Save The Redwoods
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Redwood National and State Park Visitor Center and Restoration Project

Initial Study/Proposed Mitigated Negative Declaration

GHD | 718 Third Street, Eureka, CA 95501
11187543 | December 2019

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Initial Study/Proposed Mitigated Negative Declaration

California State Coastal Conservancy

Redwood National and State Park Visitor Center and Restoration Project

Prepared for:

State of California Coastal Conservancy

California State Coastal Conservancy
1515 Clay Street, 10th Floor
Oakland, CA 94612-1401

Prepared by:

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December 2019

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1. Project Information

Table 1-1 Project Information

Project Title	Redwood National and State Park Visitor Center and Restoration Project
Lead Agency Name & Address	California State Coastal Conservancy 1515 Clay Street, 10th Floor Oakland, CA 94612-1401
Contact Person & Phone Number	Su Corbaley, (510) 286-6767
Project Location	Orick, California
Project Applicant's Name & Address	Save the Redwoods League 111 Sutter Street, 11th Floor San Francisco, CA 94104
General Plan Land Use Designation	RA40-160; CR; P RA: Residential Agriculture CR: Commercial Recreation P: Public Lands
Zoning	RA-40-D-WR-F; CH-X-D-WR-F; U; FR-B-5(20)-D RA: Rural Residential Agriculture CH: Commercial Highway U: Unclassified FR: Forest Recreation Combining Zones: B: Special Building Site D: Design Control F: Floodplain WR: Streamside Management Area and Wetlands X: Recreation

1.1 CEQA Requirements

The Redwood National and State Park Visitor Center and Restoration Project (Project) is subject to the requirements of the California Environmental Quality Act (CEQA). The lead agency is the State Coastal Conservancy (Conservancy). Section 15063(d) of the State CEQA Guidelines states the content requirements of an Initial Study as follows:

1. A description of the project including the location of the project;
2. An identification of the environmental setting;
3. An identification of environmental effects by use of a checklist, matrix, or other method, provided that entries on a checklist or other form are briefly explained to indicate that there is some evidence to support the entries;

4. A discussion of the ways to mitigate the significant effects identified, if any;
5. An examination of whether the project will be consistent with existing zoning, plans, and other applicable land use controls; and
6. The name of the person or persons who prepared or participated in the Initial Study.

1.2 Surrounding Land Uses and Existing Setting

The Project is located in the unincorporated community of Orick, in Humboldt County, California. Orick is located near the mouth of Redwood Creek, in what was historically Yurok tribal territory. In the latter half of the 20th century, logging was a lucrative and popular local industry and many timber harvesters and mill workers lived in the Orick area. Current land uses in the Orick area include dairy farming, cattle grazing, tourist and community-oriented businesses and services, and residences. Redwood National and State Park (RNSP)-managed property occurs east of the Project, Bald Hills Road borders the Project on the south, and Highway 101 occurs west of the Project.

2. Project Description

2.1 Project Location, Primary Components, and Site Characteristics

The Redwood National and State Park Visitor Center and Restoration Project (Project) is located approximately 1.25 miles northeast of the unincorporated community of Orick, in Humboldt County, California. The Project's disturbance extent is 89.2 acres, and the parcels that comprise the Project total 101.5 acres. The Project Area includes the lower 4,275 feet (nearly one mile) of Prairie Creek, the former Orick Mill site (Mill Site), and various access roads. The Project Area is bound to the west by Highway 101, to the north by the community of Berry Glen, to the east by Redwood National and State Park (RNSP), and to the south by Bald Hills Road (Figure 2-1 – Project Vicinity). The Project Area is primarily owned by Save the Redwoods League (the League) and includes portions of assessor parcel numbers (APNs) 519-231-018, and 520-012-013. A small portion of the Project Area (approximately 2.5 acres or three percent) is owned by the National Park Service (NPS) and includes APNs 520-012-009 and 519-231-020. See Figure 4.2-4 – Land Use Designations and Zoning Site Overview in Appendix A of this Initial Study/Mitigated Negative Declaration (ISMND) for a parcel map. The entire Project Area will ultimately transfer to RNSP. The Project is located immediately adjacent to and encroaches into RNSP lands. Thousands of acres of RNSP property lie immediately to the east of the Project Area. See Figure 2-2 – Existing Conditions for a visual orientation to the current conditions within the Project Area.

The Project will include infrastructure, recreation enhancements and habitat restoration elements to increase recreation and public educational opportunities, provide regional trail connections, restore hydrological connections and floodplain habitat, and improve habitat for native plants, fish and wildlife. The Project will include construction of a new, world class redwood Visitor Center for RNSP and onsite interpretive elements. It also will include establishment of a Yurok Demonstration Site to conduct ceremonies and to use for other tribal community events and interpretive purposes. A redwood tree Canopy Walkway will provide visitors with an up-close redwood experience. The Project will establish local trails, a new segment of the California Coastal Trail (CCT), and a new trail connection to RNSP. Additionally, the Project will include onsite stream and wetland restoration to enhance nearby Prairie, Skunk Cabbage and Libby Creeks, in turn improving rearing habitat for salmonids that are federally and state listed as threatened. Culvert replacements will improve instream flow in onsite waterways such as Otter Creek and the installation of Low Impact Development (LID) retention basins will improve stormwater management within the Project area.

There are six major components of the Project:

1. Visitor Center
2. California Coastal Trail
3. Canopy Walkway
4. Yurok Demonstration Site
5. Prairie Creek Restoration
6. Libby Creek Enhancement

The Project components are discussed in detail in Section 2.6 – Project Components, and shown in Figure 2-3 – Conceptual Design Project Components.

Some off-site Project-related improvements will take place on RNSP land to the east of the Project Area as shown in Figure 2-3, and within the California Department of Transportation (Caltrans) owned right-of-way to the west. These offsite improvements will be planned and implemented in close coordination with NPS and Caltrans, and all necessary right of ways and permits will be obtained prior to project implementation.

The Humboldt County General Plan Land Use designation for the Project Area is Residential Agriculture 40-160 in the western portion of both parcels, and Commercial Recreation in the eastern portion. According to the spatial metadata within Humboldt County Web GIS (version 2.0, 2019), the zoning for the Project Area is Rural Residential Agriculture with a 40-acre parcel size in the western portion of both parcels (RA-40-D-F-WR), and Commercial Highway in the eastern portion of both parcels (CH-D-X-F-WR). A recreation (X) combination zone overlay exists in the eastern portion of both parcels. The zoning for both parcels must comply with local Orick community design standards (D), and with the Flood Hazard Area combining zone (F). Portions of both parcels are within Humboldt County Streamside Management Areas (WR) and therefore must comply with Humboldt County Streamside Management Area guidelines where applicable. See Figure 4.2-2.

2.2 Existing Conditions

The historic Mill Site lies in the southeastern portion of the Project Area. See Figure 2-2 for a visual and spatial orientation of existing conditions at the Project Area. The Mill was built between 1958 and 1960, was shut down in 2009 and demolished in 2010 (Bueno 2015, Clayburn 2013, and SHN 2011). The Mill was built upon compacted river run aggregate fill and was capped with asphalt. Mill facilities had concrete foundations. The river run subgrade, asphalt and concrete foundations remain. Flooding at the Mill Site was a regular natural occurrence (Bueno 2015). A seasonal drainage ditch known as the Southern Drainage Ditch exists east and south of the Mill Site. There are two access roads, the Upper Road and Lower Road, which extend to the north from the Mill Site. The roads parallel each other at different elevations for approximately 0.30 miles until they intersect towards the northern end of the Project Area. Beyond the Upper and Lower Road intersection, the Lower Road continues northwest for approximately 0.25 miles to Highway 101, and the Upper Road continues north for approximately 1 mile to Berry Glen. Both roads are located in forested terrain at the boundary of RNSP. Forest habitat surrounding the Project Area is dominated by coast redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), red alder (*Alnus rubra*), big leaf maple (*Acer macrophyllum*), and numerous shrubs and ferns. See Figure 4.4-3 – Vegetative Cover Type in Appendix A. An old growth coast redwood tree, the Centennial Tree, exists in the northern portion of the Project Area, at approximately 0.40 miles along the Lower Road from the Mill Site.

The west side of the Project Area includes Prairie Creek, Skunk Cabbage Creek (a tributary to Prairie Creek), and a fairly uniform area of upland vegetation along the central western portion of the Project Area that extends westward to U.S. Highway 101. The north-westerly, southern and central portions of the Project Area support freshwater emergent wetlands, riparian habitat, and transitionary habitat extending to upland grasslands. Libby Creek drains into wetlands in the central portion of the Project Area. A manmade ditch extends from these wetlands to Prairie Creek. Stands of invasive non-native reed canary grass (*Phalaris arundinacea*) exist along the ditch. The Project Area contains pastureland with associated infrastructure such as fences in the western and central portion of the property, respectively. Upland woody vegetation dominates the banks of Prairie Creek throughout the majority of the Project Area. The barn seen in Figure 2-2 was removed in early 2019.

The lowest one mile of Prairie Creek, towards its confluence with Redwood Creek, is located within the Project Area. Prairie Creek is a tributary to Redwood Creek and contains critical habitat for Chinook Salmon (*Oncorhynchus tshawytscha*) and Coho Salmon (*Oncorhynchus kisutch*). Much of the Prairie Creek watershed is contained within RNSP and provides high quality salmonid habitat. This area has been owned by numerous landowners over the last century, and natural habitat on the site is in relatively poor condition. The majority of the historic Prairie Creek floodplain within the Project Area encompasses open remnant pastureland with interspersed seasonal wetlands and woody riparian vegetation along Prairie Creek. The Prairie Creek channel is disconnected from its adjacent floodplain; channel banks are on average 12 to 15 feet higher than the bed of the stream. Channel incision may have been caused by historic logging practices upstream of the Project Area, resulting in greater sediment entrainment and deposition in the form of natural levees within the low gradient Project Area. Levees aggraded over time as a result of sediment deposition from upstream sources. The remnant pastureland is divided into southern and northern pastures. The southern pasture is higher in elevation than the northern pasture and acts as a longitudinal barrier for north-south directional overflow. Both of these pastures likely gained elevation due to the sediment deposition associated with the 1964 flood of Redwood Creek (pers. Comm. Anderson 2019). The pasture adjacent to Prairie Creek is relatively flat with longitudinal topographical gradients and contains wetlands along its eastern edge. Historically this area likely contained wetlands, numerous channels and a highly connected floodplain with abundant riparian vegetation.

Three creeks drain to the eastern portion of the property: Libby Creek, which is perennial, and two seasonal waterways, Otter Creek and an unnamed tributary. The headwaters of the three creeks originate in RNSP northeast of the Project Area. The three creeks flow underneath the Upper and Lower Roads through culverts and drain into wetlands within the historic Prairie Creek floodplain. Libby Creek crosses the Upper Road approximately 900 feet north of the Mill Site. A small instream concrete impoundment exists within Libby Creek approximately 100 feet east of the Upper Road crossing. This structure is believed to have provided water to the Mill workers who were housed adjacent to Libby Creek, at the location proposed for the Yurok Demonstration Site. The unnamed tributary crosses the Upper Road approximately 600 feet north of Libby Creek, and Otter Creek crosses the Upper Road approximately 1,000 feet north of Libby Creek.

2.3 California Environmental Quality Act Compliance

The Project is subject to the requirements of the California Environmental Quality Act (CEQA). The lead agency is the State Coastal Conservancy (Conservancy). As the CEQA Lead Agency, the Conservancy has developed this Initial Study for the following purposes:

- Provide the Lead Agency with information to use as the basis for deciding whether to prepare an EIR or a Negative Declaration.
- Enable an applicant or Lead Agency to modify a project, mitigating adverse impacts before an EIR is prepared, thereby enabling the project to qualify for a Negative Declaration.
- Assist in the preparation of an EIR, if one is required, by:
    - Focusing the EIR on the effects determined to be significant,
    - Identifying the effects determined not to be significant,
    - Explaining the reasons for determining that potentially significant effects will not be significant, and
    - Identifying whether a program EIR, tiering, or another appropriate process can be used for analysis of the project's environmental effects.

- Facilitate environmental assessment early in the design of a project;
- Provide documentation of the factual basis for the finding in a Negative Declaration that a project will not have a significant effect on the environment;
- Eliminate unnecessary EIRs;
- Determine whether a previously prepared EIR could be used with the project

This Initial Study has been prepared to satisfy the requirements of CEQA (Public Resources Code [PRC], Div. 13, Sections 21000-21189.57) and the CEQA Guidelines (California Code of Regulations, Title 14, Sections 15000-15387). Based on the findings of the Initial Study, the Conservancy proposes to adopt a Mitigated Negative Declaration for the Project. A Mitigated Negative Declaration is appropriate when potentially significant environmental impacts can be avoided by adopting specified mitigation measures, such that no substantial evidence exists that the Project may cause a significant effect on the environment (CEQA Guidelines Section 15070). Mitigation measures are identified in this Initial Study to reduce potentially significant effects to less than significant.

The Project will require permits from federal and state agencies. An individual permit or nationwide permit will be required for impacts to wetlands subject to U.S. Army Corps of Engineers (USACE) jurisdiction under Section 404 of the Clean Water Act (CWA). The USACE will serve as the lead agency for Project compliance with the National Environmental Policy Act (NEPA). An Environmental Assessment (EA) is expected to be the appropriate NEPA compliance document.

The public review period for this Initial Study and proposed Mitigated Negative Declaration (ISMND) is December 19, 2019 through January 20, 2020. Comments regarding the correctness, completeness, or adequacy of the ISMND are invited. Comments received during the public review period will be considered by the Conservancy prior to its public meeting regarding the Project. Comments on the ISMND should be submitted via e-mail to VCRPComments@scc.ca.gov or mailed to:

State Coastal Conservancy
1515 Clay Street, 10th Floor
Oakland, CA 94612

Attn. Su Corbaley

Comments must be received by 5:00 pm on January 20, 2020.

SCC intends to prepare written responses to comments prior to a project approval/CEQA document adoption public meeting in mid 2020. Once the ISMND is adopted and the project approved, SCC will file a Notice of Determination (NOD) with the State Clearinghouse and the county Clerk.

2.4 Project Goals

The goal of the Project is to improve the property to benefit the public, including visitors from around the world, and the local community, including local tribes, while restoring the site to provide important wildlife and ecosystem services. Specific Project goals are to:

- Create a world class visitor center that serves as the southern gateway to RNSP;
- Establish a new model for redwood interpretation and visitor experience;
- Provide a place for the Yurok people and other local tribes to tell their own story as part of the visitor experience;
- Restore natural processes that benefit native plants and wildlife;

- Enhance physical (hydraulic and geomorphic) processes to stream channels, floodplains, and upland areas;
- Significantly increase salmonid abundance by increasing rearing habitat, and protecting or restoring access to tributaries and wetlands;
- Minimize occurrence of invasive species in Project areas and create sustainable native plant communities;
- Reconnect wildlife corridors where feasible;
- Create a facility that can showcase stream restoration and public access opportunities in a sustainable way;
- Provide regional trail connections including access to RNSP trail networks and provide a new segment of the California Coastal Trail (CCT).

2.5 Project Overview

The Project includes significant improvements to public educational opportunities, recreation, plant and wildlife habitat, ecosystem services and climate change resilience. The Project Area is currently closed to the public and is not functioning hydrologically to benefit aquatic wildlife. The Project will transform the property from a fallow open area to a destination for visitors from around the world to experience redwood forest ecology and showcase state of the art stream and wetland restoration. Specifically, the Project will redevelop the former Mill Site into a world-class Visitor Center and will offer numerous educational and recreational opportunities for visitors on the CCT, Canopy Walkway and within the Visitor Center pedestrian plaza. In addition, the Project will significantly improve endangered salmonid habitat within Prairie Creek, enhance hydrologic function for Libby and Otter Creeks and the unnamed tributary, and help preserve local indigenous cultural practices through the creation of a Yurok Demonstration Site. The following sections discuss each of the six Project components in detail, along with the activities required to construct, operate and maintain each component.

2.6 Project Components

2.6.1 Visitor Center

Construction

Recreation and Educational Features

The Visitor Center will consist of two main buildings connected by an outdoor covered walkway totaling approximately 5,347 square feet. A 2,518 square foot screened-in eating and picnicking area, covered by a rooftop, will be located in the northern extent of the Visitor Center building resulting in a total development footprint of 7,865 square feet. Additionally, a café will exist within the Visitor Center near the screened-in eating and picnicking area to service guests. Containment of food serving facilities is necessary to limit food availability to corvids who could prey on eggs of Marbled Murrelets, a federally threatened and California endangered species, known to nest in nearby old growth redwoods within RNSP. Educational amenities include a 60-seat amphitheater and an outdoor classroom that will be located northwest and west of the Visitor Center building, respectively. The Visitor Center will be the highest point within the Project Area (not including the Canopy Walkway and CCT) and will sit upon up to ten feet of fill that will be placed on top of the current site elevation.

