inc.
2927 Newberry Street, Suite A
Berkeley, California 94703

Ms. Ellen Tiedemann, PE
Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831

Subject: **Surface Fault Rupture Study - San Andreas Fault**
Bolinas Lagoon Wye Wetland Project
Bolinas, California

Dear Ms. Tiedemann:

Slate Geotechnical Consultants Inc. (Slate) is pleased to present this report summarizing the findings of the surface fault rupture study on the San Andreas Fault for the Bolinas Lagoon Wye Wetland Project.

Please call us should you have any questions.

Sincerely yours,

Slate Geotechnical Consultants Inc.

Jennie Watson-Lamprey, PhD	Kathryn Wooddell	Kelley Shaw, PG, CEG
Principal Engineering Seismologist	Senior Engineering Seismologist	Project Geologist

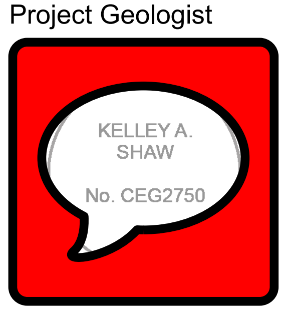


TABLE OF CONTENTS

FAULT RUPTURE HAZARD DISPLACEMENT REPORT

San Andreas Fault Surface Fault Rupture Study
Bolinas, California

1.0 INTRODUCTION

Slate conducted a fault displacement analysis at the northwest apex of the Bolinas Lagoon along Olema Bolinas Rd. between California State Route 1 and Fairfax – Bolinas Rd. in Bolinas, California to support the Crawford & Associates, Inc. design team working on a proposed 18.3-m-long bridge. Caltrans Memo to Designers 20-10 (2013) requires a Surface Fault Rupture Displacement Hazard Analysis (SFRDHA) where any portion of a structure falls within an Alquist-Priolo Earthquake Fault Zone (APEFZ) or within 300 m of an unzoned fault Holocene or younger in age. The proposed bridge is approximately 0.12 km from the main trace of the San Andreas.

In this report, we present SFRDHA results for a **M** 8.1 earthquake on the main trace of the San Andreas fault that includes the Northern Segment of the San Andreas fault. The magnitude of the event was selected to represent an earthquake that passes within 2 km of the site and has a 975-year return period from the UCERF 3 source characterization (Field et al., 2013). Fault displacement estimates at the bridge location are provided in Section 6.0 and Section 7.0.

2.0 LITERATURE REVIEW

Slate preformed a review of existing site data, including available drawings, reports, geologic maps, nearby historic earthquakes reports, aerial photos, LiDAR, and other readily available published information. Findings from the literature are presented below.

2.1 Site data

Existing site subsurface data reviewed for this study include AECOM (2017) Log of Soil Borings and Map, Crawford & Associate Inc. (2021) Bolinas Draft Logs and Borings Site Map, and Crawford 19-570.1 LOTB.

AECOM Soil borings and Map:
Seven borings were performed by AECOM from March – April 2017. Borings were advanced using hollow stem auger rig with maximum depth of 20.3 m. Borings #1, #2, #3 and #6 are located within the immediate vicinity of the site and borings #4, #5 and #7 are located further away to the east. Units characterized in B1-B3 and B6 are fill, lagoon deposits, younger alluvium, older alluvium, terrace deposits, and the Merced formation. Below is a summary of units observed ordered from the surface to depth.

- B1 – 20.3 m - Younger alluvium, older alluvium, Merced formation;
- B2 – 15.5 m - Younger alluvium, terrace deposits;
- B3 – 15.7 m - Thin 2' fill, alluvium, terrace deposits;
- B6 – 18.4 m - 1' lagoon deposits, terrace deposits, Merced formation.

Crawford & Associates, Inc Draft Borings Logs and Site Map:
Five borings were performed by Crawford & Associates Inc. in October 2021. Borings were advanced using hollow stem, solid stem, and mud rotary methods with maximum depth of 27.7 m.

- R-21-001 – Mud rotary – 27.7 m
- A-21-002 – Solid Stem Auger – 2.0 m
- R-21-003 – Hollow Stem Auger – 24.5 m
- A-21-004 – Solid Stem Auger – 9.6 m
- A-21-005 – Solid Stem Auger – 9.6 m

2.2 Geologic Maps, Fault Databases and Aerial Photos

Geologic maps, fault databases and aerial photos reviewed include: Offshore and Onshore Geology and Geomorphology, Offshore of Bolinas Map Area, California (Johnson et al., 2015); Special Studies Zone Earthquake Fault Zone (AP Zone); Map of the Bolinas Quadrangle (CA Division of Mines and Geology, 1974), UC Berkeley Aerial photo library (Cartwright Aerial Survey Inc, 1965), EarthScope Northern California LiDAR (2007); UCERF3 Fault database (Field et al., 2013); and the USGS Quaternary Faults and Fold Database (USGS and CGS, 2022).

2.2.1 Geologic Maps

The surficial Quaternary and bedrock geology of the site area is presented in Figure 2-1 (modified from Johnson et al., 2015). Seven geologic units with ages ranging from Holocene to Cretaceous are found in the site area, bisected by numerous fault traces and splays striking approximately 35 degrees. Holocene Estuarine-Delta Deposits, Qed, occur in the site footprint and the flat laying area north of the Bolinas lagoon. This deposit is characterized as a mix of coarse to fine estuarine sediments, deposited in deltas at mouths of tidally influenced coastal streams. Estuarine deposits, Qes, are mapped within the offshore portions of the Bolinas Lagoon. To the west of the site, the Merced Formation, Qtm, forms elevated ridges. This unit runs parallel to and is approximately confined by the two main fault traces bisecting the map. The Merced formation is a sandy siltstone, silty sandstone, and interbedded pebble unit. Northwest and west of the site are two alluvial units occurring on lower elevation surfaces between the bedrock units. The older alluvial unit, Qoa, is late Pleistocene in age and is mapped on gently sloping to level alluvial fan or terrace surfaces. The younger Holocene alluvial deposit, Qa, sits slightly lower topographically and is confined to active or recently active drainages. Both alluvial units are derived from either the Merced formation west of the San Andreas fault and Cretaceous Franciscan complex, Kfs, located east of the fault. West of the San Andreas fault is the late Miocene Santa Cruz Mudstone, Tsc, unit.

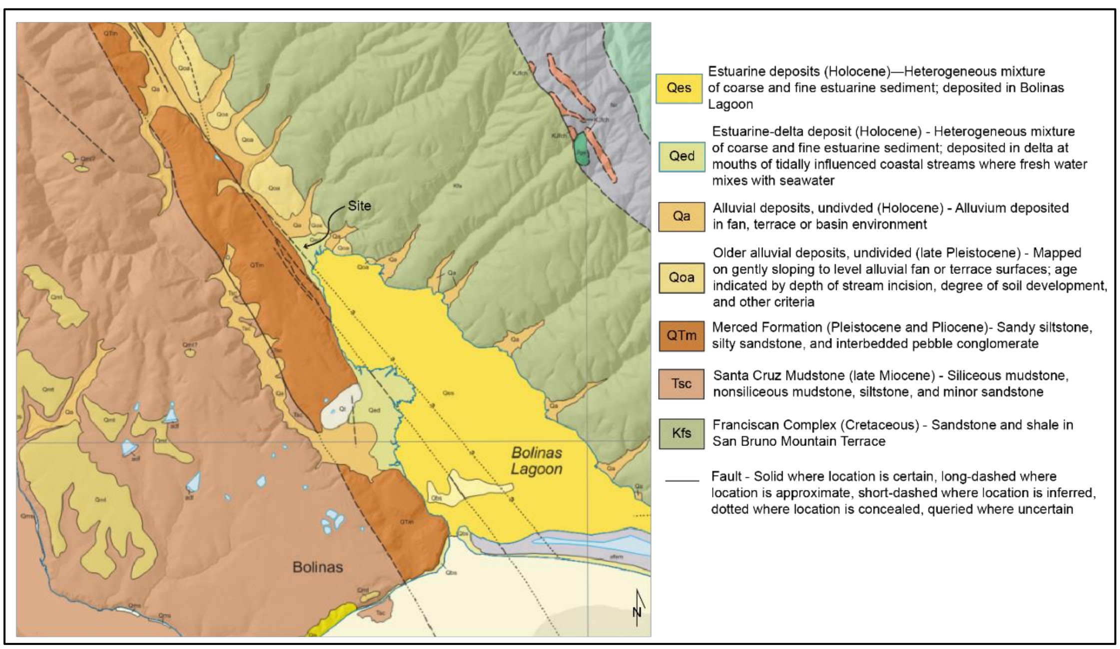


Figure 2-1. Geologic Map (modified from Johnson et al., 2015).