Approximately 1.6 acres of walkways, trails and pedestrian plazas will be located within the Visitor Center vicinity in addition to numerous outdoor interpretive exhibits, including a watershed display and an approximate 0.5-mile loop trail to overlook Prairie Creek (see Figure 2-3 and Sheet 1-1 – Volumes Regions in Appendix A). A welcome kiosk will be located adjacent to the Visitor Center to the south. The Project facilities will comply with applicable state requirements, such as Title 24 energy efficiency standards and the California Green Building Standards mandatory measures, unless exemptions apply.

Circulation

A secondary information kiosk with signage and park monument will be located at the Visitor Center entrance gate at Bald Hills Road. A construction entrance currently exists approximately 200 feet west of the Visitor Center entrance gate. This entrance will be enhanced to ensure it could accommodate heavy equipment ingress and egress, which will include the installation of a new culvert to support construction activities. Two existing culverts will be replaced in this location, one at the Visitor Center entrance gate and the other at the construction entrance. Another new culvert will be installed approximately 200 feet east of the entrance gate to allow for access via trail to Bald Hills Road towards the Redwood Creek trailhead.

The new segment of the multi-modal CCT will extend from the entrance gate into the Project Area towards the Visitor Center where visitors could utilize the local trail system. East of the Visitor Center entrance gate, a trail will cross the Southern Drainage Ditch via a culvert to connect to Bald Hills Road. A crosswalk will be painted on Bald Hills Road to allow trail users to cross the road with greater safety and utilize the Lower Road which connects to the Redwood Creek trailhead, approximately 0.45 miles east.

As shown in Figure 2-3, three parking lots, accommodating up to 84 regular vehicles, 10 recreational vehicles, and 10 American with Disabilities Act (ADA) vehicles will be constructed near the Visitor Center. At the Visitor Center entrance gate there will be a bus/vehicular drop-off zone. Shoulder parking will be provided between the Visitor Center entrance gate and the southern parking lot for visitors to temporarily pull off the road to view the site. Bicycle parking will also be provided near the Visitor Center. Total parking acreage will be approximately 3.1 acres.

Stormwater Management

The Visitor Center area will contain appropriately sized low impact development (LID) stormwater retention basins. One of the LID retention basins, referred to as the Interface Restoration Area (IRA), will be west of the Visitor Center entrance gate. Another stormwater management area, referred to as the Eastside Restoration Area (ERA) will consist of multiple LID infiltration basins located along the southeastern edge of the Visitor Center near the Southern Drainage Ditch. The IRA will serve as a staging area during construction prior to becoming an LID feature.

The ERA will serve as a stormwater management area and native vegetation enhancement area. There will be a net gain of approximately 32,400 cubic yards (cy) of fill within the ERA to change the elevation. Approximately 100 trees with a maximum 20-inch diameter at breast height (dbh) will be removed from the ERA during the fill placement. Tree species to be removed include Douglas-fir, coast redwood, Sitka spruce, big leaf maple, red alder and cascara (*Frangula purshiana).* The added earthen material will temporarily fill the drainage ditch, which will be reestablished in the same location at a higher elevation as a drainage swale flowing towards the southeastern corner of the Project Area. The drainage swale will connect to the existing Southern Drainage Ditch to the south. In this location the berm and debris along the northern side of the Southern Drainage Ditch will be removed from the area up to the approximate location of the proposed open bottom culvert across the Ditch, to allow for the installation of LID infiltration areas and greater connectivity to the Southern Drainage Ditch. The LID infiltration areas will capture all stormwater runoff from the southeastern half of the Visitor Center (approximately). The Southern Drainage Ditch downstream of the berm removal area will be widened to approximately 20 feet and will remain at the same elevation. No work below the ordinary high water mark will take place in the Southern Drainage Ditch. The area that comprises the Southern Drainage Ditch widening area extends from the approximate location of the proposed crosswalk to approximately 500 feet west of the entrance gate. In addition to the 100 trees that will be removed from the ERA, another 150 trees with 8-16 inch dbh will be removed from the southern Project boundary during the berm and debris removal and the ditch widening (ditch section north of and parallel to Bald Hills Road). Tree species to be removed include big leaf maple, red alder and willow. The removed trees and vegetation will be used in the Prairie Creek Restoration area, or ground up into either chips or mulch and utilized in the restoration area as small woody debris, floodplain organic materials or as mulch. Existing dilapidated fencing will be replaced with new fencing. Three new culverts will be replaced within the ditch widening area (as mentioned above): an open bottom culvert to support trail connectivity to the proposed crosswalk and Redwood Creek Trailhead; a culvert at the Visitor Center entrance gate; and a culvert at the construction entrance. The ERA and southern ditch area will be revegetated with native tree species upon completion and are considered restoration elements of the Project. Both the ERA and southern ditch will be monitored similarly to the other restoration components of the Project, which is further discussed in Section 2.8.1 – Restoration Monitoring. See Figure 2-3 for the locations of the various IRA and ERA Project components along and within the Southern Drainage Ditch.

The process and timing of the various construction elements including construction in the IRA and ERA are further discussed in Sections 2.7.2 – Site Access and Staging Locations and 2.7.3 – Earthwork.

Landscaping

The Visitor Center will contain approximately 1.2 acres of landscaping features to create an aesthetically pleasing ambiance. Landscaping will be geographically relevant and will utilize California native vegetation when possible. If native vegetation is not available, compatible non-invasive vegetation species will be utilized.

Utilities and Amenities

The utilities necessary to ensure an adequate supply of drinking water, fire protection water, wastewater management, telecommunications, electricity and gas will be located at the southern end of the Project Area north east of the Visitor Center entrance gate. The collective footprint of the utility building areas is expected to be approximately 500 square feet. Domestic water will be supplied by a new well and a 5,000 to 10,000-gallon storage tank, or possibly two tanks. A Water Treatment Building will be built to test and treat drinking water. The National Fire Protection Association (NFPA) standard 22 states that the fire water storage tanks must be able to be refilled within eight hours. In order to do this, a well must be able to provide 121 gallons per minute (gpm). The existing well on site had a capacity of 23 gpm, but this amount was limited by the existing well pump, and it is estimated that the existing well could produce about 35 gpm. In order to meet the NFPA standard, it is proposed that one primary well and three alternative wells will be installed to collectively produce 140 gpm. The wells will likely have a depth of 150 feet to 200 feet with a minimum 50-foot sanitary seal. Well diameters are expected to be six to eight inches. The primary well will supply potable water to the Project Area following treatment at the Water Treatment Building. Fire protection water will be collectively supplied by the four wells, and two 30,000-gallon storage tanks will be located on-site for a total of 60,000-gallons of fire protection water storage. A Fire Pump House building will house the back-up fuel-driven generator and fire pump and located adjacent to the fire-protection water storage tanks.

An onsite wastewater treatment system will be installed and will include a leach field. The leach field will likely consist of eight lines with 10-foot spacing between lines. Based and the current design the lines will be approximately 69 feet in length and will be installed to accommodate wastewater needs for the site. There will be a 100 percent reserve leach field area adjacent to the primary leach field site. Wastewater will likely be pumped through a series of tanks for treatment, initially starting with an estimated 12,000 gallon septic tank and followed by an estimated 8,000 gallon equalization tank, an estimated 1,500 gallon recirculation tank, an Orenco Advanced Treatment Unit, and an estimated 1,000 gallon dosing tank that will pump wastewater to the leach field. All tank sizes are approximate. The onsite wastewater treatment system will be designed to meet state and county requirements.

Onsite lighting will be fully shielded (pointed downward) and will minimize blue light emissions to limit light pollution in the nighttime environment. Onsite outdoor lighting will be consistent with the Humboldt County General Plan goals and policies.

There is currently no electrical nor communications service to the Visitor Center development area. The closest known electrical service, provided by Pacific Gas & Electric Company (PG&E), terminates at or near the site of the barn foundation in the Prairie Creek Restoration Area. Due to the grading proposed for the Prairie Creek Restoration Area and the desire to have no visible overhead services in the restoration area, two complementary ways to provide electrical and communications service to the site are currently envisioned, consisting of PG&E service and a grid-tied photovoltaic system. Both are described in detail below.

PG&E service will be delivered by removing existing overhead lines to the site and installing new overhead service lines south along Highway 101 and east along Bald Hills Road, to the south side of the site. Power lines within the Project Area will be buried.

1. The existing overhead service alignment will be removed. New joint utility poles and overhead lines will be extended south along highway 101 and then east along Bald Hills Road, and then into the South side of the site through the main site entrance.
2. 12kV underground power and telephone service will be extended into the site from the new joint utility poles on Bald Hills Road. A new power utility pad-mounted transformer will be located at the water treatment area, to serve a new 200 amp (A), 120/208 volt (V) power service to the water treatment equipment.
3. An additional utility company 12kV extension will be extended underground across the site to the Visitor Center, where a second utility company transformer will be located, with an additional 200A, 120/208V power service.
4. A propane-fuelled backup generator will be provided adjacent to the site utilities. Size of generator and propane tanks will be determined based on backup energy requirements of the Project.
5. Underground telephone service will be terminated at the Water Treatment area as well, with a customer owned underground telephone extension to the Visitor Center, which will enable

hard wired telephone service. The telecommunications provider is unknown at this point, however it will likely be served by a local internet provider and will include minor equipment.

In addition to the PG&E service as described above, a grid-tied photovoltaic system will be provided. The photovoltaic system size will be determined based on Project goals. It is assumed that the array will be located on the Visitor Center roof, will be fully tied into the grid system, and will provide renewable energy for all or a portion of the Visitor Center needs during normal operation. No battery storage is currently proposed. Should the photovoltaic system not be feasible, the Project will receive electricity solely via PG&E service.

Operations and Maintenance

Utility operations and maintenance for the Visitor Center will include routine drinking water treatment and testing in the water treatment building, periodic testing of fire suppression water levels, periodic testing of the emergency fire pump and generator, and routine refueling of propane storage tanks. The septic tank will likely need to be pumped every three to five years. The pump screen in the septic tank will be cleaned annually. The Orenco system will be visually inspected quarterly, and will alarm if immediate maintenance is required. The operation of the system should be verified by the operator on a regular basis. The LID stormwater retention basins, parking lots and culverts will be managed and cleared of debris as needed. Interpretive signage will be maintained and updated as needed in the Visitor Center area to enforce food restrictions to protect Marbled Murrelet from corvids that are attracted to food crumbs and debris. Interpretive signage will also inform the public of the potential presence of large mammals known to occur in the Project vicinity, such as Roosevelt Elk, Mountain Lion and Black Bear, and to discourage feeding, close approach, inappropriate behavior, or other negative interactions. Vegetation maintenance to promote the establishment of native flora and to limit the establishment of non-native plants will be implemented through mechanical and chemical means. The southern ditch widening area will be maintained as necessary to limit bank erosion and to ensure that vegetation does not obstruct flow in order to protect infrastructure including Highway 101, Bald Hills Road, and the Visitor Center. Trash and recycling will be collected on a weekly basis by Humboldt Sanitation. Aesthetic maintenance, cleaning and interpretive program management will be conducted by staff as needed.

2.6.2 California Coastal Trail

The CCT is a network of public trails for walkers, bicyclists, equestrians, wheelchairs and other non-motorized users along the 1,200-mile California coastline. The Project will create a new approximately 1.3 mile section of the CCT from the Project entrance gate to the trail terminus at Berry Glen. The CCT terminus is at the intersection with the existing Berry Glen footpath. Hiking, bicycling, and equestrian use will be welcome on the Project’s portion of the CCT. Wheelchairs will be able to access the Americans with Disabilities Act (ADA) accessible segment of the CCT from the Visitor Center to and including the Canopy Walkway.

Construction

The CCT will be constructed from the Visitor Center entrance gate, through the former Mill site, and will utilize the footprint of the existing Upper Road to its terminus at Berry Glen. ADA accessibility will require earthwork (cutting and filling) and grading to create the maximum five percent grade required for ADA compliant pathways to the Centennial Tree (see Figure 2-3 and Sheet 1-1 Volume Regions in Appendix A). The ADA portion of the CCT will be 16 feet wide. Construction of the CCT at the base of the existing Upper Road will require the removal of approximately 20 to 30 coast redwood trees with dbh of 12 to 18 inches. This location is fairly steep, and significant earthwork and grading will be required at this location to create the relatively flat ADA accessible conditions. The portion of the CCT that is not ADA accessible, will remain in its current paved state and will serve as a less developed portion of the CCT. The earthwork involved in construction of the CCT is discussed in Section 2.7.3.

The Upper and Lower Roads intersect approximately 1,750 feet north of the Visitor Center. During construction of the CCT, landslide debris on and above the Upper Road will be removed from a vulnerable portion of the hillside north of the Canopy Walkway. This area will be stabilized through vegetation planting and stormwater improvements to limit erosion through removal of existing improper flow pathways, and to maintain shear strength and integrity. Stormwater improvements will include approximately five to eight culvert and up to four cross drain replacements. Some specific culvert replacement locations are already determined and shown in Figure 2-3, including the culvert replacement at the Lower and Upper Road intersection, at the unnamed tributary, and at Otter Creek. In addition to the above-mentioned replaced, four to six new culverts may be installed. The culvert and stormwater improvements may require the removal of approximately 10 to 15 trees with 8 to 16 inch dbh. Species of trees to be moved include red alder, Sitka spruce, Douglas-fir, and coast redwood. Remaining culvert replacement locations will be determined by a road assessment.

A variety of interpretive elements will be installed along the CCT including panels, displays and artistic renderings of coast redwood forest ecology. Panels will be installed utilizing concrete footings and metal posts. A series of metal posts will be installed on both sides of the CCT between the Visitor Center at a distance of 380 feet, symbolizing the height of a coast redwood tree.

Operations and Maintenance

The CCT will be maintained regularly to provide a safe and visible pathway between the CCT terminus at Berry Glen and the entrance gate. Routine operations and maintenance will include clearing and maintaining stormwater ditches and culverts along the trail, clearing seasonal debris, trimming back vegetation along the trail, maintaining safe public access, repairing or replacing equipment as needed, vegetation management to control non-native plants, cleaning signage, and remedying any vandalism to signage. Vegetation management will consist of manual methods including hand pulling and use of power equipment, and chemical treatments when necessary, including the use of herbicides.

2.6.3 Canopy Walkway

Construction

The Canopy Walkway construction footprint will result in approximately 30,000 square feet of disturbed area including 20 feet on either side of the walkway, the location of the concrete abutments, and the area of the Upper Road to be regraded for accessibility. To construct the walkway and create the desired views, approximately 20 to 30 trees with dbhs of 8 to 16 inches will be removed including alder, coast redwood, and Sitka spruce. The earthwork involved in construction of the Canopy Walkway is discussed in Section 2.7.3.

The Canopy Walkway construction site will be accessed from Highway 101 using the Lower Road and the proposed CCT (currently serving as the existing Upper Road) via the Highway 101/Bald Hills Road intersection approximately 650 feet south of the Centennial Tree. During construction, the proposed CCT segments and Lower Road will be used for staging and construction access.

Design Layout

The Canopy Walkway will be designed and constructed to allow visitors to view the Centennial Tree, Prairie Creek restoration, and adjacent forests from a unique perspective. The Canopy Walkway will connect to the proposed new segment of the CCT. The new segment of the CCT will traverse the Project Area along the existing Upper Road. The Canopy Walkway will connect to the CCT in two locations to form a loop heading west from the CCT to a viewing platform and then back east to the CCT. The Canopy Walkway will be approximately 16 feet wide and 300 feet long. It will slope five percent maximum in gradient with two percent maximum cross slopes. The overlook platform will be up to 2,000 square feet in size with a height of approximately 52 feet above the base of the tree on the downslope side of the trunk and approximately 37 feet above the base of the tree on the upslope side. The walkway will be approximately 30 to 40 feet above the Lower Road, thereby allowing emergency and maintenance vehicle access along the road. At its closest location, the viewing platform will be 15 feet east of the Centennial Tree trunk. See Figure 2-3 for the Canopy Walkway location.

Earthwork regrading will be required at concrete abutment headwalls, which will connect the Walkway to the CCT. The CCT may also need to be regraded to maintain a five percent maximum longitudinal gradient to meet ADA accessibility standards without handrails. The width of the Lower Road will remain the same, with the addition of the ADA accessible trail, allowing for emergency and maintenance vehicle access or Canopy Walkway servicing. The viewing platform, Canopy Walkway, and CCT will include visitor interpretive elements.

Structural Systems

The concrete abutments that will connect the Walkway to the CCT will each be approximately 30 to 35 feet long. The abutments will likely be constructed with concrete walls, concrete footings, and a concrete surface pedestrian landing. The concrete abutments will be installed on the Upper Road (proposed CCT) with each installed along the roadway on the eastern side of the Centennial Tree. Future ingress and egress access on the Lower Road will be maintained. The handrails and guardrails will be constructed of Corten steel or painted galvanized steel.

The walkway structure will likely be constructed of painted steel beam support structure, Corten steel or painted galvanized steel guardrails and wood planks.

The walkway will likely be supported by painted steel columns, approximately 15 feet on center that will sit on 18-inch diameter concrete piers. There will be approximately 35 piers and columns. The closest pier to the Centennial Tree will be approximately 20 feet from the main trunk.

Operations and Maintenance

The Canopy Walkway will be accessed from the main trail leaving the Visitor Center and connecting to the CCT. After visiting the Canopy Walkway, visitors could either continue north along the north segment of the CCT or return to the Visitor Center. The Canopy Walkway will be ADA compliant. Bicycle access on the Canopy Walkway will not be allowed. Bike racks will likely be located at the entrance to the walkway.

The Canopy Walkway will be open to visitors during daylight hours when the Visitor Center is open. Operating hours will be clearly posted. The Canopy Walkway will not be staffed, although staff- led tours will likely be provided during busy tourist times or by special request.

The Canopy Walkway will be periodically inspected to ensure structural stability and a hazard free walkway. The surface will be maintained to remove litter and tree debris that could cause slippage accidents.

Interpretive signage will be provided to communicate redwood forest ecology, the restoration of Prairie Creek, and other points of interest. Signage will also be installed indicating the prohibition on outdoor food to protect Marbled Murrelet from corvids that are attracted to food crumbs and debris. A bench will be installed at or near the Canopy Walkway. Maintenance and emergency access will be via the Lower Road connection to Highway 101. An alternate emergency access to the Visitor Center will be via the Lower Road from Highway 101 to the CCT, south of the Canopy Walkway.

2.6.4 Yurok Demonstration Site

The Redwood Creek watershed, of which Prairie Creek is an integral component, is within ancestral lands of the Yurok Tribe. Historically, Prairie Creek has produced abundant salmon and has been a significant and highly regarded resource to the tribe. The installation of a Yurok Demonstration Site will enable the Yurok Tribal people and other visiting tribes to practice their indigenous cultural dances and ceremonies on Yurok ancestral land, which will facilitate greater preservation of the tribes' heritage.

Construction

The Yurok Demonstration Site could include the following structures, each accompanied by a fire pit:

- Sweat house,
- Dance house,
- Cook house,
- Yurok Men's house,
- Yurok Women's house,
- Visiting tribes Men's house, and
- Visiting tribes Women's house.

The cookhouse will be the only structure with a foundation. The remaining structures will have earthen floors. The footprint of all structures combined will total less than 5,000 square feet. An approximately 200-foot long trail will be constructed between the sweat house and Libby Creek. Prior to construction of the structures and trail, an average of two to five feet of fill totaling up to 8,000 cy will be placed on the site to raise the elevation. The Yurok Demonstration Site will be accessible by vehicles. However, vehicle use will only be for maintenance and for access during tribal events.

Interpretive elements will be installed describing the significance of the ceremonies on ancestral land to the Yurok people, as well as other relevant information about the Yurok people and their connection to the region. Utilities, including domestic water, fire water, sewage treatment (with pumping) and electricity may be installed to the site.

Currently, the Lower Road extends north beyond the Yurok Demonstration Site and connects to Highway 101. As a component of the Project, the Lower Road will be converted to an ADA accessible trail that will continue past the site as shown on Figure 2-3 and Sheet 1-1 Libby Creek/Yurok Site Conceptual Design in Appendix A. The portion of the Lower Road that will be converted to the ADA accessible trail will be excavated to the elevation of the wetlands located immediately to the west, and will be re-contoured to the height of the cut bank to the east. The trail will cross over Libby Creek over the proposed newly installed culvert. The trail will extend beyond the Canopy Walkway. The northern extent of the Lower Road, between the terminus of the trail and Highway 101, will be left in the current condition. No trees will be removed between the intersection with the CCT and Highway 101.

Operations and Maintenance

The Yurok Demonstration Site will be used for community event and interpretive purposes. The Site may also be infrequently used for special events by the Yurok Tribe and other visiting tribes (approximately four 4-day events per year). The site may be open to the public as agreed upon with the tribe; the ADA accessible trail will bypass the site. If desired a gate will temporarily prevent access to trail users during special events. During any special event at the site, it is anticipated that up to 100 people could participate in events. Food preparation will take place indoors within the cookhouse with the exception of traditional foods which may be prepared outside during ceremonial dances or other events. Outdoor food restrictions will be enforced through signage and staff patrols during all non-ceremonial times to protect the Marbled Murrelet from corvids that are attracted to food crumbs and debris. There will be routine building repairs to the structures throughout their lifespan. Vegetation management at the site will likely be conducted regularly to prevent the re-establishment of Himalayan blackberry (*Rubus armeniacus)* and other invasive plants, and to encourage the establishment of native vegetation.

2.6.5 Prairie Creek Restoration

Salmonid History and Context

Three salmonids federally and/or state listed as threatened or endangered under the federal and state Endangered Species Act will benefit from the restoration of Prairie Creek: Southern Oregon/Northern California (SONCC) Coho Salmon, California Coastal Chinook Salmon, and Northern California Steelhead (*Oncorhynchus mykiss*). Coastal Cutthroat Trout (*Oncorhynchus clarki clarki*), a California Department of Fish and Wildlife (CDFW) species of special concern, will also benefit from the proposed restoration. As mentioned in Section 2.2 – Existing Conditions much of the Prairie Creek watershed is contained within RNSP and provides high quality salmonid habitat.

The National Marine Fisheries (NMFS) considers the Redwood Creek population of SONCC Coho Salmon to be at a high risk of extinction, due to a lack of floodplain and channel structure and impaired estuarine/mainstem function (Wilzbach and Ozaki 2017). Within the Redwood Creek population, Prairie Creek is the most important habitat for Coho Salmon (NMFS 2014). Prairie Creek is considered a stronghold for Coho Salmon and produces most of the Coho Salmon (and cutthroat trout) within the Redwood Creek basin (Brown 1988 in Wilzbach and Ozaki 2017). This has been attributed to the lower gradient habitat and cooler water temperatures than are present elsewhere in the Redwood Creek basin and greater availability of habitat in nearly pristine condition in RNSP land. Coho Salmon were once abundant in Prairie Creek; Hallock et al. (1952) seined 9,610 juvenile Coho Salmon from Boyes Creek and an unnamed tributary of Prairie Creek in 1951. More recently, Drobny (2016) estimated a juvenile density of Coho Salmon in Prairie Creek in late summer 2014 to be 0.52 fish per square meter, which is a much lower density than was observed in 1951.

California Coastal Chinook Salmon also utilize Prairie Creek. Historically Coho Salmon were six times as abundant as Chinook Salmon in Prairie Creek (Briggs 1949 in Wilzbach and Ozaki 2017). The number of estimated returning Chinook Salmon adults has decreased over time. In 1960, approximately 2,000 adults were estimated to return to Prairie Creek and lower Redwood Creek based on extrapolation from Eel River returns (USFWS 1960 in Wilzbach and Ozaki 2017). Duffy (2011) compiled escapement estimates between 1999-2008 for Chinook Salmon and reported a high value of 710 adults in 2002, and a low of 38 adults in 2008. Prairie Creek is an unusually small stream to support spawning by Chinook Salmon, as they typically prefer areas of comparatively greater flow (Briggs 1953 in Wilzbach and Ozaki 2017).

A diminishing number of summer-run Steelhead are also found in the mainstem of Redwood Creek (Wilzbach and Ozaki 2017). Although not a basin-wide estimate of adult Steelhead abundance, Duffy (2011) found four to 142 adult Steelhead annually in Prairie Creek between 1999 to 2011, with an average of 40 adults per year (Save the Redwoods League 2016).

As of 2015, the Coastal Cutthroat Trout has been considered a species of special concern (SSC) by CDFW. Van Kirk (1994) suggests that sea-run Coastal Cutthroat Trout were very abundant in the Prairie Creek watershed during the late 1800s and early 1900s, and that their numbers have since declined considerably. They were determined to be overfished by sport anglers by 1925, and populations declined further in response to habitat degradation during the 1950s and 1960s (Gerstung 1997 in Wilzbach and Ozaki 2017). More recently, Duffy and Bjorkstedt (2008) reported that northern California Coastal Cutthroat Trout populations appear to be stable. The Prairie Creek watershed supports nearly all of the Coastal Cutthroat Trout production in the Redwood Creek basin (Wilzbach and Ozaki 2017).

Goals for Prairie Creek Restoration

The habitat improvements associated with this component of the Project will support life history diversity, bolstering SONCC Coho Salmon, California Coastal Chinook Salmon, Northern California Steelhead, and Coastal Cutthroat Trout population resilience to environmental stressors, including climate change.

The goals of this Project component include:

- Provide slow water winter rearing habitat for overwintering salmonids;
- Provide large wood structures to create geomorphic complexity, provide in-channel roughness to increase floodplain access, and to provide cover for summer and winter rearing juveniles and holding/migrating adult salmonids;
- Improve access to the native wetland to the east of the main channel through improved connectivity for salmonids between the floodplain, native wetland, main channel and backwater channels;
- Remove invasive non-native plant species and discourage future re-establishment;
- Utilize topographic variability to support aquatic or near aquatic plant assemblages to increase native wetland, emergent, and riparian vegetation area; and
- Arrange planting materials to form the primary components of wildlife and fish habitat and the basis of large wood and detritus that could be utilized by benthic macroinvertebrates.

Lower Prairie Creek will be improved by transitioning from an incised channel and disconnected floodplain to a connected system of wetlands, riparian habitat, spruce-dominated upland vegetation, backwater braided channels, an interconnected floodplain with tributary and off-channel habitats, large wood structures, and instream riffles and pools. Design objectives will be achieved by elevating the stream bed to reactivate floodplain connectivity and wetland functions within lower Prairie Creek, modified topography to create additional wetlands and to provide upland habitat reinforcements, and riparian vegetation enhancement. Impacts to wetlands, waters and riparian habitat will be mitigated onsite. The extent and quantity of wetlands, and waters onsite have been determined through formal wetlands delineation according to USACE standards and was verified by the USACE. Riparian vegetation and other sensitive plant communities have been mapped as part of ongoing technical studies to support CEQA and the restoration design and permitting and is discussed in Section 4.4 – Biological Resources. Overall, the Project will result in a substantial net benefit to special status fisheries habitat quality and quantity within the Project Area, as well as significantly enhanced ecosystem functions throughout the Prairie Creek corridor.

Construction

The Prairie Creek channel will be realigned and high elevated ground lowered to improve floodplain connectivity, instream habitat for special status salmonids and other aquatic species, and geomorphic function. The new channel alignment will be located further away from Highway 101 to increase opportunity for floodplain and aquatic habitat creation and with reduced risk to the Highway 101 road prism (NHE 2018a, NHE 2018b). Construction of a series of side channels and interconnected backwater channel features will offer greater habitat complexity and improved connectivity between Prairie Creek and the floodplain over a broad range of flows and particularly during flows likely to support juvenile rearing, which is a limiting factor for Coho Salmon (NMFS 2014). Fluvial and habitat connectivity to Skunk Cabbage Creek, and Libby Creek will also be enhanced (See Figure 2-3). Channel realignment will require filling much of the existing Prairie Creek channel and excavating new channels. Large woody debris (LWD) will be installed in the channels and floodplain to improve habitat complexity and offer juvenile fish greater opportunities to escape predators. LWD will be installed strategically, utilizing a passive anchoring approach to retain the integrity of the wood structure without the use of bolts or cables. Passive anchors use the weight and shape of the structure itself to provide resistance to movement. Trees or other large LWD will be inserted perpendicular to the stream channel, and other woody debris will be inserted adjacent and diagonal to the anchor piece, thereby pinning the wood structure together in order to stay intact during large flow events. Wood structures will be installed using a vibratory driver and/or heavy equipment.

To implement the construction of this Project component, the Prairie Creek and Skunk Cabbage Creek channels will be temporarily disconnected from their upper and lower reaches as appropriate, and streamflow will be bypassed around the construction area. The isolated creek sections will then be dewatered, and all fish within the sections will be relocated. Dewatering equipment including pumps will remain onsite and utilized as needed to ensure that the construction zone remains dry. Prairie Creek is expected to be dewatered at the uppermost and lowermost section within the Project Area, and Skunk Cabbage Creek is expected to be dewatered within the Project Area, or at the downstream side of the Highway 101 culvert (and pumped via a pipe and fish screen netting on the upstream side of the culvert). No disturbance will occur on the upstream side of the Highway 101 culvert on Skunk Cabbage Creek. Dewatering equipment includes (but is not limited to) coffer dams, sand bags, fish screens and pumps. All dewatering, fish relocation and stream bypassing will be undertaken in consultation with the National Marine Fisheries Service (NMFS) and the CDFW and consistent with state and federal take permit requirements under the state and federal Endangered Species Acts.

Significant earthwork will be needed to excavate new channels and floodplain features, fill old channels, and to create topographical modifications to account for drainage retention, emergent wetland and riparian vegetation restoration and improved salmonid habitat. Earthen fill sourced from the excavations will be stored and processed within the existing asphalt and concrete pad to be used as fill and top soil in the greater Project. In the location where the old channel is filled and juxtaposed to the new channel, remnant channel plugs will be installed. This will consist of select compacted fill material, large rock, and/or a vinyl or PVC sheet pile wall which will be installed by vibratory driving or by pushing it in by heavy equipment, to be in place as a permanent feature. The compacted fill, rock, and/or sheet pile wall will prevent head cutting and/or erosion and prevent reestablishment of the old channel. The downstream portion of Skunk Cabbage Creek located within the Project Area may be widened and realigned, which will include excavating and filling, to improve hydrologic exchange. The reed canary grass located in the drainage ditch between the Libby Creek wetlands and Prairie Creek, and all other encountered reed canary grass onsite or other target invasive vegetation including western manna grass (*Glyceria x occidentalis*) and Himalayan blackberry (*Rubus armeniacus*), will be removed (see Section 4.4 – Biological Resources for a description of invasive vegetation removal). Once construction is completed, the upstream channels will be reconnected with the newly constructed Prairie Creek channels to drain into Redwood Creek. A small structure, approximately 4 by 4 by 7 feet, will be built near the stream in order to house water quality monitoring instruments, and stream gauging equipment. Staff plates and piping (stilling wells) will be installed between the structure and the creek channel in order to house equipment sensors in the creek, or to provide continuous creek samples for the water quality instruments within the structure (if deemed feasible). A cableway will also be constructed over the creek channel to obtain discharge and other water quality samples during high flows when wading is not possible. The cableway will consist of two small A-frames sitting on or in concrete footings on the top of bank on each side of the creek channel and anchored by concrete blocks if needed. A cable will be suspended between both A-frames and sampling equipment will be deployed from the cable. Earthwork associated with this component of the Project is discussed in detail in Section 2.7.3.

Following the earthwork, the Prairie Creek Restoration area will be revegetated with native species including woody riparian species such as willow (*Salix spp*.) and alder, and the floodplain will be revegetated with conifers such as Sitka spruce and coast redwood, shrubs such as oceanspray (*Holodiscus discolor*), and numerous wetland species such as rushes (*Juncus spp.),* sedges *(Carex spp.),* native grasses, and hardstem bulrush (*Schoenoplectus acutus*) species. A complete revegetation species list will be completed during the permitting process. Plant cages or exclusion fencing may be installed around native vegetation plantings to limit ungulate browsing and other pressures.

Operations & Maintenance

To ensure the long-term viability of the reconstructed stretch of Prairie Creek, operations and maintenance measures will be implemented as required by permit conditions. Vegetation management will be implemented to limit the establishment of non-native vegetation, and to promote the establishment of native flora species. Non-native vegetation control will include mechanical means such as hand pulling, the use of machinery such as mowers, weed eaters, or a small backhoe, and chemical means such as the use of herbicides, compliant with permit conditions. Herbicides will not be applied directly over water and will be applied in compliance with the *Invasive Plant Management Plan and Environmental Assessment for the Redwood National Park and Santa Monica Mountains National Recreation Area*, October 2017 and the Invasive Plant Management Plan (GHD 2019d) attached as Appendix F. Herbicides will be applied in wetlands, floodplains and creek areas, but only when there is no standing water under the area of application (i.e., wetlands will not have standing water and application will occur in summer or fall). Native vegetation may need to be replaced or replanted if initial attempts are unsuccessful. Vegetation may need periodic trimming to facilitate topographical surveys or other monitoring efforts. A native plant nursery may be installed onsite within a one to two acre fenced area. The nursery will produce the initial and recurring maintenance vegetation to be planted within the Prairie Creek Restoration area and the Libby Creek Enhancement area (described below). The nursery location has yet to be determined, however it will likely be located on the existing paved surface at the former Mill Site. Electricity will be provided from the Visitor Center site. Irrigation lines will be sourced from the drinking water well supply on site. Fire management (controlled burns) may be implemented as a means to promote the success of native plant species, and to promote prairie conditions within the floodplain. Erosion control fabric may require replacement or additional securing following Project implementation.