2.2.2 Fault Databases

The proposed bridge is located within the Special Studies Zone Earthquake Fault Zone, Map of the Bolinas Quadrangle (CA Division of Mines and Geology, 1974). In the site vicinity, the AP Zone is 1.2 km wide (Figure 2-2). Numerous fault traces and splays of the San Andreas fault are located within the zone. Five shorter faults are mapped just west of the site, and one longer semi-linear fault trace is located farther to the west. This trace is also known as the western fault trace the "western boundary fault" or the San Gregorio Fault (Grove and Hall, 2005). The five shorter fault traces located just west of the site ruptured in 1906 and are mapped as approximately located. The eastern trace (closest the to the site) crosses the intersection of Bolinas-Fairfax Road and Olema Bolinas Road. Three of the four fault traces terminate into the Bolinas Lagoon. One fault trace continues south and is mapped as concealed (dotted) where offshore and is approximately located (long dash) along portions of the shoreline and where bisecting Kent Island and the western tip of Stinson beach. The USGS quaternary fault and fold database include the same fault traces and geometry presented in the AP Zone map (USGS and CGS, 2022).

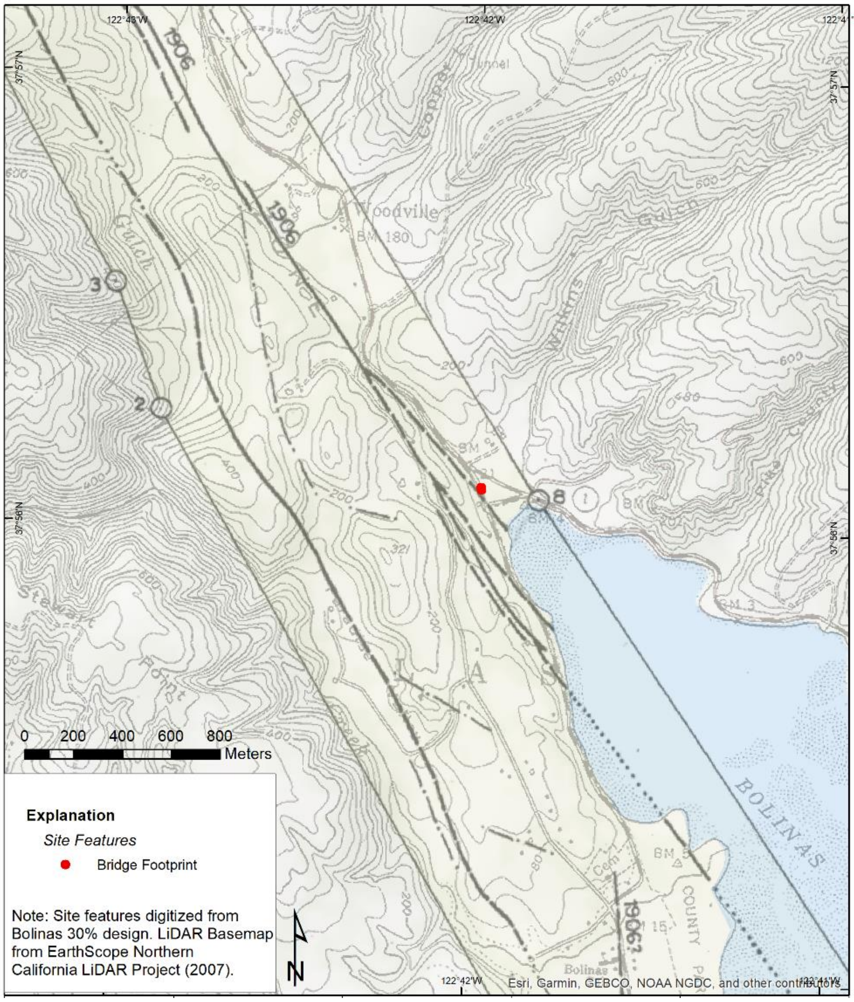


Figure 2-2 Site proximity to Special Studies Zone Earthquake Fault Zone, (modified from Map of the Bolinas Quadrangle, CA Division of Mines and Geology, 1974)

A separate fault characterization has been made by UCERF3 (Field et al., 2013). The UCERF3 project was a multi-year initiative to provide an authoritative estimate of the magnitude, location, and time-averaged frequency of potentially damaging earthquakes in California. This project addressed important issues not previously implemented such as relaxing fault segmentation assumptions and multi-fault ruptures. The UCERF3 model defines the long-term rate of all possible earthquake ruptures above a minimum magnitude of 5. Two alternative fault models give the spatial geometry of the larger, active faults throughout the region, with the alternative models representing the epistemic uncertainty in the fault system geometry. The UCERF3 fault model is informed by previous projects (WGCEP, 2002; WGCEP, 2008). In each version of these fault models, the 1,290 km long San Andreas fault has been divided into 15 segments based on rupture history, slip rate, and geodesy. The site is closest to the North Coast segment of the Northern San Andreas which extends 171 km from the Golden Gate Bridge to Point Arena (Figure 2-3).

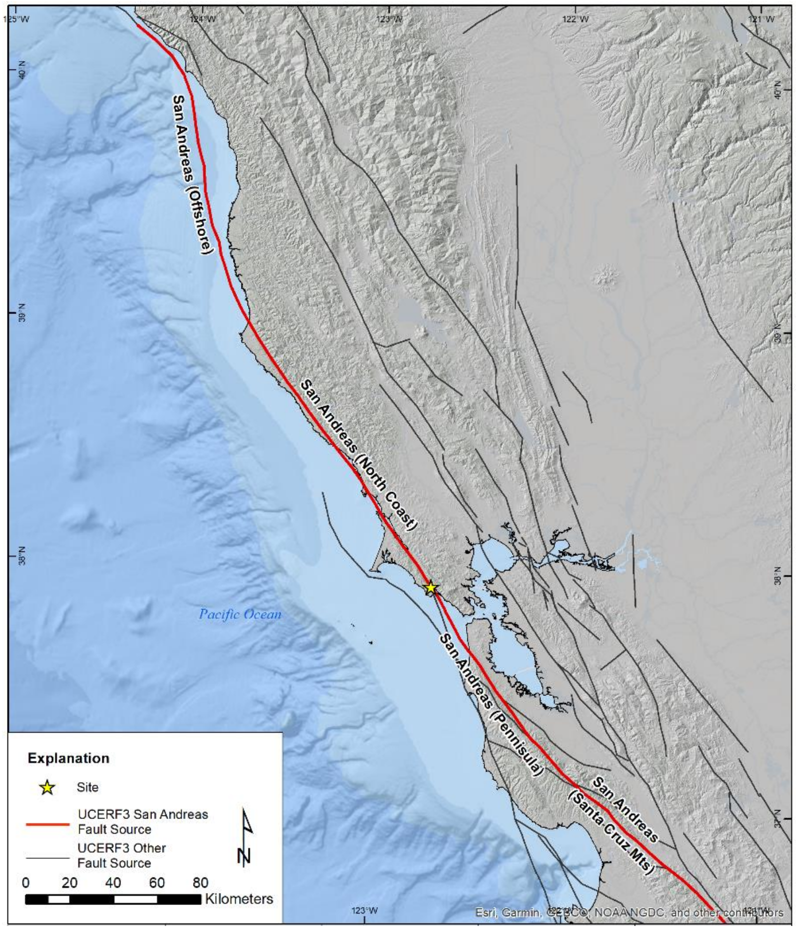


Figure 2-3. UCERF3 Fault Source Map.

Published slip rate and geometry information for the Northern San Andreas fault segments is presented in Table 2-1 based on UCERF3 fault database (Field et al., 2013).

Table 2-1. Northern San Andreas Fault Characterization

Fault segment Name	Length (km)	Width (km)	Dip (°)	Slip rate (mm/yr)
Offshore	130.8	11	90	24+-3 (UCERF2) 16-27 (UCERF3 range) 24 (UCERF3 best estimate)
North Coast	170.7	11	90	24+-3 (UCERF2) 16-27 (UCERF3 range) 24 (UCERF3 best estimate)
San Francisco Peninsula	99.7	13	90	17+-4 (UCERF2) 13-21 (UCERF3 range) 17 (UCERF3 best estimate)
Santa Cruz	62.5	15	79	17+-4 (UCERF2) 13-21 (UCERF3 range) 17 (UCERF3 best estimate)

Information from the AP Zone map, USGS Quaternary fault database, and UCERF3 fault model were utilized to characterize the San Andreas fault for this analysis. UCERF3 fault source geometries are simplified or generalized for modeling purposes whereas the AP Zone maps/USGS fault traces are based on geologic mapping and aerial photograph interpretation. Therefore, fault trace location from the AP Zone Map/USGS Quaternary Fault is preferred over the UCERF3 fault model. Fault slip rate estimates in the UCERF3 model are derived from a number of previous studies and sources and are therefore preferred in our fault characterization.

2.2.3 Aerial Photography and Elevation Datasets

A set of vertical, black and white stereo aerial imagery collected in 1965 at a scale of 1:12,000 was viewed under a stereoscope at the UC Berkeley library (Cartwright Aerial Survey Inc, 1965). Linear ridges and troughs west of the site are aligned with the strike of the fault at approximate 35 degrees (Figure 2-4). Vegetation is dense in the region and therefore no lineaments were directly observed in the air photos.

Figure 2-4. Areal imagery of the site (Cartwright Aerial Survey Inc, 1965).

LiDAR imagery was also reviewed for this evaluation. A LiDAR derived digital elevation model (DEM) was downloaded from OpenTopography.com and subsequently converted into a hillshade surface in ArcGIS (Earthscope Northern California LiDAR, 2007). The LiDAR dataset has a point density of 5.17 pt/m^2. Bare earth LiDAR derived DEM surfaces remove canopy cover and are very useful for geomorphic interpretation when dense vegetation obscures the ground surface and expression of the fault. The LiDAR just west of the site shows an incised creek (Lewis Gulch Creek) draining into Bolinas Lagoon, and a fault trace falls within the creek terrace at the foot of the elevated ridge (Figure 2-5). The elevated linear ridge is oriented parallel to the fault traces. Continuing south along the ridge line, a curvilinear creek (Wharf Creek) running into Bolinas Lagoon crosses two mapped fault traces. On the top of the ridge, along Horseshoe Hill Road the creek runs east-west and where it crosses the fault there is a slight notch in the bank. The creek then turns and follows the second fault trace as it continues downslope. Further to the south, a stream run east towards the Bolinas Lagoon (labeled Creek A). This stream channel intersects three traces of the fault and that has an irregular shaped stream channel.

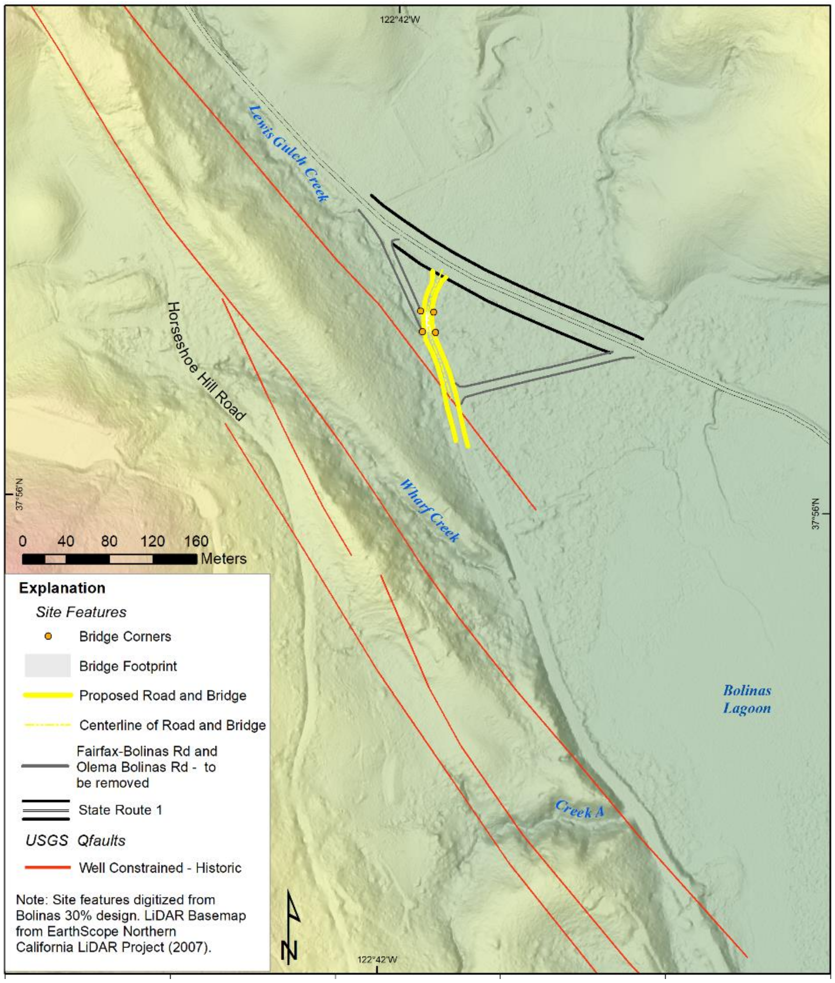


Figure 2-5. LiDAR hillshade surface of the site region with USGS fault traces (USGS and CGS, 2022).

2.3 Paleoseismic Publications

Publications related to the paleoseismic evaluations reviewed included: The California Earthquake of April 18, 1906 (Lawson, 1908); The San Francisco Earthquake and Fire of April 18, 1906 (Gilbert et al., 1907); Paleoseismic Study of the San Andreas Fault at the Vedanta Site, Olema, CA (Niemi et al., 2006); The 1906 Earthquake Fault Rupture and Paleoseismic Investigation of the Northern San Andreas Fault at the Dogtown Site, Marin County, California (Hall and Niemi, 2008); and Late Quaternary deformation and slip rates in the northern San Andreas fault zone at Olema Valley, Marin County (Grove and Niemi, 2005).

The 1906 **M** 7.9 California earthquake ruptured 470 km of the San Andreas fault zone along the North Coast, Peninsula, and Santa Cruz Mountain segments (Lawson, 1908; Thatcher et al. 1997. Following the earthquake, a group of researchers surveyed the damage and nature of the deformation along the entire surface rupture (Lawson, 1908; Gilbert et al., 1907). In Marin County, Lawson and Gilbert described the rupture plane as typically vertical, striking 35 degrees north of west. Surface expression of the fault was primarily manifested as a 1-3 m wide mole track ridge with a height that ranged from a few centimeters to 0.5 meters. In other places, the fault formed a shallow depression with ragged edges spanning 0.7-2 m across. This surface expression was typical north of the site in Main County and near the town of Inverness. At the head of the Bolinas Lagoon, both Gilbert and Lawson documented and photographed secondary en echelon cracks cutting the tidal flats (Figure 2-6a). Along the western shoreline of the Bolinas Lagoon, Olema Bolinas Road was offset by the 1906 fault rupture (Figure 2-6b). Three coeseismic displacements, with an average displacement of 4.03 m, were reported in the Lawson report between the towns of Olema and Bolinas: a 4.1 m offset row of eucalypts trees located 1.4 km north of the site, a 4.6 m offset fence at Strain Ranch located 2.3 km north of the site, and a 3.4 m offset fence near Dogtown 2.1 km north of the site.

Figure 2-6. Photos taken following the 1906 earthquake in Bolinas. Left photo shows secondary cracks in tidal fault in northern portion of Bolinas Lagoon (Gilbert no 2860, 1907). Right image shows damage along Olema Bolinas Road looking north, picture was taken approximately 2 km south of the site (Gilbert no 2852, 1907)

Previous investigators have performed two paleoseismic trench studies on the Northern San Andreas Fault in Marin County, one at the Vedanata Marsh site (Neimi et al., 2006) and one in Dogtown (Hall and Niemi, 2008). The Vedanta Marsh Site is located in Olema, CA 13.5 km northwest of the site. Multiple trenches have been excavated in this location from 1992 to 2007. Evidence for twelve displacement events were identified in these trenches. The average recurrence interval between events is 240 years over the last 3000 years, with a range of 40-488 years. When only considering events in the past 1000 years, the recurrence interval is 140 years with a range of 79-220 (Niemi et al., 2006). No event displacement measurements could be determined given the strike slip nature of the fault. The Dogtown paleoseismic study was performed 5 km north of site. Evidence was found for the 1906 earthquake and a penultimate earthquake which occurred between 1695 and 1776 AD. The time interval between the two events found within the trench is 130 - 210 years.