Sediment removal in mainstem Prairie Creek is unlikely to take place because this component of the Project is being designed to be more dynamic and adjust over time to natural stream processes such as channel deposition of sediments. However, should sediment removal be necessary to maintain the hydrologic health of the ecosystem, it will include dredging instream sediment from wetted areas. Sediment removal from the side channels is not anticipated but may be implemented. See Section 4.10 – Hydrology and Water Quality for a discussion of potential sediment removal. Measures including limiting bank erosion and remedying problematic log jams may be implemented to protect infrastructure including Highway 101, Bald Hills Road, and the Visitor Center. A monitoring program will be implemented to measure the success of the wetland and riparian agency-required mitigation planting. This monitoring program will be detailed in a Habitat Mitigation and Monitoring Plan (HMMP), to be developed during Project permitting and will include performance and success criteria. See Section 2.8.1 for additional information on monitoring. Operations and maintenance of the Prairie Creek Restoration area will be conducted by a task force comprised of agency representatives, landowner staff, non-profit organizations and volunteers.

2.6.6 Libby Creek Enhancement

Libby Creek is a perennial stream that originates in RNSP land east of the Project Area and drains west into the wetlands within the historic Prairie Creek floodplain. A concrete impoundment within Libby Creek on RNSP property approximately 100 feet east of the existing Upper Road currently restricts streamflow and has resulted in sediment accumulation upstream of the impoundment. The lower approximately 500 feet of Libby Creek is located in the historic Prairie Creek floodplain and is believed to be utilized by salmonids. The portion of Libby Creek east of the Brush Dance Ceremonial Site and upstream of the impoundment has a gradient too steep for salmonids to access and utilize. The goals of the Libby Creek Enhancement are to reconnect Libby Creek to the historic Prairie Creek floodplain and to restore natural processes in the drainage.

Construction

Up to 700 feet of the Libby Creek channel will be enhanced through excavation, daylighting, and removal of the upstream impoundment. Salmonid habitat enhancements including instream wood features will be installed in the downstream portion of Libby Creek. Currently, Libby Creek runs underneath the Upper Road (proposed CCT) and Lower Road through culverts. These culverts will be replaced with open bottom culverts to accommodate the new Libby Creek alignment, the Upper Road (proposed CCT) and Lower Road improvements. The small instream concrete impoundment will be removed, and the built-up sediment will be excavated and utilized as fill for the Project's earthwork. Fill will be excavated from Libby Creek and the adjacent banks to reconnect Libby Creek with the existing Prairie Creek floodplain. No excavation work is proposed on lower Libby Creek outside of the disturbance extent (see Figure 2-3 and Sheet 1-1 – Libby Creek/Yurok Site Conceptual

Design in Appendix A). See Section 2.7.3 for a description of the earthwork associated with constructing the Libby Creek enhancements.

Interpretive elements will be incorporated into the site to explain the hydrological and biological significance of the enhancements.

Operations and Maintenance

Routine maintenance will include clearing out the bottom of the open bottom culvert, especially following storms, and vegetation management to promote native species and limit non-native vegetation. Manual vegetation management will be implemented including hand pulling and use of equipment, chemical vegetation management including the use of herbicides may also be utilized. When necessary, problematic debris jams located downstream of the open bottom culvert that could cause on-site flooding or erosion will be cleared out of the Libby Creek channel.

2.7 Project Implementation

2.7.1 Project Construction

Construction Duration and Hours

Construction and demolition activities will occur from approximately 2021 to 2024 or 2025. Anticipated work hours will be 7am to 7pm Monday through Friday and 8am to 6 pm on Saturdays, unless limited by Project mitigation measures found in Section 4 of this document. During dewatering activities within the Prairie Creek Restoration, pumps will be operated constantly.

2.7.2 Site Access and Staging Locations

Project Area Access

The Project is accessible from Bald Hills Road, approximately one-quarter mile east of the Bald Hills Road/Highway 101 intersection. The site entrance will have an entrance gate, informational kiosk, and an after-hours exit gate allowing visitors to leave the site but not re-enter. A shuttle system may transport visitors between the Visitor Center and Lady Bird Johnson Grove, located approximately two miles east of the Project Area along Bald Hills Road. A Traffic Impact Study has been completed for the Project and is included in Appendix O of this ISMND. Section 4.17 – Transportation includes a detailed description of the existing conditions for traffic and site access and of the potential Highway 101/Bald Hills Road intersection improvements.

The secondary and emergency access route into the Project site will be via the Lower Road, which intersects with Highway 101 approximately two miles north of Bald Hills Road. The segment of the Lower Road between the Visitor Center and approximately 375 feet north of the Canopy Walkway will be converted to an ADA accessible trail, connecting to the Upper Road, resulting in a loop from the Visitor Center (See Figure 2-3, Appendix A).

Construction Access

General construction site access will be through the main site entrance gate and through a secondary access point approximately 50 feet west of the existing entrance gate on Bald Hills Road. An additional construction access roadway exists between the Prairie Creek Restoration Area and the Lower Road slightly northwest of the Canopy Walkway.

Construction Equipment and Staging Locations

Construction materials include building materials and soil/fill material. Construction materials will be staged outside of the Prairie Creek floodplain and at the IRA within the Mill footprint. Excavated material such as soil, gravel and rock will be utilized within the Project footprint and will be temporarily staged within at IRA within the Mill footprint for use in various components of the Project. Earthwork is further discussed in Section 2.7.3.

A variety of construction equipment will be used to build the Project. This will include excavators, drill rigs, backhoes, front end loaders, crane, drill rig, scrapers, graders, concrete saws, cranes, hammer excavator attachments, vibratory driver, winches, chainsaws, fork lifts, rollers, scrapers, asphalt road pavers, tractors, compactors, air compressors, chippers, hydromulcher, drill rig, generator sets, and pneumatic tools. A variety of trucks including cement mixers with the capacity to pour, haul trucks, dump trucks, and water trucks will also be required. Site preparation, including demolition, clearing and grading of the Project Area as necessary will require the removal and off-haul of materials. This will include, but not necessarily be limited to, vegetation, concrete, asphalt and fill, and certain existing utilities that will be removed and replaced.

Site Preparation

Salvageable materials, such as redwood lumber, were saved from previous demolitions and are stored onsite for reuse as components of the Project. The Mill Site foundation and the barn foundation (anticipated to amount to 3,640 and 320 cy, respectively) will be jack hammered and removed. Foundation materials will either be reused onsite, staged for another entity to use, or disposed of at an appropriate waste facility offsite. Four power poles, located with the Prairie Creek Restoration Area footprint, will be removed. Two of the power poles are owned by PG&E and contain electrical wires and other electrical infrastructure. The other two power poles are customer-owned poles and do not contain electrical wiring or infrastructure. Coordination with PG&E regarding these poles is ongoing. A variety of fencing structures will be removed in preparation of the Project. This includes barbed wire fencing at the Lower Road area, chained link fencing at the Southern Drainage Ditch area adjacent to Bald Hill Road, and agricultural fencing in the Prairie Creek Restoration Area footprint located near the barn foundation. Fencing material will be hauled off the site for reuse or to an approved landfill.

2.7.3 Earthwork

Successful implementation of the six Project components will require a significant amount of earth moving. In total approximately 328,900 cy of material will be relocated within the Project Area as a result of Project implementation. Some fill material (up to 21,000 cy) will likely need to be imported consisting of 16,300 cy of gravel for Prairie Creek, 4,500 cy of aggregate base for the Visitor Center and 300 cy of gravel for Libby Creek. Overall, cut (excavation) plus up to 21,100 cy of import are anticipated to equal the fill volumes. The earthwork associated with each component of the Project is summarized below.

Visitor Center

The former Orick Mill was built upon approximately 105,000 cy of river run gravel which will remain onsite and be left in-place or used as fill material for other Project component, as necessary. Up to approximately 108,200 cy of fill, comprised of: up to 103,100 cy of fill from the Prairie Creek Restoration area, and up to 4,500 cy of imported materials, will be used at the Visitor Center site to raise the current elevation. The area will be graded in accordance with the construction grading plans. The ERA (within the Visitor Center footprint) will serve as a stormwater management area and native vegetation enhancement area. Up to approximately 3,200 cy of materials will be cut and up to approximately 37,400 cubic yards of fill will be added in the ERA to increase the elevation, resulting in a net gain of approximately 34,200 cy of fill in this area. The IRA (located between the Visitor Center and Prairie Creek Restoration areas) will also serve as a stormwater management area. Up to approximately 24,200 cy of material will be cut and up to approximately 42,000 cy of fill material will be added to the IRA, resulting in a net gain of approximately 17,800 cy of fill in this area.

California Coastal Trail

Up to approximately 5,300 cy of material will be cut and up to 12,300 cy will be filled within the CCT footprint, resulting in a net increase of approximately 7,000 cy of fill. The CCT will be ADA accessible up to the intersection with the Lower Road and therefore a grade of no more than five percent will need to be constructed and maintained throughout the entirety of the ADA trail between the entrance gate and the intersection with the Lower Road wherever feasible. Slight deviations may be included in accordance with applicable design standards. To account for this requirement, the CCT will need to be graded to create a relatively flat pathway.

Canopy Walkway

Minimal earthwork will be required to construct and implement the Canopy Walkway to place footings. Approximately 20 to 30 Sitka spruce, alder, and young redwood trees will be removed during construction in order to install the Canopy Walkway and to create a viewshed of the Prairie Creek Restoration area from the Canopy Walkway. The removed trees will be used in the Prairie Creek restoration. The area where trees will be removed will require minimal grading. Limited earthwork and grading will also take place on the proposed CCT to support the installation of the Canopy Walkway, and will balance within this site. No substantial (up to 1000 cy) of fill or cutting is expected.

Yurok Demonstration Site

The Yurok Demonstration Site will be predominantly filled, utilizing available excavated material sourced onsite. The site will be filled with up to approximately 8,000 cy of earthen material to raise its current elevation. Any remaining earthen material will be utilized in the Visitor Center site or for CCT construction.

Prairie Creek Restoration

Up to approximately 239,300 cy of material will be excavated from the Prairie Creek Restoration Area, and up to approximately 120,000 cy of this material will be utilized as fill and graded within the restoration area. The remaining fill material will be utilized at the Visitor Center site or for CCT construction, or other Project component sites. Up to approximately 16,300 cy of gravel may be imported to be placed in the newly over excavated channel.

Libby Creek Enhancement

Up to 35,800 cy of cut material will be excavated from the Libby Creek banks and floodplain and along the adjoining Lower Road, and up to approximately 1,000 cy will be filled in this area. Most of the removed fill material will consist of river run gravel, road base, and soil. The excess cut material will be used as fill for the Visitor Center, Yurok Demonstration Site, or other Project component areas. If appropriate gravel and boulder material cannot be generated on-site to construct the Libby Creek channel, up to approximately 300 cy of channel bed material may need to be imported.

2.7.4 Energy Usage and Conservation

The Project Area will be powered through PG&E, and if feasible also by photovoltaic panels as discussed in Section 2.6.1. The Project aims to achieve a high level of energy efficiency, consistent with design standards for new facilities managed by state or federal agencies. Should photovoltaic panels be feasible, they will be installed on the south facing roof of the Visitor Center building. The Visitor Center building will be built as an energy efficient building and will passively generate light and heat, and will therefore require less energy to operate the building than conventional buildings. An emergency generator will be located in the Utilities Infrastructure area, to be powered by propane in the event of a power outage.

2.7.5 Construction Schedule and Duration

The construction of the Project components will be sequenced to make the best use of the site's materials and staging locations. Sequencing of the Project is as follows:

- Removal of concrete foundation at former Mill Site and barn to be stored onsite and/or disposed of off-site and site grading (2020-2021)
- Visitor Center Project construction (2021-2024)
- Prairie Creek Restoration Area Implementation (2021-2024)
- Canopy Walkway construction (in the future as funding is secured)
- California Coastal Trail implementation (2022-2024)
- Libby Creek Enhancement Project implementation (2022-2024)
- Yurok Demonstration Site construction (2022-2024)

2.8 Post-Project Implementation Monitoring and Management

2.8.1 Restoration Monitoring

To measure the success of the Project's restoration components, a long-term monitoring program will be implemented, which will be detailed in the forthcoming HMMP to be developed, including performance and success criteria, during Project permitting. Independent of the HMMP, a Mitigation Monitoring and Reporting Program (MMRP) will be developed and will include a list of the mitigation measures proposed in this ISMND, a schedule of implementation for each measure, and potential monitoring required of each measure. The MMRP may include some measures relating to restoration components of the Project, however its purpose is to concisely list the mitigation measures derived from this document that will reduce potential impacts from the entire Project under CEQA. Whereas the HMMP will contain monitoring elements and success criteria as determined by resource agencies during Project permitting. The restoration components of the Project that will be monitored include the Prairie Creek Restoration Area, Libby Creek Enhancement, the ERA native revegetation area, and the Southern Drainage Ditch channel widening area. Project monitoring will be conducted in full compliance with all permits including but not limited to Clean Water Act (CWA) Section 401, Section 404, and the California Department of Fish and Wildlife (CDFW) Lake and Streambed Alteration

Agreement. Potential impacts associated with monitoring are discussed in Section 4.4 – Biological Resources and 4.10 – Hydrology and Water Quality.

2.8.2 Adaptive Management Program

Ongoing operations and maintenance activities will be necessary to assure long-term safety, geomorphic, and ecological functions of the Project. The facilities to be maintained include the Visitor Center parking lots, pathways, exhibits, infrastructure, trails, Canopy Walkway, CCT, Yurok Demonstration Site, stormwater management areas, Southern Drainage Ditch, stormwater ditches, culverts, invasive species, waterway channels, sediment removal and bank stabilization, and native vegetation management. Designated areas may require vegetation removal, ongoing planting and/or repeated excavation or reworking of deposited sediments. Establishing a formal and predictable structure of ongoing maintenance is fundamental to preserving the long-term social and biological integrity of the Project.

An Adaptive Management Program (AMP) will assist managers in responding to unanticipated changes to Project components including hydrology, sedimentation, target habitat development, or species' response along the restoration trajectory (NRC 2004). The detailed AMP will be prepared by the Project applicant during Project permitting and will be included as an Appendix to the HMMP. The Redwood Creek watershed, of which Prairie Creek is an integral component, is situated in a rugged and remote region of California which contains a combination of relatively active tectonic regimes, high frequency of road failures and high rates of annual precipitation. These characteristics may affect the Project in unintended ways. An AMP is the most effective and flexible management tool for coping with the challenges that may arise during long term operation of the site. These challenges include, but are not limited to:

- Flooding which may significantly modify topography of the Project Area which has the potential to damage infrastructure which will need to be corrected to fix or protect infrastructure;
- Substantial colonization by invasive species which will require effort above and beyond what is anticipated for routine operations and maintenance of invasive species;
- Occurrence of natural disasters which cause isolation of Project Area;
- Sediment removal in backwater features or the floodplain;
- Repair of the remnant channel plug;
- Incision of Prairie Creek channel, which will require grade control structures.

2.8.3 Emergency Response

The Project Area has two points of vehicular access. The Visitor Center entrance gate off of Bald Hills Road will serve as the primary point of entrance to the Project Area. A secondary access point is located on the Lower Road off of Highway 101, and will intersect with the CCT (Upper Road).

The closest medical care facility to the Project Area is the United Indian Health Services in Klamath, located 20 miles north via Highway 101. The closest hospitals to the Project Area are Mad River Community Hospital in Arcata, located 33 miles south via Highway 101 and Sutter Coast Hospital in Crescent City, located 41 miles north via Highway 101.

2.9 Cumulative Impact Projects

Cumulative impacts are defined as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts” (CEQA Guidelines Section 15355). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The following agencies were contacted to discuss nearby projects that may, in addition to the proposed Project, cause a cumulative environmental impact: Humboldt County, Del Norte County, Caltrans and the NPS. The cumulative impact analysis for each environmental resource category is described in Section 4.21 – Mandatory Findings of Significance. Table 2-1 – Projects Considered for Cumulative Impacts provides a list of past, present and reasonably foreseeable future projects within and near the Project Area. Single-family homes and other similar small-scale projects were not included because of their negligible contribution to cumulative effects.

Table 2-1 Projects Considered for Cumulative Impacts

Project Name	Project Description	Estimated Construction Schedule	Project Location
Redwoods Rising: Greater Prairie Creek Ecosystem Restoration Project	The parks (California Department of Parks and Recreation [CDPR] and NPS), under the banner of Redwoods Rising, propose to rehabilitate 9,200 acres in the greater Prairie Creek watershed and restore ecosystem processes that have been degraded by historical land use. Rehabilitation will be accomplished through thinning second growth forests which is anticipated to promote growth of remaining trees, understory vegetation and development of a multi-story canopy; removing or maintaining roads to reduce the potential for erosion and sedimentation into streams; restoring instream habitat complexity; and augmenting riparian corridors by planting native vegetation.	Project is in the planning phase.	Project is located in Redwood National and State Park within the Prairie Creek watershed, upstream of the proposed Project location.