Slip rate estimates for the North Coast section were determined near the town of Olema using age data of offset sedimentary and geomorphic features. A minimum late Holocene slip rate of 21–25 mm/year was determined based on a 20 m displacement of a 1000-year-old debris lobe (Grove and Niemi, 2005). A second slip rate was determined in Olema from an offset stream channel. A 1,800 ± 78 dated channel was laterally offset 42.5 ± 3.5 m which results in a minimum geologic slip rate of 21-27 mm/yr (Hall and Niemi, 1992).

3.0 BRIDGE REVIEW

The proposed bridge is an 18.3 m clear span bridge with the footing nearest to the main trace of the San Andreas fault at -122.699681, 37.934770. Its construction will allow the Lewis Gulch Creek to reconnect to its former floodplain by removing the existing Crossover Road and realigning the Olema-Bolinas Road. The new channel will flow beneath the proposed bridge.

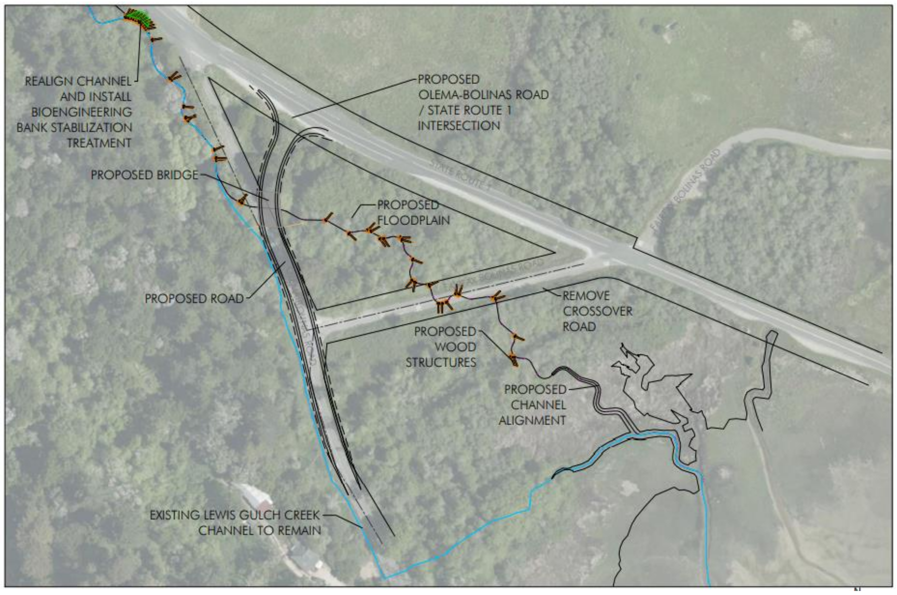


Figure 3-1. Bridge plan overview (Ellen Tiedemann, personal communication February 16, 2022)

The preliminary bridge design was supplied by Crawford & Associates, Inc. and is included in Figure 3-2.

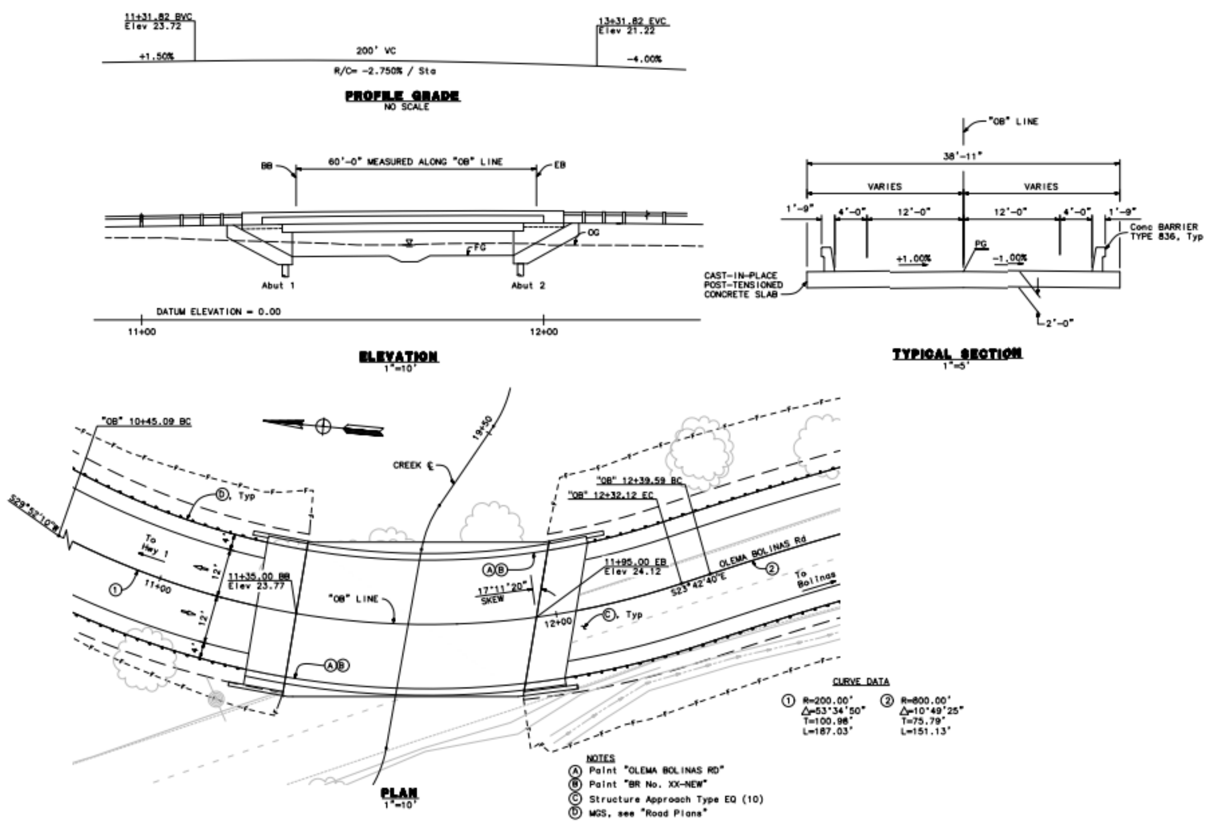


Figure 3-2. Proposed bridge design by WRA and Mark Thomas (Ellen Tiedemann, personal communication February 16, 2022)

4.0 FAULT EVALUATION

The San Andreas Fault stretches along the western margin of California for more than 1,290 km and forms the boundary between the Pacific and North American Plate (Figure 4-1). Fifty cm per year of right lateral motion occurs along the plate boundary (DeMets and Dixon, 1990). Approximately 75% of the 50 mm/yr plate boundary deformation is concentrated along the San Andreas fault system, and the remaining deformation is distributed east of the Sierra Nevada along the Eastern California Shear zone and Walker Lane (Wesnousky, 2005). The site is closest to the North Coast segment of the Northern San Andreas that extends 171 km from the Golden Gate Bridge to Point Arena (Figure 4-1). The North Coast segment of the San Andreas, along with segments to the north and south, ruptured during the **M** 7.9 1906 Earthquake (Thatcher et al., 1997). Just north of the site, the San Gregorio fault splays off the North Coast segment of the San Andreas. As stated in the literature review section, the slip rate of the North Coast section is 24 mm/yr with a range of 21-27 mm/yr (Fields et al., 2013; Hall and Neimi, 1992; Grove and Hall, 2005). This segment of the San Andreas fault is locked and does not deform via fault creep (Hall and Niemi, 1992).

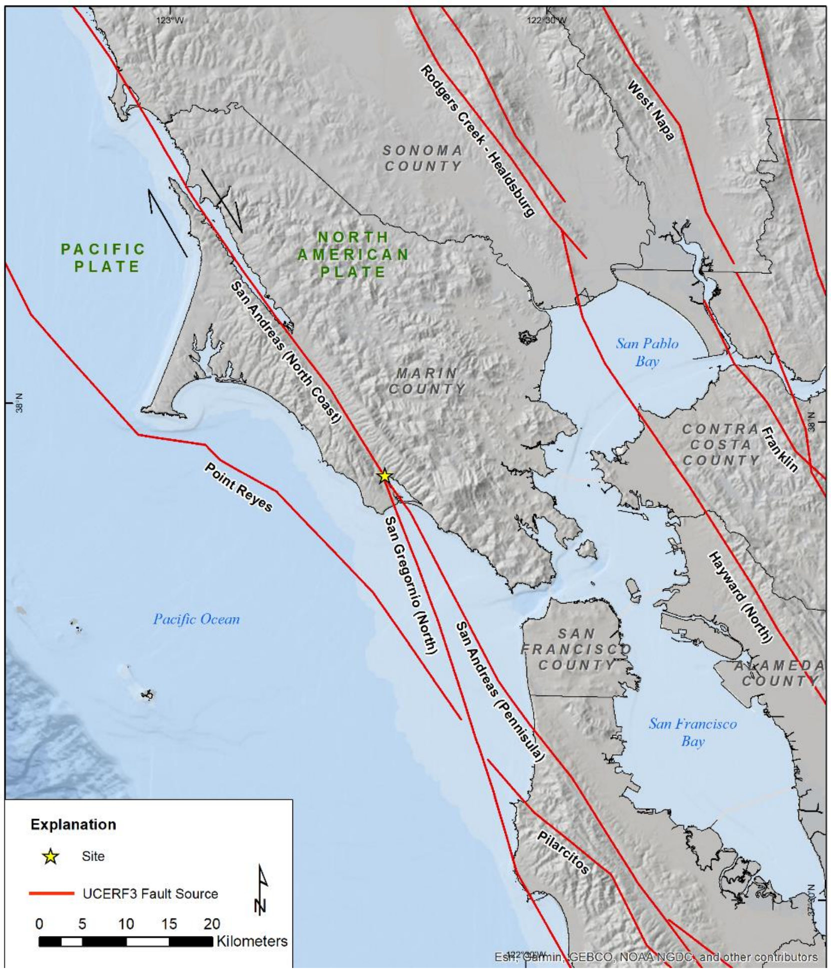


Figure 4-1. Site Location and Tectonic Setting.

In the site region the San Andreas fault is composed of two main parallel fault traces spaced 518 – 610 m apart (Figure 2-2). The eastern and western fault traces are divided by a series of semi-linear ridges that have been eroded over time by streams. The western fault traces, located 725 m to the east of the site, is a continuous, single, approximately linear to curvilinear fault. This trace of this fault is late quaternary in age and older than the eastern trace (USGS, QFaults). The eastern fault trace (the fault system nearest to the site) is composed of up to four shorter parallel fault traces (Figure 4-2). Portions of eastern fault trace ruptured during the 1906 earthquake.

The four traces of the eastern fault are spread across 200 m (Figure 4-2) in the project location. Based on the literature review, published maps, and available datasets described in Section 2, we designate the Main Trace as the principal segment, located 121.6 m east of the site, based on the following reasons:

- The northern extension of the Main Trace ruptured in the 1906 Earthquake, as shown in the Bolinas AP Zone map (Figure 2-2).
- LiDAR and topography data (Earthscope Northern California LiDAR, 2007) support the location of the approximately mapped southern continuation of the 1906 segment, the Main Trace in our study.
- The northern 1906 segment and the Main Trace extend from Dogtown to the western edge of the Bolinas lagoon (3,084 m). These traces are relatively long and linear, indicating the possibility of throughgoing ruptures (Wesnousky 2008).
- Field observations and laboratory models indicate that over time individual discontinuous fault segments coalesce onto a principal fault trace (Wesnousky, 1988). The smaller fault splays and discontinuous fault segments surrounding the Main Trace are therefore expected to have less displacement with the majority of deformation occurring on the more linear and continuous Main Trace.

There are short steps along the 1906 traces and between the Main Trace (USGS and CGS, 2022, Figure 2-2). Wesnousky (2008) surveyed historic rupture data and compiled information on fault step size and type. This research showed that most documented historic ruptures did not continue beyond steps greater than 3-4 km, whether restraining or releasing. The small steps seen in the project areas are much smaller than this, leading to the conclusion that rupture propagation is not only possible, but likely.

Secondary Traces 2 and 3 are splay faults, and by definition of a splay, they are not the principal fault traces or "Main Trace". Secondary Trace 2 splays off the Main Trace (700 m northwest of the site) and lies just east of a linear ridge. The Lewis Gulch creek runs along portions of this fault trace. It is 16.6 m west of the bridge and intersects Olema Bolinas Road. This fault splay terminates at the head of the Bolinas lagoon south of the site. It is shorter (890 m) than the Main Trace (3,084 m) and, based on empirical relationships relating surface length to average displacement, cannot support large displacements.

Secondary Trace 3 splays off the Main Trace and cuts through an elevated terrace. It is a short fault splay (266 m) that has smaller expected displacements given its length compared to the Main Trace. A 32 m-wide step divides Secondary Trace 3 and an open bow shaped fault segment, 528 m in length. Wharf creek, draining into the Bolinas lagoon south of the site, is right laterally offset along this fault trace. A long, linear trace following the western coast of the Bolinas Lagoon splays off this bow shaped trace. Portions of this long, linear trace are designated as 1906 ruptures, while other portions are mapped as concealed under the lagoon. A reasonable interpretation is that this fault trace transitions into the main trace as the fault continues south, but given that Secondary Trace 3 is further from the site, our current designation of the Main Trace is more conservative.

Secondary Trace 4 is approximately 640 m long and is the furthest trace from the site, located 77.5 m west of the Main Trace. It is designated as secondary rather than main due to its location and length. It is a short segment (640 m) that does not connect with other fault traces to the north or south and does not have the potential to generate displacements larger than the longer Main Trace.

From examination of geomorphology, specifically how streams interact with the various fault traces, it is estimated that a majority (~70%) of future fault displacement would occur along the main trace, and the remainder would be spread amongst the secondary traces. Approximately 10% of deformation would occur on Secondary Trace 2, ~15% on Secondary Trace 3 and ~5% on Secondary Trace 4. This estimate of slip partitioning is consistent with estimates measured following the 1906 earthquake summarized by Thatcher and Lisowski (1987). Table 4-1 presents the distance from the southwestern corner of the proposed bridge to the Main Trace and the three secondary fault traces.

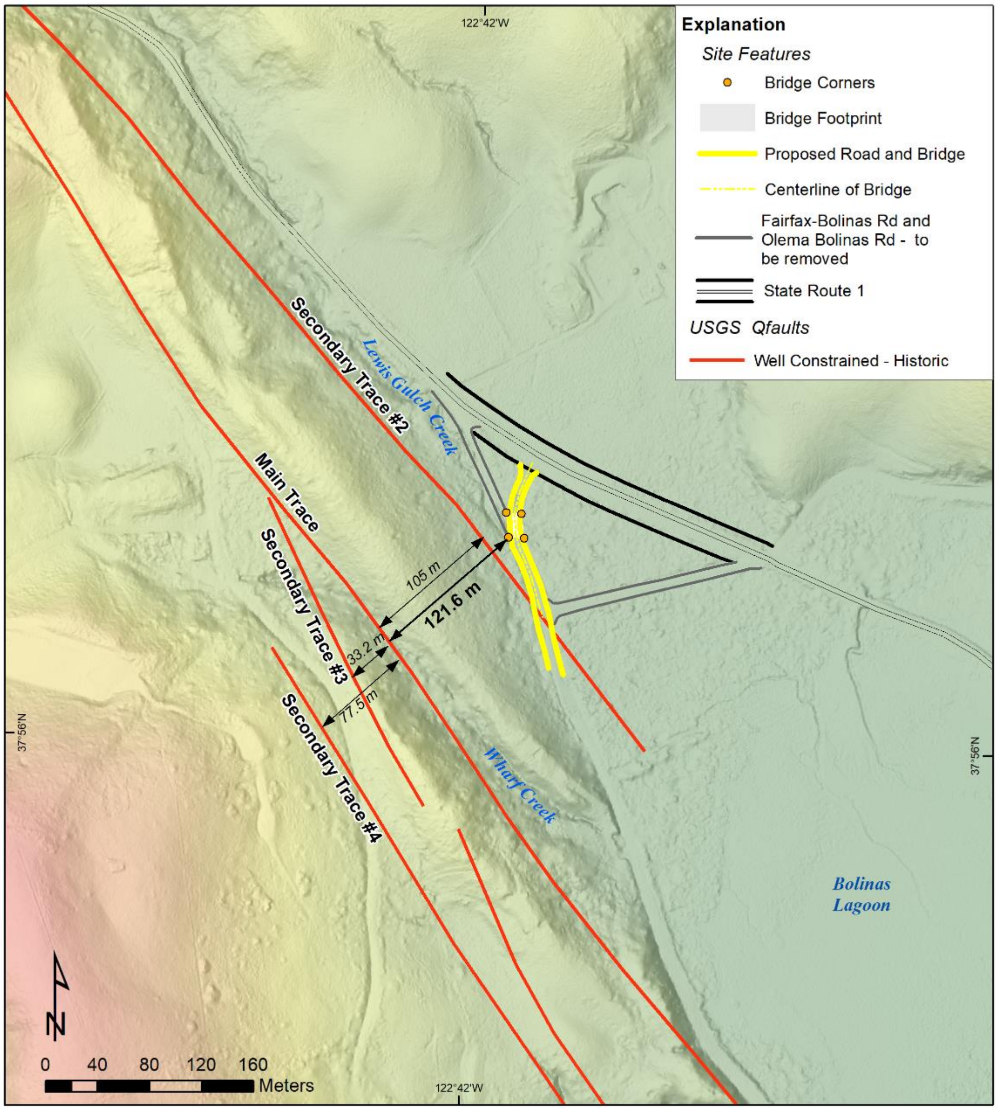


Figure 4-2. Site map including segment distances relative to the SW bridge corner and the main trace of the fault.