Project Name	Project Description	Estimated Construction Schedule	Project Location
Redwoods Rising: Mill Creek Ecosystem Restoration Project	The parks (CDPR and NPS) under the banner of Redwoods Rising, propose to rehabilitate 34,080 acres within the greater Mill Creek area. Project components will include: vegetation management actions including forest thinning, snag creation, crown manipulation, tree planting, manual and mechanical vegetation removal, flaming and torching, mowing, solarization and covering, girdling and fuels reduction. Abandoned logging roads and related infrastructure will be removed. Aquatic restoration will include placement of large wood in streams to enhance habitat and stream function.	Project is in the planning phase.	Located in Del Norte Coast Redwoods State Park (DNCRSP) and a portion of Redwood National Park, within the Mill Creek watershed, which is north of the Prairie Creek watershed, and drains to the Smith River.
Lower B500 Road Removal Project	The NPS is managing a road removal project including the removal of an approximately 0.8 mile segment of an abandoned logging road, called the “Lower B500” in the Larry Damm Creek watershed. Removing the Lower B500 is needed to eliminate the threat of sediment delivery from the road into Larry Damm Creek, improve fish habitat conditions by restoring drainage patterns affected by the placement of the road adjacent to the stream; and to improve watershed function by restoring hydrologic patterns altered by the road.	Project is in the planning phase; implementation is scheduled for mid September 2019 and will last approximately one month.	The project is located in Redwood National Park, approximately five miles from Orick. Larry Damm Creek is the first major tributary encountered at the lower reaches of Lost Man Creek, which is part of the Prairie Creek watershed.
Little Lost Man Creek Bridge – Fish Passage Improvement Project	Caltrans is removing a culvert over Little Lost Man Creek (a tributary to Prairie Creek) and replacing it with a bridge to improve fish passage.	The project is estimated to be constructed between September 2019 and December 2021	The project is located in Berry Glen, immediately north of the Project Area. This project is hydrologically connected to the Project Area via Prairie Creek.

Project Name	Project Description	Estimated Construction Schedule	Project Location
Proposed Centennial Grove Trail & Berry Glen Connector Trail	The purpose of this project is to build two trails that will provide visitors with the opportunity to experience an old growth redwood forest that is easily accessible from the proposed Visitor Center Project. The Centennial Grove Trail (CGT) will start at the existing Upper Road south of the Centennial Tree and will continue upslope to the northeast switch backing in between two drainages before the intersection of the loop to offer trail users a return route to the Upper Road. The constructed length of the CGT will be 1,262 feet. The Berry Glen Connector Trail (BGCT) will start at the upper portion of the CGT and will continue climbing in elevation to the southeast, and then north to the intersection and terminus at the existing Berry Glen Trail. The BGCT will be 4,004 feet. The combined total of both trails to be constructed is 5,266 feet. Approximately 20 trees (16 inches in diameter at breast height and under), will need to be cut. This is anticipated to cause little or no canopy loss.	Both phases of the project will begin after noise restrictions lift in September. Construction is anticipated to take place between 2020 and 2022.	The project is located between the existing Upper Road (south of the Centennial Tree) and Berry Glen Trail, northeast of the proposed Project.
RP-5 Road Improvement Project	This project is located on the Upper Road partially within and mostly outside (west) of the disturbance extent associated with the Project that this ISMND analyzes. Erosion of the outboard side of the road is leading to potential road failure. The failure appears to be related to gravitational forces acting on loose sidecast fill soils, and is not believed to be caused by concentrated runoff or drainage issues. The League has carried out drainage improvement measures to provide short-term relief. To address long-term improvements, this area will likely be excavated to remove the failing earthen material from the outboard side of the roadway. Following future excavation, the roadway is expected to be able to support vehicles in an emergency.	Short-term drainage improvements have taken place in 2019. Long-term improvements are unplanned, but are expected to take place independent of the Project likely after 2021.	The project is located approximately 0.25miles north of the Centennial Tree on the western (outboard) side of the Upper Road.

2.10 Required Permits and Approvals

The following permits are anticipated to be required for Project Implementation:

- Humboldt County - Encroachment Permit for Project improvements that encroach into County right-of-way on Bald Hills Road
- Humboldt County – Demolition Permit (for Mill Site and barn foundation removal)
- Humboldt County – Conditional Use Permit for League-owned parcels, includes Project actions in Streamside Management Areas
- Humboldt County – Streamside Management Area Permit for creek restoration on League-owned parcels
- North Coast Unified Air Quality Management District (NCUAQMD) – Generator Permit
- North Coast Regional Water Quality Control Board (NCRWQCB) – 401 Water Quality Certification
- NCRWQCB – Onsite Wastewater Treatment System Permit
- State Water Resources Control Board – Domestic Water Supply Permit
- Caltrans - Encroachment permit for improvements along US 101
- CDFW – Lake and Streambed Alteration Agreement (1602)
- CDFW – 2081(a) permit for take of CESA listed species
- State Historic Preservation Office (SHPO) – National Historic Preservation Act Section 106 consultation
- U.S. Army Corps of Engineers (USACE) – Individual 404 Permit and 404(B)1 Alternatives Analysis or Nationwide Permit
- NMFS – Endangered Species Act (ESA) Section 7 Consultation and Incidental Take Permit
- U.S. Fish and Wildlife Service (USFWS) – ESA Section 7 Consultation and Incidental Take Permit

2.11 Environmental Protection Actions Incorporated into the Project

The following environmental actions are included as part of the Project to design and implement the Project consistent with Project goals and in an environmentally responsible manner. These actions are included proactively to avoid impacts and are not considered mitigation. Mitigation measures to reduce potentially significant impacts resulting from project implementation are presented in Chapter 4 – Environmental Analysis, where applicable. To ensure that all Project elements (environmental protection actions and mitigation measures) are carried forward during design and construction, both will be included in the Mitigation Monitoring and Reporting Program (MMRP) at the time that the Project is considered for approval. Each environmental protection action and mitigation measure will remain clearly labelled to indicate its origin.

2.11.1 Environmental Protection Action 1: Implement Geotechnical Design Recommendations

As part of the Project design process, the League has engaged a California-registered Geotechnical Engineer to conduct a design-level geotechnical study for the Project. The League will ensure that the Project is designed to comply with the site-specific recommendations identified in the Project's geotechnical report. This will include design in accordance with the seismic and foundation design criteria, as well as site preparation and grading recommendations included in the report. The geotechnical recommendations will be incorporated into the final plans and specifications for the Project and will be implemented during construction.

2.11.2 Environmental Protection Action 2: Stormwater Pollution Prevention Plan (SWPPP)

The Project will seek coverage under State Water Resources Control Board (Water Board) Order No. 2009-0009-DWQ, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities. The League will submit permit registration documents (notice of intent, risk assessment, site maps, Stormwater Pollution Prevention Plan (SWPPP), annual fee, and certifications) to the Water Board. The SWPPP will address pollutant sources, best management practices (BMPs), and other requirements specified in the Order. The SWPPP will include erosion and sediment control measures, and dust control practices to prevent wind erosion, sediment tracking, and dust generation by construction equipment. A Qualified SWPPP Practitioner will oversee implementation of the Project SWPPP, including visual inspections, sampling and analysis, and ensuring overall compliance.

2.11.3 Environmental Protection Action 3: Construction BMPs

The Contractor will implement BMPs during construction including the following BMPs from the current California Stormwater BMP Handbook for Construction: EC-1: Scheduling; EC-2: Preservation of Existing Vegetation; NS-2: Dewatering Operations; NS-9: Vehicle Equipment and Fueling; NS-10: Vehicle & Equipment Maintenance; WM-2: Material Use; WM-4: Spill Prevention and Control. Additionally, the following conditions will be required during construction:

- Contractors will be responsible for minimizing erosion and preventing the transport of sediment to sensitive areas;
- Sufficient erosion control supplies will be maintained on site at all times, available for prompt use in areas susceptible to erosion during rain events;
- Disturbance of existing vegetation will be minimized to only that necessary to complete the work;
- The contractor will make adequate preparations, including training and providing equipment, to contain oil and/or other hazardous materials spills;
- Dewatering operations will be conducted where needed from the work location and stored or disposed of appropriately;
- Vehicle and equipment maintenance should be performed off-site whenever practical;
- Contractor shall ensure that the site is prepared with BMPs prior to the onset of any storm predicted to receive 0.5 inches or more of rain over 24 hours;
- All erosion and sediment control measures shall be maintained in accordance to their respective BMP fact sheet until disturbed areas are stabilized;
- This plan may not cover all the situations that arise during construction due to unanticipated field conditions. Variations may be made to the plan in the field subject to the approval of or at the direction of the League’s Project Manager or Construction Manager

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3. Environmental Factors Potentially Affected

The environmental factors checked below will 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. Where checked below, the topic with a potentially significant impact would be addressed in an environmental impact report unless mitigation measures are incorporated:

☐ Aesthetics
☒ Agricultural & Forestry Resources
☒ Air Quality
☒ Energy
☒ Biological Resources
☒ Cultural Resources
☒ 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 would 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 would be prepared.

☐ I find that the proposed 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 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 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.

LEAD AGENCY Signature

Date

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4. Environmental Analysis

4.1 Aesthetics

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
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 view of the site and its surroundings? (Public Views are those that are experienced from publicly accessible vantage point). 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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the project have a substantial adverse effect on a scenic vista?	Major alteration of a view from a scenic vista or major obstruction in viewed area towards a scenic vista	CEQA Guidelines Appendix G, Checklist Item I (a)
Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	Non-conformance with the five required elements of corridor protection	CEQA Guidelines Appendix G, Checklist Item I (b) Section 261 of the Streets and Highway Code
In non-urbanized areas, substantially degrade the existing visual character or quality of public view of the site and its surroundings? (Public Views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	High visual contrast or change from a publicly accessible vantage point	CEQA Guidelines Appendix G, Checklist Item I (c)
Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	Non-compliance with County General Plan Standard SR-S4	CEQA Guidelines Appendix G, Checklist Item I (d) General Plan Policy SR-S4

This Section evaluates the potential impacts to aesthetic resources resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area incorporates the Project Area and the surrounding areas including the Highway 101 and Bald Hills Road corridors adjacent to the Project Area and forested areas bordering the Project to the east.

The study area is comprised of redwood forest, small headwater creeks, large waterways, open meadows, and mountainous terrain located in the coastal fog belt of northern California. The Project is located adjacent to over 13,000 contiguous acres of forestland protected and managed by RNSP in a remote area of California. The Project is within the Redwood Creek watershed, of which Prairie Creek is considered the largest and most pristine tributary (Wilzbach & Ozaki 2017).

Regulatory Setting

Federal

There are no federal policies or regulations that apply to aesthetics within the study area.

State

Scenic Highway Program

Caltrans administers the Scenic Highway Program, and the section of Highway 101 that is adjacent to the Project is designated as a scenic highway (Caltrans 2017). According to the Scenic Highway Guidelines (Caltrans, no date), Sections 260 through 263 of the Streets and Highways Code establishes "the State's responsibility for the protection and enhancement of California's natural scenic beauty by identifying those portions of the State highway system which, together with adjacent corridors, require special conservation treatment." Caltrans is authorized by statute to revoke an official scenic highway designation if it determines that the Corridor Protection Program or the scenic quality of the corridor is no longer in compliance. Caltrans defines non-compliance as a program that:

- No longer complies with the five legislatively required elements under Section 261 of the Streets and Highway Code,
- No longer affords protection because required elements have been amended or changed, or
- No longer is being enforced by the local governing body.

Per Section 261 of the Streets and Highway Code, "Planning and Design Standards; Complete Highway,"

> *The department shall establish and apply pertinent planning and design standards for development of official scenic highways. In establishing and applying such standards for, and undertaking the development of official scenic highways, the department shall take into consideration the concept of the "complete highway," which is a highway which incorporates not only safety, utility, and economy, but also beauty. The department shall also take into consideration in establishing such standards that, in a "complete highway," pleasing appearance is a consideration in the planning and design process. In the development of official scenic highways, the department shall give special attention both to the impact of the highway on the landscape and to the highway's visual appearance. The standards for official scenic highways shall also require that local governmental agencies have taken such action as may be necessary to protect the scenic appearance of the scenic corridor, the band of land generally adjacent to the highway right-of-way, including, but not limited to, (1) regulation of land use and intensity (density) of development; (2) detailed land and site planning; (3) control of outdoor advertising; (4) careful attention to and control of earthmoving and landscaping; and (5) the design and appearance of structures and equipment.*

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate aesthetics include the following:

> *CO-G1. Conservation of Open Spaces*
>
> Open spaces that distinguish and showcase the county's natural environment, including working resource lands while not impacting the ability to provide livelihoods, profitable economic returns and ecological values.
>
> *UL-P5. Community Identity.*
>
> Preserve community features that residents value and create development that compliments or adds to community identity and character.

UL-P11. Natural Amenities

Encourage the incorporation of natural amenities (e.g., landmark trees and rock outcroppings) into new project designs.

UL-P18. Landscaping

All new residential and commercial projects shall use landscaping to enhance the appearance of neighborhoods, control erosion, conserve water, improve air quality and improve pedestrian and vehicular safety.

SR-G1. Conservation of Scenic Resources

Protect high-value scenic forest, agriculture, river and coastal areas that contribute to the enjoyment of Humboldt County's beauty and abundant natural resources.

SR-G2. Support for a Designated Scenic Highway System

A system of scenic highways that increase the enjoyment of, and opportunities for, recreational and cultural pursuits and tourism in the County without detracting from allowed uses.

SR-P3. Scenic Highway Protection

Protect the scenic quality of designated Scenic Highways for the enjoyment of natural and scenic resources, coastal views, landmarks, or points of historic and cultural interest.

The following standard from the Humboldt County General Plan serves as a threshold of significance for analysis in this Section:

SR-S4. Light and Glare

New outdoor lighting shall be compatible with the existing setting. Exterior lighting fixtures and street standards (both for residential and commercial areas) shall be fully shielded, and designed and installed to minimize off-site lighting and direct light within the property boundaries.

Orick Community Plan

The policies within the Orick Community Plan which address aesthetics include:

OCP-P19. Design and Community Beautification

To increase visitor expenditures in the commercial businesses in Orick, the community should encourage and assist property owners along the highway to use landscaping, fencing and painting to improve the appearance of the community. The OEDC should consider commissioning a Design Plan to guide private beautification efforts.

Impact Analysis

a) Have a substantial adverse effect on a scenic vista? (Less than Significant Impact)

A scenic vista can commonly be defined as a view that has remarkable scenery or a broad or outstanding view of the natural landscape. Within the study area, existing scenic vistas of the Project Area are limited from Highway 101 and Bald Hills Road due to dense vegetation along both roadways. The proposed Prairie Creek Restoration area is visible at approximately three locations where openings in the vegetation exist along Highway 101 west and northwest of the Project Area. Although these views are aesthetically pleasing, the scenery is not considered remarkable, broad or outstanding, and therefore does not meet the definition of a scenic vista. The former Mill Site asphalt is not visible from these locations. However, the proposed Visitor Center is anticipated to be visible.

The only area of the Project that is currently visible from Bald Hills Road is the asphalt of the former Mill Site, which is visible from the existing entrance gate. The proposed Visitor Center will also be visible from the entrance gate. This area is not considered scenic due to the abundant asphalt. However, there are scenic landscape views in the background. Views from within the Project Area are visible in open areas where vegetation does not obstruct views, such as within the Prairie Creek Restoration Area, Visitor Center, and the Yurok Demonstration Site.

The views of the study area from Highway 101 and Bald Hills Road will be temporarily affected during construction. However, views are not anticipated to be adversely affected during operation of the Project, due to the aesthetically pleasing nature of the Project's structures and ecological enhancements. The Prairie Creek Restoration Area will be enhanced with an expansive network of restored interconnected waterways. These natural habitats will be aesthetically appealing. It is anticipated that wildlife including waterfowl, migratory birds and ungulates will utilize the Prairie Creek Restoration Area, which will also improve the aesthetics of the study area.

The former Mill Site will be transformed from approximately 20 acres of dilapidated asphalt and concrete foundations to contain an array of visitor-serving amenities including kiosks, interpretive displays, landscaping, parking lots, trails, and the Visitor Center. The Visitor Center will significantly enhance the aesthetic nature of the Mill Site compared to existing conditions, resulting in an aesthetic benefit. The Visitor Center has been designed by an architectural firm to incorporate the surrounding environment into the design to be aesthetically pleasing and geographically relevant. Landscaping around the Visitor Center will include native or compatible plants, seamlessly blending with the restoration plantings to the west, and creating an appealing flow and visitor experience within the Project Area. See Image 4.1-1 below for a representation of the proposed Visitor Center. The Yurok Demonstration Site will incorporate local tribal cultural designs, culturally significant vegetation and color schemes.

During Project construction, views of the site will be altered due to the presence of construction equipment, earth moving, and bare soils. However, due to the short-term nature of these site modifications, this impact will not be considered substantially adverse. Operation of the Project will not have an adverse effect on views of the site due to the aesthetically pleasing Project components visible within the study area. The Project's impact on scenic vistas will be **less than significant.**

Image 4.1-1: A digital representation of the Visitor Center (Save the Redwoods League 2018).

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway? (No Impact)

The section of Highway 101 adjacent to the Project is located between Leggett and the intersection of Highway 199 in Crescent City and is therefore considered a state scenic highway (Caltrans 2017). There are no scenic vistas of the Project Area from the surrounding vicinity. However there are approximately three locations along Highway 101 west and northwest of the Project where views of the Project Area are visible. There are no historic buildings, rock outcroppings or exceptional trees, such as the Centennial Tree, visible from Highway 101. Therefore, there will be no impact to scenic resources.