Table 4-1. San Andreas fault segment distances relative to the SW bridge corner and the main trace of the fault.

Segment of San Andreas Fault	Distance to SW Bridge Corner (m)	Distance from Main Trace (m)
Main Trace	121.6	-
Secondary Trace 2	16.6	105
Secondary Trace 3	154.6	33.2
Secondary Trace 4	199.60	77.5

5.0 SUMMARY OF FIELD INVESTIGATIONS

The Slate team joined WRA Inc. personnel to conduct a field reconnaissance of the site on March 22, 2022. The objective of the site visit was to look for recent deformation along the San Andres fault within the site footprint and evidence to confirm the location of nearby mapped faults. The identification of recent deformation was limited to the visible assessment of the ground and geomorphology. No samples were collected nor was a subsurface investigation performed. The site reconnaissance was performed by Kelley Shaw with participation from Brian Bartell of WRA Inc.

No direct evidence of an exposed fault trace was observed in site area. To the west of Olema-Bolinas Road and creek, the fault is obscured by dense vegetation. The areas off paved roads were inaccessible by foot due to extensive presence of stinging nettle and poison oak. Figure 5-1 shows a photo taken looking west at Secondary Trace 2 near the intersection of Olema Bolinas Road and Fairfax Bolinas Road. Note the dense vegetation covering the ground. Secondary Trace 2 is assumed to fall along the change of slope between the stream terrace and ridge deposits, as indicated by the dashed white lines. All on-site activities and photos are presented in the field report (Appendix A).

Photo looking west taken from the west side of Olema Bolinas Road on bank of stream. Apparent change in slope indicated with white dashed line. Dense vegetation (stinging nettle and poison oak) in foreground made access limited

Figure 5-1. Site photo looking at Secondary Trace 2

6.0 FAULT RUPTURE ANALYSIS

Per the Caltrans Geotechnical Manual (2017) and the Guidelines for Evaluating the Hazard of Surface Fault Rupture (CGS, 2002), Slate used the provided Fault Rupture Hazard Strike Slip 9 spreadsheet analysis tool to perform a probabilistic fault displacement analysis (PFDHA) of the 5% in 50 years probability of exceedance, corresponding to the 975-year return period. The analysis tool calculates magnitude using Hanks and Bakun (2002) and the surface displacement using Wells and Coppersmith (1994). Probabilistic fault displacement hazard is based on Abrahamson (2008), and off fault displacement hazard is assessed in accordance with Peterson et al. (2011).

6.1 Methodology

The basic form of the Petersen et al. (2011) probabilistic fault rupture hazard is:

$$v\left(Rup_{surf} > z\right) = N(M_{min}) \int_{M_{min}}^{M_{max}} f_m(m) P(Surf\ Rup|m) P(Rup\ at\ site|m)\ P\left(Rup_{surf} > z|m, Surf\ Rup, Rup\ at\ site\right) dm \qquad \text{(eq. 1)}$$

where:

- $N(M_{min})$ is the rate of earthquakes above M_{min} on the fault,
- $f_m(m)$ is the magnitude density function describing the relative numbers of earthquakes of different magnitudes,
- P(Surf Rup | m) is the probability that there is surface rupture somewhere on the fault for a given magnitude,
- P(Rup at Site | m) is the probability that the surface rupture on the fault extends past the site, and
- $P(Rup_{surf}>z$ | m, Surf Rup, Rup at Site) is the probability of the surface rupture exceeding z given that there is some surface rupture at the site.

Eq. 1 is a useful approach for computing the probability of fault rupture at a site, but it contains many parameters that are difficult to define, like the probability that the surface rupture on the fault extends past the site. Abrahamson (2008) made a simplifying assumption, resulting in an equation that relies on much simpler inputs. Abrahamson (2008) considers only the surface rupture from a single characteristic magnitude and assumes that a characteristic earthquake always ruptures the surface at the site. The result is:

$$V\left(Rup_{surf} > z\right) = N(M_{char}) P\left(Rup_{surf} > z|M_{char}\right) \qquad \text{(eq. 2)}$$

where $N(M_{min})$ becomes the annual rate of the characteristic earthquake, $N(M_{char})$, and the probability of the surface rupture exceeding z is only dependent on the occurrence of $N(M_{char})$. With a rearrangement of the terms, eq. 2 provides an easy way to find the probability level of the surface rupture needed to reach the desired return period given the occurrence of a characteristic earthquake on the fault, as shown in eq. 3.

$$P\left(Rup_{surf} > z \mid M_{char}\right) = \frac{v(Rup_{surf}>z)}{N(M_{char})} \qquad \text{(eq. 3)}$$

Observations show that the log of rupture displacements follows a standard cumulative normal distribution, so Abrahamson (2008) finds the number of standard deviations (ε) above or below the median rupture that corresponds to the probability given in eq. 3 with the following Excel function:

$$\varepsilon = -NORMINV\left(P\left(Rup_{surf} > z \mid M_{char}\right), 0{,}1\right) \qquad \text{(eq. 4)}$$

Following the simplified Abrahamson (2008) approach, the Fault Rupture Hazard Strike-Slip 9 spreadsheet requires only a few inputs, including: fault width (km), fault length (km), slip rate (mm/yr), and the number of measured rupture displacements on the fault in question (N_s). The fault length, width, and slip rate are used to compute the Hanks and Bakun (2002) magnitude, the Wells and Coppersmith (1994) average displacement (m), and the recurrence of the characteristic magnitude, $N(M_{char})$. The number of measured rupture displacements, N_s, is used to reduce the value of the ergodic total sigma (0.39), defined as:

$$\sigma_T = \sqrt{\sigma_{AD}^2 + \sigma_{AS}^2} \qquad \text{(eq. 5)}$$

where σ_{AD} is the standard deviation for the Wells and Coppersmith average displacement model (0.28 in $\log_{10}$ units), and σ_{AS} is the standard deviation for the along strike variability (0.27 in $\log_{10}$ units). The ergodic sigma should be used at sites where no previous rupture displacements have been observed or measured (N_s=0). The ergodic sigma represents the variability expected from surface ruptures from a global dataset. If, however, even a single observation is available at the site (N_S>0), the total standard deviation can be reduced based on observations by Hecker and Abrahamson (2004) showing that the variability at a single site (σ_{SS}) is about 0.17 in $\log_{10}$ units. This observation supports the Abrahamson (2008) assumption that surface rupture at a point is strongly characteristic for a site, but it also requires an increase in the epistemic uncertainty in the mean surface rupture at a single site, given by:

$$\sigma_{\mu} = \begin{cases} \sqrt{\sigma_T^2 - \sigma_{SS}^2} \; for\ N_S = 0 \\ \frac{\sigma_{SS}}{\sqrt{N_S}} \quad for\ N_S \geq 1 \end{cases} \qquad \text{(eq. 6)}$$

and the non-ergodic total sigma is calculated according to eq. 7.

$$\sigma_T = \sqrt{\sigma_{SS}^2 + \sigma_{\mu}^2} \qquad \text{(eq. 7)}$$

6.2 Fault Rupture Characterization

The fault rupture methodology relies on the identification of a characteristic magnitude upon which the fault ruptures are based. The characteristic magnitude is selected using an evaluation of the UCERF3 fault characterization, where every rupture passing through the fault segment closest to the bridge location is tracked along with its rate of occurrence to compute the magnitude recurrence for the San Andreas fault zone. The magnitude recurrence for the San Andreas fault in the project vicinity results in a M8.1 characteristic magnitude, and the scenario associated with the characteristic magnitude is provided in Table 6-1.

The Abrahamson methodology requires slip-rate as an input to estimate the return period of the characteristic earthquake. The characteristic earthquake used in this analysis is a proxy for all multi-segment ruptures that occur near the project site, thus the return period should be consistent with these large, multi-segment ruptures. By looking at a magnitude recurrence plot from the UCERF3 source characterization (Figure 6-1) we can see that there is an inflection point at a magnitude of approximately 7.8. This inflection point is the result of two overlapping distributions: the single-segment ruptures and the multi-segment ruptures. We can estimate the return period of the multi-segment ruptures by taking the rate at the inflection point and converting it to a return period. This analysis yields a return period of about 440-years. Alternatively, a slip-rate for the fault system can be used to estimate the return period. Using the upper end of the slip rate estimates on the nearby fault segment (25 mm/yr) gives an approximate return period for the characteristic magnitude of 442 years. This gives consistent results with the UCERF3 source characterization, thus a slip rate of 25 mm/yr is selected for this analysis.

Table 6-1. Inputs to Primary Fault Displacement Analysis.

Input parameter	Value
Creep Rate	0 mm/yr
Width	11 km
Slip Rate	25 mm/yr
Length	534 km, Mw (HB) = 8.1
Number of site-specific rupture observations (from different events)	1
Mean of measured displacement (m)	4.03

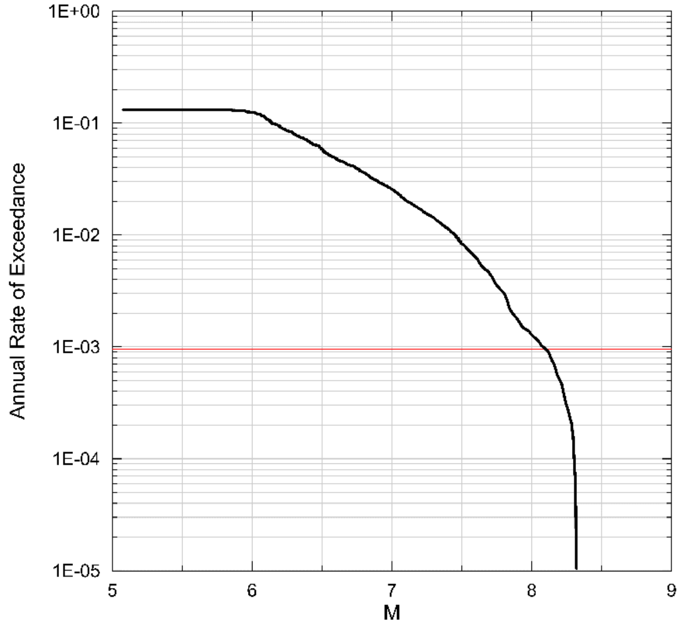


Figure 6-1. Magnitude recurrence plot based on the UCERF3 data for the San Andreas fault system. The red line shows the M8.1 scenario at a return period of 952 years.

Following the Abrahamson (2008) approach, a scaling factor is needed to scale the mean measured displacement (for $N_S \geq 1$) to the desired return period. Eq. 3 is used to compute the probability of the surface rupture exceeding z given M_{char} at a return period of 975 years (Table 6-2, column 6). Given the computed probability of the surface rupture, eq. 4 is used to compute the corresponding epsilon (Table 6-2, column 7). The epsilon is the number of standard deviations required to scale the mean measured displacement to the desired 975-year return period following equation 8.

$$D_{Site-Specific}(m) = D_{Measured}(m) * 10^{(\varepsilon\sigma)} \qquad \text{(eq. 8)}$$

where $D_{Site\text{-}Specific}(m)$ is the estimated displacement at the site in meters and $D_{Measured}(m)$ is the measured displacement at the site from the post-1906 observations (Lawson, 1907; Gilbert, 1907; Niemi, 1992).

Table 6-2. Scaling factors calculated following the Abrahamson (2008) simplified rupture hazard approach.

Fault **-**	**Segment** **-**	**Length** **(km)**	**Mw** **(HB)**	**N** **(Mchar)**	**Required** **$P(Rup_{surf}>z \mid M_{char})$** **(975-year)**	**Epsilon** **(975-year)**
San Andreas	UCERF3 (975-yr Mag)	534	8.1	0.0023	0.45	0.12

6.3 Results

Using the inputs from the previous section, the mean and distribution of fault displacement hazard are calculated as shown in Figure 6-5. Based on the results in Figure 6-2, the site-specific displacement for an annual return period of 975-years is 4.31 meters.

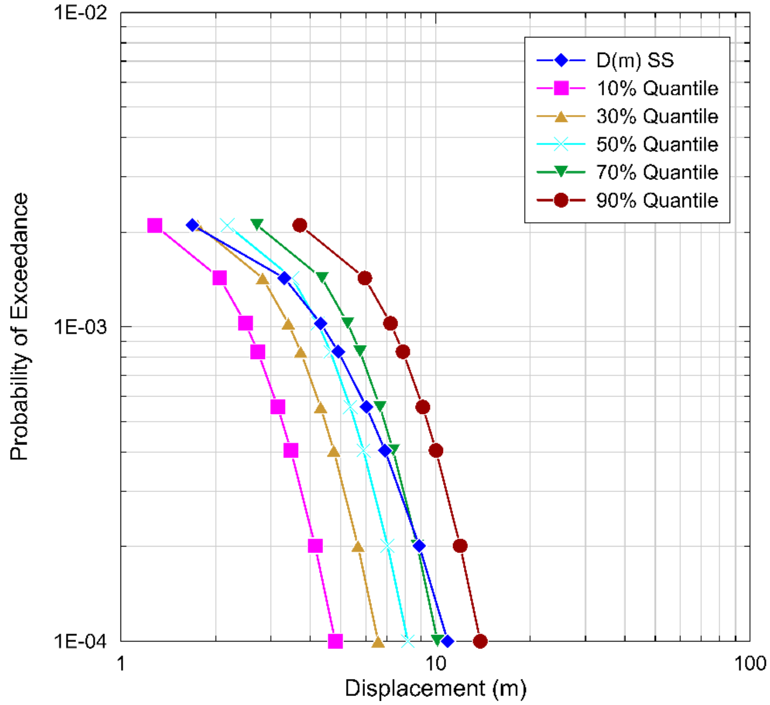


Figure 6-2. Probabilistic displacement on the Main Trace for scenario 2.

To estimate the fault displacement at the site, we allocate 70% of the total displacement to the Main Trace of the San Andreas fault and distribute the rest of the displacement across the three secondary traces as given in Table 6-2. We determined the allocation of displacement between traces by comparing the relative impact each fault has on the stream channels. Secondary Trace 2 and 3 modify/offset the stream channels more significantly than Secondary Trace 4, and therefore have a higher percent allocation. The bridge is located 121.6 meters from the Main Trace, thus the displacement at the bridge resulting from this scenario is 0.34 meters (Figure *6-3*). Given that Secondary Trace 2 is closest to the bridge, the orientation and sense of slip at the bridge will be dominated by its characteristics. Secondary Trace 2 strikes 145 degrees and has a right-lateral sense of slip. Displacements at the bridge location are expected to be parallel to the strike of Secondary Trace 2, so the site and areas to the east of the fault traces will move laterally toward the southeast.

Table 6-3. Percent displacement allocation across the main trace and secondary structures.

Main Trace (%)	Secondary Trace 2 (%)	Secondary Trace 3 (%)	Secondary Trace 4 (%)
70	10	15	5

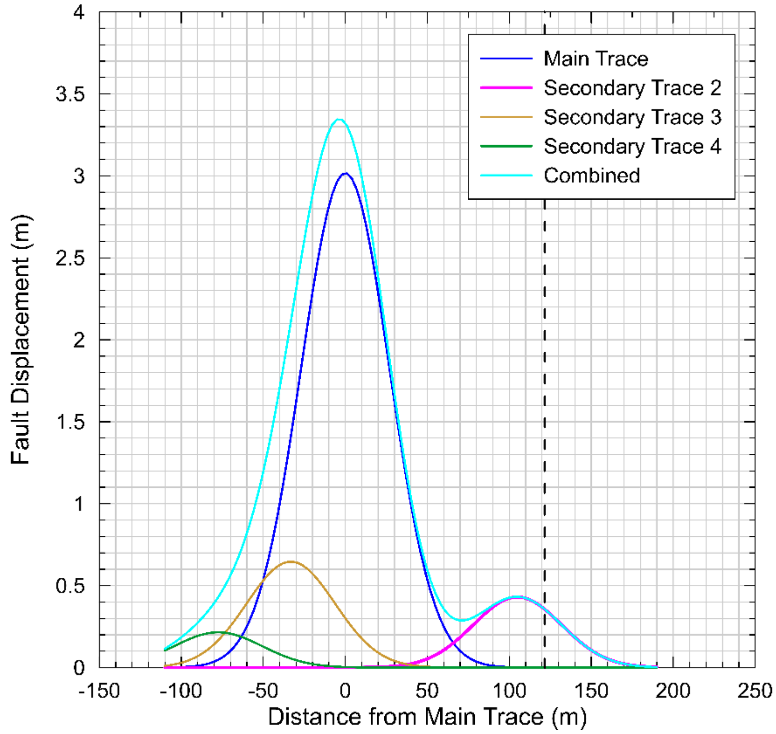


Figure 6-3. Displacement across the main fault and the three secondary traces for alternative 1 (Main, 70%; Trace 2, 10%; Trace 3, 15%; and Trace 4, 5%). The black dashed line shows the location of the bridge relative to the main fault trace centered at zero.