Construction and operation of the Project will not cause non-compliance with the five legislative elements of the Scenic Highway Program per Section 261 of the Streets and Highway Code requirements, due to the (1) compliance with local zoning regulations, (2) detailed land and site planning, (3) absence of billboards within the Project Area, (4) forthcoming detailed construction planning and SWPPP compliance, and (5) aesthetically pleasing structures and restored creek system. Therefore the Project will have no effect on the section of Highway 101 designated as a scenic highway within the study area and adjacent to the Project. **No impact** will occur.

c) In non-urbanized areas, substantially degrade the existing visual character or quality of public view of the site and its surroundings? (Public Views are those that are experienced from publicly accessible vantage point). 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)

According to the Orick Community Plan (2017), the Project is located outside of the Urban Development Area and Urban Expansion Area within the community of Orick (OCP 2017). The

Project is visible from approximately three locations along Highway 101 and from the existing entrance gate along Bald Hills Road. The Project Area is naturally isolated from its surroundings due to the thick vegetation lining most of the Project Area boundary. For this reason, construction-related activities and operations are not anticipated to substantially degrade the existing visual character of the site and its surroundings.

Operation of the Project is not anticipated to degrade the quality of public views of the site. The Project will in fact improve scenic resources, compared to existing conditions, due to the expansion of the Prairie Creek channel network, revegetation, and the construction of an architecturally suitable Visitor Center along with appealing landscaping. Infrastructure has been designed to blend in or to be aesthetically appropriate with the surrounding environment. Other components of the Project, including the Prairie Creek Restoration and Libby Creek Enhancement areas, are also expected to enhance the natural setting.

The construction and operations of the Project will not substantially degrade the existing visual character of the site or surrounding area nor conflict with zoning or other applicable regulations governing scenic resources. A **less than significant impact** will occur.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area? (Less than Significant Impact)

Infrastructure proposed as part of the Project includes the Visitor Center building and amenities including kiosks, parking lots, photovoltaic panels, roads, trails, an amphitheater, outdoor classroom and signage, which will be designed and built to minimize glare. Operation of the Project will result in the use of exterior lighting within the Visitor Center footprint. Outdoor onsite lighting will be fully shielded (pointed downward) and will minimize blue light emissions to limit light pollution in the nighttime environment. Outdoor lighting will be consistent with the Humboldt County General Plan standard SR-S4. Photovoltaic panels, if utilized, will be placed on the southern roof of the Visitor Center facing towards Bald Hills Road where no residences exist. The Visitor Center will be constructed upon fill and will be up to approximately ten feet higher than the elevation than currently exists. Therefore the panels will be above the line of sight of visitors and will not cause glare.

Construction of the Project is not anticipated to result in any temporary or permanent sources of light, or substantial light or glare which will adversely affect day or nighttime views within the study area, as no night time work is proposed.

The Project is located in a rural area where there is minimal light pollution or glare concerns, and due to the design elements of the Project which will minimize glare, and minimize light emissions, including the use of natural materials such as wood, geographically appropriate landscaping, and shielded outdoor lighting, a **less than significant impact** will occur.

An analysis of potential cumulative impacts on aesthetics from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
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 Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
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 (FMMP) of the California Resources Agency (California Department of Conservation [DOC]), to non-agricultural use?	The conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance within the project area as shown on maps in the FMMP	CEQA Guidelines Appendix G, Checklist Item II (a) DOC FMMP and maps
Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?	Any such applicable language in the Humboldt County Zoning Regulations, and the presence of Williamson Act contracts	CEQA Guidelines Appendix G, Checklist Item II (b) Williamson Act contracts Humboldt County Zoning Code – Chapter four
Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	Any such applicable language in the Humboldt County Zoning Regulations Public Resources Code Section 12220(g), Section 4526, Government Code Section 51104(g)	CEQA Guidelines Appendix G, Checklist Item II (c) Humboldt County Zoning Regulations – Chapter Four Public Resources Code Section 12220(g), Section 4526, Government Code Section 51104(g)
Would the project result in the loss of forest land or conversion of forest land to non-forest use?	The permanent loss or conversion of a substantial amount of forest land within the Project Area	CEQA Guidelines Appendix G, Checklist Item II (d)
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?	The Land Evaluation and Site Assessment (LESA) analysis conducted for the project to assess agricultural conversion The permanent loss or conversion of a substantial amount of forest land within the project area	CEQA Guidelines Appendix G, Checklist Item II (e) DOC's LESA

This Section evaluates the potential impacts to agricultural and forestry resources resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area includes the Project Area and surrounding properties at least 0.25 miles and up to 0.60 miles outside the Project Area (as shown on Figure 1 within Appendix B – LESA Analysis).

The study area is comprised of redwood forest, small tributary creeks, large waterways, open meadows, residences, privately owned and operated agricultural operations, and the remaining asphalt of the former Mill Site. The Project footprint and surrounding lands were heavily logged from the turn of the 20th century up until the 1980s. There are a few remaining old growth redwood trees within the study area, including the Centennial Tree. Most of the redwood forest stands within the study area are second growth. Regionally, timber production and agricultural production have a strong heritage, as these industries provided the backbone of the economy in the Project vicinity for decades. Timber is still harvested regionally, at a much smaller scale than at the climax of the industry. No commercial timber harvesting occurs within the study area. Agriculture, specifically ranching and dairy operations, are prominent land uses within the Redwood Creek estuary, located approximately two miles downstream of the Project Area. Agricultural uses also occur within the southern portion of the study area, south of Redwood Creek.

Regulatory Setting

Loss of farmland is an important concern that is addressed by the development of federal, state and local policies calling for protection of Prime, Unique or Farmland of Statewide Importance.

Federal

Federal Farmland Protection Policies

Under the Federal Farmland Protection Policy Act (FPPA), projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to non-agricultural use and are completed by, or with the assistance of, a federal agency. The Natural Resources Conservation Service (NRCS) is charged with oversight of the FPPA. The proposed Project is partially funded with federal funds, therefore the FPPA applies to the proposed Project. NRCS uses a Land Evaluation and Site Assessment (LESA) system to establish a farmland conversion impact rating score on proposed sites of federally funded and assisted projects. A LESA analysis was conducted for this Project. The analysis is included in Appendix B of this ISMND and is discussed in question (a) below.

State

State Farmland Conservancy Program Act

State farmland protection policy is described in the California Farmland Conservancy Program Act (CFCPA), (PRC Section 10201-10202). The CFCPA recognizes the importance of the state's agricultural lands economically, culturally, and in terms of food security, as well as the threat to those lands from development. The agricultural conservation strategy established by the CFCPA involves appropriating state funds for the voluntary purchase of agricultural easements, together with restrictions on development through local planning and zoning.

California Environmental Quality Act (CEQA)

Pursuant to CEQA, agricultural land is defined as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on maps prepared under the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency. CEQA requires the lead agency to evaluate agricultural resources in the environmental analyses at least in part based on the FMMP. According to the Department of Conservation's FMMP, the agricultural land designations are defined as follows:

> *<u>Prime Farmland</u>: Farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and*

moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Unique Farmland: Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated but may include nonirrigated orchards or vineyards as found in some climatic zones in California. Lands must have been cropped at some time during the four years prior to the mapping date.

Farmland of Statewide Importance: Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Lands must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Public Resources Code (PRC) Section 21060.1

(a) "Agricultural land" means prime farmland, farmland of statewide importance, or unique farmland, as defined by the United States Department of Agriculture land inventory and monitoring criteria, as modified for California.

(b) In those areas of the state where lands have not been surveyed for the classifications specified in subdivision (a), "agricultural land" means land that meets the requirements of "prime agricultural land" as defined in paragraph (1), (2), (3), or (4) of subdivision (c) of Section 51201 of the Government Code

California Government Code Section 51201 (c)

"Prime agricultural land" means any of the following:

1. *All land that qualifies for rating as class I or class II in the NRCS land use capability classifications*
2. *Land which qualifies for rating 80 through 100 in the Storie Index Rating*
3. *Land which supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the United States Department of Agriculture*
4. *Land planted with fruit- or nut-bearing trees, vines, bushes, or crops which have a nonbearing period of less than five years and which will normally return during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production not less than two hundred dollars ($200) per acre*

A determination of which lands can be considered "agricultural land" per PRC Section 21060.1 is discussed in question (a). Under CEQA, an impact on an agricultural resource is considered significant if a Project will result in an impact to or conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. A LESA evaluation is an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process (DOC 2019a).

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate agriculture and forest resources include the following:

RL-G1. Residential Agriculture Development

The orderly development of land suitable to meet projected demand during the General Plan planning period for residential agriculture use with access to Rural Community Centers and Community Planning Areas.

RL-P1. Compatible with Resource Production

Planned development on residential agriculture lands adjacent to designated agricultural and timberlands shall be compatible with agriculture and timber production.

AG-G1. Agricultural Production

Economically viable agricultural operations contributing to the growth and stability of the economy and a strong market demand for agricultural lands dedicated to agricultural production.

AG-G2. Preservation of Agricultural Lands

Agricultural land preserved to the maximum extent possible for continued agricultural use in parcel sizes that support economically feasible agricultural operations.

AG-P5. Conservation of Agricultural Lands

Agricultural lands shall be conserved and conflicts minimized between agricultural and non-agricultural uses through all of the following:

A. By establishing stable zoning boundaries and buffer areas that separate urban and rural areas to minimize land use conflicts.

B. By establishing stable Urban Development, Urban Expansion and Community Planning Areas and promoting residential in-filling of Urban Development Areas, with phased urban expansion within Community Planning Areas.

C. By developing lands within Urban Development, Urban Expansion and Community Planning Areas prior to the conversion of agricultural resource production lands (AE, AG) within Urban Expansion Areas.

D. By not allowing the conversion of agricultural resource production lands (AE, AG) to other land use designations outside of Urban Expansion Areas.

E. By assuring that public service facility expansions and non-agricultural development do not inhibit agricultural viability, either through increased assessment costs, degradation of the environment, land fragmentation or conflicts in use.

F. By increasing the effectiveness of the Williamson Act Program.

G. By allowing historical structures and/or sensitive habitats to be split off from productive agricultural lands where it acts to conserve working lands and structures.

H. By allowing lot-line adjustments for agriculturally designated lands only where planned densities are met and there is no resulting increase in the number of building sites.

AG-P6. Agricultural Land Conversion – No Net Loss

Lands planned for agriculture (AE, AG) shall not be converted to non-agricultural uses unless the Planning Commission makes the following findings:

A. There are no feasible alternatives that will prevent or minimize conversion;

B. The facts support an overriding public interest in the conversion; and

C. For lands outside of designated Urban Development Boundaries, sufficient off-setting mitigation has been provided to prevent a net reduction in the agricultural land base and agricultural production. This requirement shall be known as the “No Net Loss” agricultural lands policy. “No Net Loss” mitigation is limited to one or more of the following:

   1. Re-planning of vacant agricultural lands from a non-agricultural land use designation to an agricultural plan designation along with the recordation of a permanent conservation easement on this land for continued agricultural use; or
   2. The retirement of non-agricultural uses on lands planned for agriculture and recordation of a permanent conservation easement on this land for continued agricultural use; or
   3. Financial contribution to an agricultural land fund in an amount sufficient to fully offset the agricultural land conversion for those uses enumerated in subsections a and b. The operational details of the land fund, including the process for setting the amount of the financial contribution, shall be established by ordinance.

AG-P11. Support Vegetative Management Programs

Support vegetation management programs (controlled burning, etc.) when it is found that they improve the availability and quality of rangeland for livestock and wildlife, reduce the hazard of disastrous wildfires, and increase water quality and quantity.

AG-P15. Compliance with Regulations

The County shall place a priority on abatement of violations that result in agricultural land conversion, loss of agricultural productivity or conflicts with neighboring agricultural operations.

AG-P16. Protect Productive Agricultural Soils

Development on lands planned for agriculture (AE, AG) shall be designed to the maximum extent feasible to minimize the placement of buildings, impermeable surfaces or nonagricultural uses on land as defined in Government Code Section 51201(c) 1- 5 as prime agricultural lands.

SR-G1. Conservation of Scenic Resources

Protect high-value scenic forest, agriculture, river, and coastal areas that contribute to the enjoyment of Humboldt County’s beauty and abundant natural resources.

CO-P4. Support for Working Lands

The County shall support policies that maintain profitable resource production on timber and agricultural lands as a means to secure long-term protection and sustainability of open space lands through programs such as the Williamson Act and Timber Production Zone programs.

CO-P10. Encourage Private Outdoor Recreation

Encourage private acquisition, development, and management of compatible outdoor recreational services and facilities as a means to generate economic returns for the landowner from conservation and open space lands where such recreational uses do not significantly detract from the agricultural capability or timber productivity of lands planned and zoned for agriculture or timber.

CO-P11. Public Recreation

Support acquisition, development and management of parklands and trails primarily in locations that are highly accessible to the public in order to serve the outdoor recreation and ADA needs of current and future residents, and where such uses do not reduce the agricultural capability, timber productivity and ecological services on open space lands

The following standard within the Humboldt County General Plan which is applicable to the regulation of agriculture resources includes the following:

AG-S7. Prime Agricultural Land.

Prime Agricultural land per California Government Code Section 51201(c) means:

A. All land which qualifies for rating as Class I or Class II in the Soil Conservation Service land use capability classifications.

B. Land which qualifies for rating 80 through 100 in the Storie Index Rating.

C. Land which supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the U.S.D.A.

D. Land planted with fruit or nut bearing trees, vines, bushes or crops which have a non- bearing period of less than five years and which will normally return during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production not less than $200.00 per acre. Humboldt County General Plan Adopted October 23, 2017 Part 2, Chapter 4. Land Use Element 4-32

E. Land which has returned from the production of unprocessed agricultural plant products on an annual gross value of not less than $200.00 per acre for three of the five previous years.

Impact Analysis

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? (Less than Significant Impact)

Appendix G to the CEQA Guidelines suggests a finding of significance if a project will convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps for the Farmland Mapping and Monitoring Program (FMMP) by the California Natural Resources Agency (California Department of Conservation [DOC]), to non-agricultural uses. The study area does not contain Prime Farmland, Unique Farmland or Farmland of State Importance as shown on the maps prepared pursuant to the FMMP of the DOC, as soil data in Humboldt County has not been compiled into the FMMP (DOC 2019b).

However, CEQA includes a secondary definition of “agricultural land”, stated above in the Regulatory Setting under PRC Section 21060.1 (b), which relies on the standards presented below it in California Government Code Section 51201(c)(1)-(4). The Humboldt County General Plan includes a definition of “Prime Agricultural Land”, stated above under standard AG-S7, which also relies on the California Government Code Section 51201(c)(1)-(4). Although no land within the study area is designated Prime Farmland, Unique Farmland or Farmland of Statewide Importance according to the FMMP, there is one mapped soil unit (approximately 21.9 acres) within the Project Area that will be considered Prime Agricultural land under subsection (1) of the California Government Code Section

51201 (c) (see Figure 4.2-1 – Soil Map Units). Lands outside the Project Area but within the study area were not analyzed to determine if they meet the definition of Prime Agricultural Land under California Government Code Section 51201 (c) because the Project will not affect lands outside the Project Area.

To assess the significance of the conversion of agricultural land, CEQA allows the use of a Land Evaluation and Site Assessment (LESA) evaluation. See Appendix B for the LESA evaluation prepared for this Project by GHD (2019). The Land Evaluation component of the LESA analysis evaluates soils based on Land Capability Classification (LCC) and Storie Index Rating data from the NRCS Web Soil Survey database. A score is assigned to each soil type based on its LCC, Storie Index Rating, and percentage within the Project Area. The final scores are totaled for both the LCC and Storie Index Rating and assigned a factor weight of 0.25 each. The Site Assessment component of the LESA analysis considers (1) project size, (2) water resource availability, (3) surrounding agricultural lands, and (4) surrounding protected resources lands. Project size is determined through scoring the proportion of the Project Area with the highest LCC soils based off a scoring chart in the LESA instructions. Water resource availability is based upon identifying the various water sources that may supply a given property and then determining whether different restrictions in supply are likely to take place in years that are characterized as being periods of drought and non-drought. Surrounding agricultural and protected resource lands are considered to determine potential cumulative effects of agricultural or resource land conversion within the Project Area of those surrounding lands within a 0.25-mile zone of influence. See Figure 1 in Appendix B for the properties considered in the zone of influence. LESA scoring to determine whether an impact is significant based on the following rubric:

- A score of 0 to 39 is considered not significant,
- A score of 40 to 59 is considered significant only if both the LESA subscores are each greater than or equal to 20 points,
- A score of 60 to 79 points is considered significant unless either the LESA subscore is less than 20 points, and
- A score of 80 to 100 is considered significant (DOC 1997).

Despite the possible designation under CEQA of some on-site soils as “Prime Agricultural Land,” the LESA analysis conducted for the Project yielded a score of 39, which is not considered significant. The Land Evaluation component of the LESA yielded a score of 23, and the Site Assessment component yielded a score of 16. Thus, even if the final combined score had exceeded 40, it will not have resulted in a significant impact, according to the above rubric. Based on the LESA analysis, the potential conversion of Prime Agricultural Land is not considered significant. For the foregoing reasons, any potential impact will be **less than significant**.

b) Conflict with Agricultural Zoning or Williamson Act Contract? (No impact)

The study area does not contain any lands under Williamson Act contract. Lands that are considered agricultural resource production lands in the Humboldt County General Plan include the Agriculture Exclusive (AE) and Agriculture General (AG) land use designations. The study area does not contain any areas with AE or AG land use designations.

The Project Area contains land use designations of RA40-160 (Residential Agriculture) in the western portion of the Project Area, and CR (Commercial Recreation) in the eastern portion. Similarly, the study area is zoned Rural Residential Agriculture (RA) with a minimum lot size of 40 acres, Commercial Highway (CH), and Forest Recreation (FR) (see Figure 4.2-2 – Land Use Designations and Zoning Site Overview). The zoned areas contain five combining zones: Special Building Site (B), Design Control (D), Floodplain (F), Streamside Management Areas and Wetlands (WR), and Recreation (X). Additionally, the Project encroaches on and includes approximately 2.5 acres of land to the east owned by Redwood National Park (RNP). This property is within the study area and is zoned Unclassified (U).

The RA zoning occurs within the western portion of the Project area, where the Prairie Creek Restoration, California Coastal Trail (CCT) and Canopy Walkway components of the Project will be implemented. Although general agriculture is a principally permitted component of RA zoning, other land uses, including fish and wildlife management and wetland restoration, are conditionally permitted. The CH zoning occurs within the eastern portion of the Project Area where the Visitor Center, CCT, Yurok Demonstration Site, and Libby Creek Enhancement components of the Project will be located. Zoning designated CH principally permits nurseries and greenhouses. The FR zoning occurs in the northern extent of the Project Area along the proposed CCT. Zoning designated FR principally permits public and private noncommercial recreational uses, general agriculture and dwellings. No Project activities are proposed in the FR zoned portion of the Project Area. The U zoning occurs on the eastern fringe of the study area, where the Eastside Restoration Area (ERA) subcomponent of the Project will take place. Zoning designated U includes all of the unincorporated area of Humboldt County that has not been sufficiently studied to justify precise zoning classifications. The U zoning principally permits general agriculture; however, it also conditionally permits all other land uses, including proposed uses in the ERA, Libby Creek Enhancement, and CCT.

Construction and operation of the Visitor Center and the portions of CCT, the Ceremonial Brush Dance Site, and Libby Creek Enhancement that are within the CH zoning designation will be principally permitted, and therefore will not conflict with the CH zoning. Construction and operation of the remaining components of the Project, including the Prairie Creek Restoration Area, Canopy Walkway, portions of the CCT, Libby Creek Enhancement, and the Yurok Demonstration Site that are within the RA zoning designation will be conditionally permitted, and therefore will not conflict with the RA zoning. Special conditions to address the combining zones F, WR, and X (the latter of which allows general agriculture as a principally permitted use) will be listed in a Special Permit which will be a subset of the Conditional Use Permit. (The D combining zone signifies that the Project is subject to design review by the Orick Design Review Committee). Proposed Project land uses within the U zoning designation, including portions of ERA, Libby Creek Enhancement, and CCT activities, will not conflict with the U zoning.

See Section 4.11 – Land Use and Planning for a discussion of specific Project activities taking place in the RA, CH and U zoning designations within the study area.

As mentioned above, the Project Area does not contain any Williamson Act contract lands, nor, for the foregoing reasons, will the proposed Project conflict with agricultural zoning. There are no Agriculture Exclusive (AE) or Agriculture General (AG) land use or zoning designations within the Project Area, and all proposed land uses under the Project are either principally or conditionally permitted within the respective zoning areas. Therefore **no impact** will occur.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))? (No Impact)

The Humboldt County zoning designations utilized to manage forest land and timberland are Forest Recreation (FR) and Timberland Production Zone (TPZ). The Project Area predominantly contains RA, CH and U zoning. A small area, approximately 0.75 acres, in the northern extent of the Project

Area contains land zoned FR with B and D combining zones. There are no proposed Project activities within this area, and therefore the Project will not conflict with or cause rezoning of this zoning designation. There is no land zoned TPZ within the Project Area, and therefore the Project would not conflict with or cause rezoning of any timberland. Furthermore, at the time of preparation of this CEQA document, the Project area was not being utilized for timber production, although selective removal of non-native Monterey pine (*Pinus radiata*) had recently taken place to improve forest health within the Project Area. No conflict with forest land or timberland zoning will occur from construction or operation of the Project, and **no impact** will occur.

d) Result in the loss of forest land or conversion of forest land to non-forest use? (Less than Significant Impact)

Forest land is defined as native tree cover greater than ten percent that allows for management of timber, aesthetics, fish and wildlife, recreation, and other public benefits (Public Resources Code Section 12220(g)). Native forest land vegetation types in the study area typically have greater than ten percent cover by native trees. There is approximately 30 acres of forest land scattered throughout the Project Area. Some area of forest land contains Sensitive Natural Communities, as defined by CDFW. Adverse impacts to Sensitive Natural Communities are considered potentially significant and are discussed in Section 4.4 – Biological Resources.

CEQA permits the use of the Forest Protocols adopted by the California Air Resources Board to quantify a project’s impacts to forest land. This protocol includes three eligible forest management activities designed to increase removals of carbon dioxide from the atmosphere or prevent emissions of carbon dioxide into the atmosphere through increasing and/or conserving forest carbon stocks (CARB 2015). The three eligible forest management activities include reforestation, improved forest management, and avoided conversion (CARB 2015). The Protocols define “forest management” as the commercial or noncommercial growing and harvesting of forests (CARB 2015). According to this definition, there is no existing forest management taking place within the Project Area. Forest management has not taken place within the Project Area since the removal of the Mill Site in 2010. Due to the absence of existing forest management activities within the Project Area, and the lack of future plans to utilize the Project Area for forest management, the Project will not cause a significant impact that will result in a net decrease in forest land within the study area.

In total, approximately 50 to 75 trees located along the Upper Road, 100 trees located in the ERA and 150 trees located along the Southern Drainage Ditch will be removed. The vegetation within the Upper Road and ERA that are designated as Sensitive Natural Communities will be replaced in accordance with Mitigation Measure BIO-28 (Offset Impacts to Sensitive Natural Communities). It is expected that the entire ERA will be revegetated following construction. No Sensitive Natural Communities were identified along the Southern Drainage Ditch and therefore impacts to these species are not considered significant. However, the area along the Southern Drainage Ditch will be revegetated with similar species as to those that were removed.

Approximately 300 trees located in the Prairie Creek riparian corridor will also be removed and replaced within the expanded riparian corridor and floodplain at a minimum one to one ratio, which is described in subsection (b, c) of Section 4.4. Additionally, approximately 20 acres of existing asphalt and concrete will be removed and replaced with four acres of asphalt, leaving 16 acres of landscaped areas which will be planted with native or compatible vegetation, including trees. Although there will be a temporary loss of forest land, implementation of the Project will result in a net increase in forest land due to the in-kind replacement of permanently removed trees along the Upper Road, and the minimum one to one replacement of trees removed in the ERA, Southern Drainage Ditch, and Prairie Creek riparian corridor. For the reasons explained, none of the planned selected tree removal and revegetation will result in fragmentation, indirect loss, or conversion of forest land. A **less than significant impact** will occur. See Section 4.4 – Biological Resources for further analysis of impacts to special status vegetation communities.

e) Convert Farmland or Forest? (Less than Significant Impact)

As noted above in question (a), a LESA analysis was conducted to evaluate the potential impact(s) of the Project on the agricultural or potential agricultural productivity of land within the Project Area.

The LESA analysis conducted for the Project yielded a score of 39, which is not considered significant. The Land Evaluation component of the LESA yielded a score of 23, while the Site Assessment component yielded a score of 16. Thus, even if the final combined score had exceeded 40, it will not have resulted in a significant impact, according to the LESA scoring guidelines. Therefore, the Project's potential to convert Farmland is not considered significant.

Properties in the vicinity of the Project appear to be utilized for forest management, residential uses and agriculture (Google Earth 2015). The areas that border the study area to the east, south and northwest are forested. Forested areas immediately adjacent to the Project Area are owned by RNSP and used for public recreation and wildlife habitat and not for commercial forest management. Properties to the west appear to be utilized as residential, and property southwest of the study area appears to be utilized for agriculture. The Project will not affect the existing surrounding agricultural land uses off site, as was evaluated in the LESA analysis which found the Project to have no impact on lands within a 0.25 mile buffer zone of influence. The Project will not affect surrounding forest related land uses because the Project will result in a net increase of forest land within the Project Area and is not proposing any forest management activities. A **less than significant impact** will occur.

An analysis of potential cumulative impacts on agriculture and forestry resources from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.3 Air Quality

	Potentially Significant Impact	Less-Than-Significant With Mitigation Incorporation	Less-Than-Significant Impact	No Impact
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. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?		✓		
b) Result in a cumulatively considerable net increase in any criteria pollutant for which the project region is non-attainment 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) adversely affecting a substantial number of people?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the project conflict with or obstruct implementation of the applicable air quality plan?	Compliance with NCUAQMD Rule 104 – Prohibitions, Subsection D (Fugitive Dust Emissions)	CEQA Guidelines Appendix G, Checklist Item III (a) NCUAQMD Rules and Regulations
Would the project result in a cumulatively considerable net increase in any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	Exceed NCUAQMD Rule 110 – New Source Review & Prevention of Significant Deterioration Section E, Best Available Control Technology, Table 1.0 Significance Thresholds	CEQA Guidelines Appendix G, Checklist Items III (b) NCUAQMD Rule and Regulations, Rule 110 - New Source Review (NSR) & Prevention of Significant Deterioration (PSD), Section E.1 – BACT NCUAQMD Air Quality Planning & CEQA: Environmental Review Guidelines (NCUAQMD 2018)
Would the project expose sensitive receptors to substantial pollutant concentrations?	Increased cancer risk of greater than 10.0 in a million Increased non-cancer risk of greater than 1.0 Hazard Index (Chronic or Acute)	CEQA Guidelines Appendix G, Checklist Item III (c) Air Resource Board's Air Toxic Control Measures (ATCMs)
Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Creation of a new substantial odor or dust source near existing sensitive receptors	CEQA Guidelines Appendix G, Checklist Item III (d)

This Section evaluates the potential impacts to air quality resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area includes the Project Area and the entire North Coast Unified Air Quality Management District's air basin.

The Project Area is located in a rural part of northern California absent major emissions sources, approximately two miles from the Pacific Ocean. The largest existing source of emissions within the study area is traffic on Highway 101, unpaved road dust, smoke from wood stoves, construction dust, open burning of vegetation, and airborne salts and other particulate matter naturally generated by ocean surf. The study area is located near the coast and is influenced by coastal fog throughout the year.

Regulatory Setting

Federal

Clean Air Act

The federal Clean Air Act of 1977 (CAA) governs air quality in the United States. The U.S. Environmental Protection Agency (EPA) is responsible for enforcing the federal CAA. The EPA is also responsible for establishing the National Ambient Air Quality Standards (NAAQS) for the following six 'criteria' air pollutants: ozone, particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide, carbon monoxide, lead, and sulfur dioxide. The NAAQS are required under the CAA and subsequent amendments.

State

California Clean Air Act

In addition to being subject to federal requirements, air quality in California is also governed by more stringent regulations under the California Clean Air Act. The California Clean Air Act is administered by the California Air Resources Board (CARB), which is part of the California Environmental Protection Agency, and by the Air Quality Management Districts at the regional and local levels. The CARB is responsible for meeting the state requirements of the federal CAA, administering the California Clean Air Act, and establishing the California Ambient Air Quality Standards (CAAQS) which include the six NAAQS criteria pollutants listed above as well as visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride. The CARB regulates mobile air pollution sources, such as motor vehicles. It is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment.

Local

North Coast Unified Air Quality Management District

The North Coast Unified Air Quality Management District (NCUAQMD), one of 35 air districts in California, has jurisdiction over Humboldt, Del Norte, and Trinity counties. The NCUAQMD 's primary responsibility is for controlling air pollution from stationary sources and is committed to achieving and maintaining healthful air quality throughout the tri-county jurisdiction. The NCUAQMD has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits, impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The District monitors air quality, enforces local, state and federal air quality regulations for counties within its jurisdiction, inventories and assess the health risks of TACs, and adopts rules that limit pollution.

The NCUAQMD is listed as "attainment" or "unclassified" for all the federal and state ambient air quality standards except for the state 24-hour particulate (PM_{10}) standard. For construction emissions, the NCUAQMD has indicated that emissions are not considered regionally significant for projects whose construction will be of relatively short in duration, lasting less than one year. For project construction lasting more than one year or that involves above average construction intensity in volume of equipment or area disturbed, construction emissions may be compared to the stationary source emissions thresholds.

To address non-attainment for PM_{10}, the NCUAQMD adopted a Particulate Matter Attainment Plan in 1995. This plan presents available information about the nature and causes of PM_{10} standard exceedances and identifies cost-effective control measures to reduce PM_{10} emissions to levels necessary to meet the CAAQS. However, the NCUAQMD states that the plan, “should be used cautiously as it is not a document that is required in order for the District to come into attainment for the state standard” (NCUAQMD 2018). Therefore, compliance with applicable NCUAQMD PM_{10} rules is applied as the threshold of significance for the purposes of analysis, which includes NCUAQMD Rule 104 Section D, Fugitive Dust Emissions.

Pursuant to Rule 104 Section D, the handling, transporting, or open storage of materials in such a manner, which allows or may allow unnecessary amounts of particulate matter to become airborne, shall not be permitted. Reasonable precautions shall be taken to prevent particulate matter from becoming airborne, including, but not limited to covering open bodied trucks when used for transporting materials likely to give rise to airborne dust and the use of water during the grading of roads or the clearing of land.

For operational activities, Rule 110 - New Source Review (NSR) And Prevention of Significant Deterioration establishes the pre-construction review requirements for new and modified stationary sources of air pollution and to provide mechanisms by which authorities to construct for such sources may be granted without interfering with the attainment or maintenance of ambient air quality standards.

Existing Air Quality – Criteria Air Pollutants

California and the federal government (i.e., the EPA) have established ambient air quality standards for several different pollutants. Most standards have been set to protect public health, but standards for some pollutants have other purposes, such as to protect crops, protect materials, or avoid nuisance conditions. Of pollutants that may be generated by the proposed Project, those of greatest concern are emitted by motor vehicles. These pollutants include fine particulate matter (PM) less than 2.5 microns in diameter ($PM_{2.5}$) and particulate matter less than 10 microns in diameter (PM_{10}). Other pollutants that are less problematic to the region include ozone precursors (nitrogen oxides [NOX] and reactive organic gases [ROG]) and carbon monoxide. Table 4.3-1 – Relevant California and National Ambient Air Quality Standards and Attainment Status summarizes state and federal ambient air quality standards.

Table 4.3-1 Relevant California and National Ambient Air Quality Standards and Attainment Status

Pollutant	Averaging Time	California Standards	North Coast Air Basin Status	National Standards	North Coast Air Basin Status
Ozone	8-hour	0.070 ppm (137 µg/m^3)	Attainment	0.075 ppm (147µg/m^3)	Unclassified/ Attainment
	1-hour	0.09 ppm (180 µg/m^3)	Attainment	None	NA
Carbon Monoxide	1-hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	Unclassified/ Attainment
	8-hour	9.0 ppm (10 mg/m^3)	Attainment	9 ppm (10 mg/m^3)	
Nitrogen Dioxide	1-hour	0.18 ppm (339 µg/m^3)	Attainment	0.100 ppm (188 µg/m^3)	Unclassified/ Attainment
	Annual	0.030 ppm (57 µg/m^3)	Status not reported	0.053 ppm (100 µg/m^3)	
Sulfur Dioxide	1-hour	0.25 ppm (655 µg/m^3)	Attainment	0.075 ppm (196 µg/m^3)	Unclassified

Pollutant	Averaging Time	California Standards	North Coast Air Basin Status	National Standards	North Coast Air Basin Status
	24-hour	0.04 ppm (105 µg/m^3)	Attainment	0.14 ppm (365 µg/m^3)	
	Annual	None	NA	0.03 ppm (56 µg/m^3)	
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m^3	Nonattainment	150 µg/m^3	Unclassified
	Annual	20 µg/m^3	Nonattainment	None	
Fine Particulate Matter ($PM_{2.5}$)	24-hour	None	NA	35 µg/m^3	Unclassified/ Attainment
	Annual	12 µg/m3	Attainment	12 µg/m3	

Notes:
ppm = parts per million
mg/m3 = milligrams per cubic meter
µg/m3 = micrograms per cubic meter

Source: CARB 2016 and 2017

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate air quality include the following:

AQ-1. Improved Air Quality

Air quality that meets state and federal ambient air quality standards.

AQ-2. Particulate Emissions

Successful attainment of California Ambient Air Quality Standards for particulate matter.