7.0 CONCLUSIONS

We find that our solution is sensitive to the choices we make when distributing the total displacement over the secondary structures. As a check of our slip allocation based on geomorphic evidence, we conducted a sensitivity analysis where the percent of the slip allocated to Secondary Trace 2 and the associated scenario weights are defined in Table 7-1.

Table 7-1. Percent of slip allocated to Secondary Trace 2 and the corresponding weight based on geologic evidence.

Percent of Slip on Secondary Trace 2	Weight
0	0.05
5	0.2
10	0.3
20	0.3
30	0.1
40	0.05

We then conducted a displacement hazard analysis for Secondary Trace 2 using the mean hazard results shown in the previous section and the percent of slip on Secondary Trace 2. The result is a fault displacement hazard curve for Secondary Trace 2 (Figure 7-1).

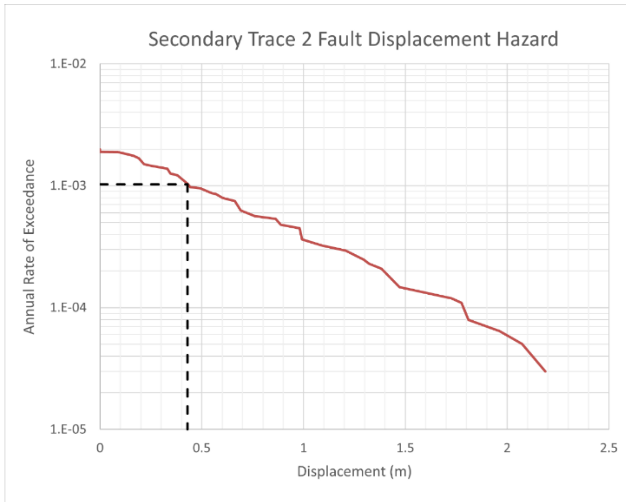


Figure 7-1. Fault displacement hazard for Secondary Trace 2.

Based on this analysis, the 975-year on-fault displacement is 0.43 meters for Secondary Trace 2, and we conclude that our slip allocation based on geomorphic evidence (10% for Secondary Trace 2) is appropriate for the site.

8.0 RECOMMENDATIONS

Given the small displacements predicted at the bridge location, we recommend using the characteristic magnitude scenario in Table 6-1 to define the characteristic earthquake at the site with a slip allocation across the traces based on geomorphic evidence (Main Trace, 70%; Secondary Trace 2, 10%; Secondary Trace 3, 15%, and Secondary Trace 4, 5%). This scenario represents our best understanding of the fault characterization based on UCERF 3 and geologic observation and analysis. This scenario results in a 975-year return period displacement of 0.34 m at the bridge location.

9.0 LIMITATIONS

On-site evaluation was limited to the visible assessment of the ground and geomorphology due to non-ideal site conditions, including stinging nettles, poison oak, and heavy vegetative cover.

The assessments presented in this report assume that all information provided by Crawford & Associates, Inc. are accurate, and the information contained within is applicable to the site. The information provided in this report was prepared for the subject project, specifically for use by Crawford & Associates, Inc. The assessments presented in this report are not valid for other locations or improvements in the project vicinity.

In the performance of our professional services, Slate Geotechnical Consultants Inc., our employees, and our agents comply with the standards of care and skill commonly used as state-of-practice in our profession practicing in the same or similar localities. We are responsible for the evaluations contained in this report; however, in the event that conclusions based on the data and information provided herein are made by others, such conclusions are not our responsibility unless we have been given an opportunity to review and concur in writing with such conclusions.

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APPENDIX A

FIELD REPORT

SLATE
GEOTECHNICAL CONSULTANTS

FIELD REPORT NO. BFS-01

Project Name: Bolinas Fault Rupture Study
Project Location: Bolinas, CA
Field Engineer: Kelley Shaw
Time On Site: 1:00 pm
Reviewed By: Katie Wooddell

Project Number: 22-080-01
Date: 3/22/2022
No. Site Visits: 1
Weather: Sunny
Date: 3/22/2022

PERSONNEL			
TIME IN	**TIME OUT**	**NAME(S)**	**COMPANY**
1:00 pm	4:00pm	Kelley Shaw	Slate Geotech
1:00 pm	2:00 pm	Brian Bartell	WRA Inc

11:30 – Leave office for Bolinas Ca for site reconnaissance visit to look for recent deformation along San Andreas fault and location of fault traces in site vicinity.

1:00 – Arrive onsite on Hwy 1 and Olema Bolinas Road, Brian (WRA Inc) already onsite. Meet with Brian and discuss wetland restoration project. Walk around site to discuss location of planned road and bridges. Go over goals of the site visit. Brian points out poison oak and stinging nettle plants while walking off roads.

1:30 – Complete site walk through with Brain. Start site reconnaissance, Brian heads off towards Bolinas Lagoon. I walk along Olema Bolinas Road and take photos looking west of fault trace #2. Areas off the road are inaccessible due to dense vegetation of poison oak and stinging nettle, and due to creek.

Photo 9646- Taken at 37.934689, -122.699572 looking west. Fault Trace #2 is located just beyond small tree illuminated by sunlight at slope break

Photo 9647- Taken at 37.934313, -122.699393 looking west. Fault Trace #2 is located just at slope break near lilies

2:00 – Walk to intersection of Olema Bolinas Road and Fairfax Bolinas road at fault crossing. Take photos along strike looking to the north and south. No evidence of faulting observed due to dense vegetation.

Attachments: ______________________

Project Name: Bolinas Fault Rupture Study	Project Number: 22-080-01
Field Engineer: Kelley Shaw	Date: 3/22/2022

Photo 9650- Taken at 37.934050, -122.699189 looking northwest. Photo taken at fault crossing looking up strike.

Photo 9649- Taken at 37.934050, -122.699189 looking southeast. Photo taken at fault crossing looking down strike.

2:15 – Walk north along Olema Bolinas Road, cross Lewis Gulch Creek. Look for evidence of secondary fault trace 2. Dense brush and trees obscure ground surface.

Photo 9654- Taken at 37.935121, -122.700054 looking west. Photo taken from stream channel looking towards ridgeline. Scarp in the immediate foreground is stream bank, then stream terrace surface where trees are rooted, secondary scarp behind trees is presumed as fault trace. Unable to access due to stinging nettle.

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2:30 – Finish site walk near proposed bridge. Mobilize to Horseshoe Hill Road to look at Main Trace of San Andreas.

2:45 – Find safe parking location on Horseshoe Hill Road. Head out and walk along road Horseshoe Hill Road. Take observations from public right of ways.

Photo 9663- Taken at 37.935496, -122.702271 looking southeast. Photo taken on mapped main fault trace looking down strike. To the right is a low lying meadow with berry bushes. To the left is elevated ridge vegetated with trees. Fault is presumed to fall along abrupt topographic chang/at foot of slope.

3:30 – Return to the car, document findings. Head south on Horseshoe Hill Road towards mouth of lagoon.

3:45 – Stop on side of road hearing north back to the site, at road cut of exposed Monterey formation. SAND, light tan, fine to medium grained, no apparent bedding. Road cut is over 20 m tall. Stream runs towards lagoon/road and cuts through fault. Couldn't walk up stream channel due to vegetation.

Photo 9663- Taken at 37.30862, -122.697521 looking northwest. Photo taken from east side of road. Exposed Monterey Formation. Stream is just out of frame to the left.

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4:00 – Drive back towards site. Leave site, head to the office in Berkeley, Ca.

5:00 – Arrive at office.