AQ-G3. Other Criteria Pollutants

Maintain attainment of Ambient Air Quality Standards for ozone and other criteria pollutants which may be subject to tightening standards.

AQ-P2. Reduce Localized Concentrated Air Pollution

Reduce or minimize the creation of "hot spots" or localized places of concentrated automobile emissions.

AQ-P3. Fireplace and Woodstove PM_{10} Emissions

Support incentives to minimize emissions from fireplaces and woodstoves.

AQ-P4. Construction and Grading Dust Control

Dust control practices on construction and grading sites shall achieve compliance with NCAQMD fugitive dust emission standards.

AQ-P5. Air Quality Impacts from New Development

During environmental review of discretionary permits, reduce emissions of air pollutants from new commercial and industrial development by requiring feasible mitigation measures to achieve the standards of the NCAQMD.

AQ-P6. Buffering Land Uses

During environmental review of discretionary commercial and industrial projects, consider the use of buffers between new sources of emissions and adjacent land uses to minimize exposure to air pollution.

AQ-P7. Interagency Coordination

Coordinate with the NCAQMD early in the permit review process to identify expected regulatory outcomes and minimize delays for projects involving:

A. CEQA environmental review;

B. Building demolition projects that may involve removal of asbestos-containing material subject to National Emission Standards for Hazardous Air Pollutants (NESHAP); and

C. Grading and mining operations subject to State Airborne Toxic Control Measures (ATCM) for naturally occurring asbestos. Rely on the air quality standards, permitting processes, and enforcement capacity of the NCAQMD to define thresholds of significance and set adequate mitigations under CEQA to the maximum extent allowable.

AQ-P8. Reduce Air Quality Impacts from Wildfires

Support and encourage fire suppression of wildfires that may have an acute air quality health impact on local population centers.

AQ-P17. Preservation and Replacement of On-site Trees

Projects requiring discretionary review should preserve large trees, where possible, and mitigate for carbon storage losses attributable to significant removal of trees.

Orick Community Plan

There are no policies within the Orick Community Plan which address air quality resources.

Impact Analysis

a) Conflict with or obstruct implementation of the applicable air quality plan? (Less than Significant with Mitigation)

This impact relates to consistency with an adopted attainment plan. Within the Project vicinity, the NCUAQMD is responsible for monitoring and enforcing local, state, and federal air quality standards.

As noted above, Humboldt County is designated ‘attainment’ for all National Ambient Air Quality Standards. With regard to the California Ambient Air Quality Standards, Humboldt County is designated attainment for all pollutants except PM_{10}. Humboldt County is designated as “non-attainment” for the state’s PM_{10} standard.

PM_{10} refers to inhalable particulate matter with an aerodynamic diameter of less than 10 microns. PM_{10} includes emission of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} emissions include unpaved road dust, smoke from wood stoves, construction dust, open burning of vegetation, and airborne salts and other particulate matter naturally generated by ocean surf. Therefore, any use or activity that generates airborne particulate matter may be of concern to the NCUAQMD. The proposed Project will create PM_{10} emissions in part through vehicles coming and going to the Project Area and the construction activity associated with the Project.

As noted above, Rule 104, Section D – Fugitive Dust Emissions is used by the NCUAQMD to address non-attainment for PM_{10}.

Pursuant to Rule 104 Section D, the handling, transporting, or open storage of materials in such a manner, which allows or may allow unnecessary amounts of particulate matter to become airborne, shall not be permitted. Reasonable precautions shall be taken to prevent particulate matter from becoming airborne, including, but not limited to covering open bodied trucks when used for transporting materials likely to give rise to airborne dust and the use of water during the grading of roads or the clearing of land. During earth moving activities, fugitive dust (PM_{10}) will be generated. The amount of dust generated at any given time will be highly variable and is dependent on the size of the area disturbed at any given time, amount of activity, soil conditions, and meteorological conditions. Unless controlled, fugitive dust emissions during construction of the proposed Project could be a significant impact, therefore, Mitigation Measure AQ-1 will be incorporated to comply with NCUAQMD's Rule 104 Section D.

Mitigation Measure AQ-1: BMPs to Reduce Air Pollution

The contractor shall implement the following BMPs during construction:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, active graded areas, excavations, and unpaved access roads) shall be watered two times per day in areas of active construction.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph, unless the unpaved road surface has been treated for dust suppression with water, rock, wood chip mulch, or other dust prevention measures.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes. Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with the manufacturer's specifications.
- Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The NCUAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

With implementation of Mitigation Measure AQ-1, the Project will not conflict with applicable air plans. This impact will be reduced to a **less than significant level with mitigation**.

Operation of the Project will typically not include the handling, transporting or open storage of materials in which particulate matter may become airborne with the exception of invasive vegetation management, which may include excavations into the earth resulting in exposed soil. However excavations will not be significant in size, as it will only be utilized for invasive vegetation management when appropriate. Operation of the Project may include prescribed burning as a means to manage vegetation which will cause a momentary increase in the amount of airborne particulate matter. Prescribed burns are anticipated to be utilized intermittently, as a means of long-term land management, and will not occur numerous times per year. Due to the limited handling, transport or open storage of materials, and prescribed burns in which particulate matter may become airborne, operation of the Project is not expected to conflict with NCUAQMD's Rule 104 Section D. A **less than significant impact** from operation of the Project will occur.

b) Result in a cumulatively considerable net increase in any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard? (Less than Significant with Mitigation)

The Project's potential to generate a significant amount of criteria pollutants of concern during Project construction and operation is assessed in this Section. As noted above, Humboldt County is designated nonattainment of the State's PM_{10} standard. The County is designated attainment for all other state and federal standards. Potential impacts of concern will be exceedances of state or federal standards for PM_{10}. Localized PM_{10} is of concern during construction because of the potential to emit fugitive dust during earth-disturbing activities.

Localized PM_{10}

The Project will include clearing and grubbing, excavation, grading, vegetation removal, embankment work, asphalt paving, building construction, and landscaping activity. Generally, the most substantial air pollutant emissions will be dust generated from site clearing and grubbing, grading, and excavation. If uncontrolled, these emissions could lead to both health and nuisance impacts. Construction activities will also temporarily generate emissions of equipment exhaust and other air contaminants. The Project's potential impacts from equipment exhaust are assessed separately in question (c) below.

The NCUAQMD does not have formally adopted thresholds of significance for fugitive, dust-related particulate matter emissions above and beyond Rule 104, Section D which does not provide quantitative standards. For the purposes of analysis, this document uses the Bay Area Air Quality Management District (BAAQMD) approach to determining significance for fugitive dust emissions from Project construction. The BAAQMD bases the determination of significance for fugitive dust on a consideration of the control measures to be implemented. If all appropriate emissions control measures recommended by BAAQMD are implemented for a project, then fugitive dust emissions during construction are not considered significant. BAAQMD recommends a specific set of "Basic Construction Measures" to reduce emissions of construction-generated PM_{10} to less than significant. Without incorporation of these Basic Construction Measures, the Project's construction-generated fugitive PM_{10} (dust) will result in a potentially significant impact.

The Basic Construction Measure controls recommended by the BAAQMD are incorporated into Mitigation Measure AQ-1. These controls are consistent with NCUAQMD Rule 104 (D), Fugitive Dust Emission and provide supplemental, additional control of fugitive dust emissions beyond that which will occur with Rule 104 (D) compliance alone. Therefore, with incorporation of Mitigation Measure AQ-1 the Project will result in a **less than significant impact** for construction-period PM_{10} generation, and will not violate or substantially contribute to an existing or projected air quality violation.

Construction Criteria Pollutants

As noted above, the NCUAQMD has indicated that emissions are not considered regionally significant for projects whose construction will be of relatively short duration, lasting less than one year. For project construction lasting more than one year or that involves above average construction intensity in volume of equipment or area disturbed, construction emissions may be compared to the stationary source thresholds. Emission modeling was conducted that assumed the Project will require approximately four years to complete with 90 days of Project work per year. The 90 days assumption was used for compressed emission modeling analysis, although its possible that there will be more than 90 days of construction per year with less driving and less use of equipment.

The NCUAQMD does not have established CEQA significance criteria to determine the significance of impacts that may result from a project; however, the NCUAQMD does have criteria pollutant significance thresholds for new or modified stationary source projects proposed within the NCUAQMD's jurisdiction. NCUAQMD has indicated that it is appropriate for lead agencies to compare proposed construction emissions that last more than one year to its stationary source significance thresholds, which are:

- Nitrogen oxides – 40 tons per year,
- Reactive organic gases – 40 tons per year,
- PM10 – 15 tons per year, and
- Carbon monoxide – 100 tons per year.

If an individual project's emission of a particular criteria pollutant is within the thresholds outlined above, the project's effects concerning that pollutant are considered to be less than significant.

The California Emissions Estimator Model (CalEEMod) version 2016.3.2 was used to estimate air pollutant emissions from Project construction (Appendix C of this ISMND). Construction of the Project is expected to begin in 2020 and require approximately four years to complete. Detailed construction equipment activity was estimated based on Project construction components and detailed data from the Project engineer. The emissions modeling included the activities included in Mitigation Measure AQ-1, such as watering the construction site daily, promptly replacing ground cover on disturbed areas, and cleaning track out off of paved roadways. Table 4.3-2 – Construction Regional Pollutant Emissions summarizes construction-related emissions. As shown in Table 4.3-2, the Project's construction emissions will not exceed the NCUAQMD's stationary sources emission thresholds in any year of construction. Therefore, the Project's construction emissions are considered to have a **less than significant** impact.

Table 4.3-2 Construction Regional Pollutant Emissions

Parameter	Emissions (tons per year)			
	ROG	NO_x	CO	PM_{10}
Project Construction 2020	0.05	0.47	0.51	0.07
Project Construction 2021*	0.43	3.03	3.13	0.54
Project Construction 2022	0.36	2.25	2.91	0.35
Project Construction 2023	0.19	1.12	1.64	0.18
Maximum Annual Construction Emissions	0.43	3.03	3.13	0.54
NCUAQMD Stationary Source Thresholds	40	40	100	15
Significant Impact?	*No*	*No*	*No*	*No*

Note: Project Construction 2021 includes vertical building construction for the Visitor's Center.

Operational Criteria Pollutants

Following construction, operation of the Project will not include any stationary sources of air emissions, with the exception of the infrequent use of a fuel-powered generator during electrical power outages. The use of a generator will be infrequent and was not considered in this operational impact analysis. The Project will generate emissions from vehicle trips, as well as from landscaping activity, and prescribed burns. Project operational emissions were estimated using CalEEMod version 2016.3.2 and Project-specific trip generation from the Traffic Impact Study (Appendix O of this ISMND). Emissions were modeled for year 2024. As shown in Table 4.3-3, the Project's operational emissions will not exceed the NCUAQMD's stationary sources emission thresholds. Therefore, the Project's operational emissions are considered to have a **less than significant impact**.

Table 4.3-3 Operational Regional Pollutant Emissions (2024)

Parameter	Emissions (tons per year)			
	ROG	NO_x	CO	PM_{10}
Total Operational Emissions	0.88	6.75	17.31	4.85
NCUAQMD Stationary Source Thresholds	40	40	100	15
Significant Impact?	*No*	*No*	*No*	*No*

c) Expose sensitive receptors to substantial pollutant concentrations? (Less than Significant Impact with Mitigation)

Activities occurring near sensitive receptors should receive a higher level of preventative planning. Sensitive receptors include school-aged children (schools, daycare, playgrounds), the elderly (retirement community, nursing homes), the infirm (medical facilities/offices), and those who exercise outdoors regularly (public and private exercise facilities, parks). The Orick School is approximately 1.25 miles southwest of the Project. The closest residences are approximately 430 feet (the closest residence) or more from the Project boundary.

BAAQMD's Basic Construction Measures included in Mitigation Measure AQ-1 (BMPs to Reduce Air Pollution) minimize idling times for trucks and equipment to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]) and ensures construction equipment is maintained in accordance with manufacturer's specifications.

Staging areas where the majority of construction equipment will be stationed, will be located 430 feet or greater from sensitive receptors. (The closest residence is approximately 430 feet away (as noted above) from the Prairie Creek Restoration component and 1,700 feet (or 0.32 miles) from the proposed Visitor Center location). Project construction activities will occur in segments throughout the Project Area when possible, and is not expected to include intensive or prolonged construction equipment use in any one location for longer than one year of construction. Due to constraints related to resources other than air quality, construction will generally occur for 90 days or less during any construction season although its possible that there will be more than 90 days of construction per year with less driving and less use of equipment.

Due to the minimum of 430 feet of distance from the majority of construction activities, and the implementation of Mitigation Measure AQ-1 which will control fugitive dust, the Project will not result in the exposure of sensitive receptors to substantial pollutant concentrations. Therefore, with implementation of Mitigation Measure AQ-1 the construction-related impact will be **less than significant with mitigation**.

Following construction, the Project will not include any stationary sources of air emissions or new emissions that will result in substantial long-term operational emissions of criteria air pollutants that will substantially affect sensitive receptors. As described in Section 2.6.4, the Yurok Demonstration Site is expected to host up to four events per year, and each event is expected to last up to four days. Open fires and outdoor cooking may take place at the events, however the closest receptor (residence) to this site is approximately 1,500 feet (or approximately 0.28 miles) away. Due to the distance between the Yurok Demonstration Site and the closest sensitive receptor, pollution sourced from open fires during events at the Yurok Demonstration Site will result in a less than significant impact. As described in Section 2.6.5 – Prairie Creek Restoration, fire management (controlled burns) may be implemented in the restoration area as a means to promote the success of native plant species, and to promote prairie conditions within the floodplain. Prescribed burns are subject to NCUAQMD Regulation II (Open Burning) and permitting requirements. Regulation II and permitting requirements minimize the potential impact of prescribed burning on receptors. Therefore, Project operation will not expose nearby sensitive receptors to substantial levels of pollutants. The operation-related impact will be **less than significant**.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people? (Less than Significant)

The Project is located in Orick, which is a rural, unincorporated community. The Project is located outside of the Urban Development Area and Urban Expansion Area and is surrounded by open space in most directions. A small neighborhood with approximately six to ten residences exists west of the Project Area. As noted above, the closest residence is approximately 430 feet away from the Prairie Creek Restoration component and 1,700 feet (or 0.32 miles) from the proposed Visitor Center location. Construction will be dispersed throughout the entire Project Area and will not be concentrated adjacent to the residential neighborhood.

The Project will create limited exhaust fumes from gas and diesel powered equipment. The likelihood of these odors and emissions reaching nearby receptors is influenced by atmospheric conditions, specifically wind direction. Wind tends to blow from the west in the vicinity of the Project due to the coastal location, which will blow odors and emissions away from nearby receptors. Should the wind be blowing from the east, odors and emissions may reach the adjacent neighborhood on a short-term and temporary basis, limited to the length of construction on a given day. Construction activities will take place in accordance with the schedule listed in Section 2.7.1 – Project Construction. Due to the distance between residences and the Project, atmospheric conditions, the relative short-term nature of construction, and the small amount of people residing adjacent to the Project area, emissions or odors caused by construction of the Project will not adversely affect a substantial amount of people. Therefore, a **less than significant impact** will occur.

Following construction, implementation of the Project will not result in any major sources of odor or emissions, except for the uncommon use of a fuel-powered generator during electrical power outages should it be needed. There will be **less than significant impact**.

An analysis of potential cumulative impacts on air quality from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.4 Biological Resources

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		✓		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US 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?				✓

Evaluation Criteria	Significance Thresholds	Sources
Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Uncompensated loss of any plant or animal species or individuals listed as rare, threatened, or endangered by federal or state government, or loss or degradation of habitat that supports such species	CEQA Guidelines Appendix G, Checklist Item IV (a) General Plan Policies BR-P2 and BR-P12
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 the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Uncompensated loss of more than an incidental and minor area of riparian habitat or other sensitive habitat type (excluding wetlands defined by Section 401 of the Clean Water Act) identified under federal, state or local policies	CEQA Guidelines Appendix G, Checklist Item IV (b) General Plan Policy BR-P6
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, filing, hydrological interruption, or other means?	Uncompensated loss or severe degradation of more than an incidental or minor area of wetlands as defined by USACE and SWRCB	CEQA Guidelines Appendix G, Checklist Item IV (c) General Plan Policies BR-P5, BR-P6, BR-P7, BR-P8
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?	Uncompensated loss or substantive modification of key habitat areas that provide for continuity of movement for resident or migratory wildlife, or as a loss or substantive degradation of key habitat components that would result in loss of use of important concentration areas for wildlife	CEQA Guidelines Appendix G, Checklist Item IV (d)
Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	Uncompensated loss of important biological resources that is inconsistent with local ordinance or policies	CEQA Guidelines Appendix G, Checklist Item IV (e)
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?	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan	CEQA Guidelines Appendix G, Checklist Item IV (f)

This Section evaluates the potential impacts to biological resources resulting from construction and operation of the Project against significance thresholds derived from applicable local or state policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area includes the Project Area and areas approximately 500 beyond the Project Area that are not adjacent to Highway 101, which were assessed via binoculars. The Prairie Creek sub-basin is 93 percent forested, and almost half of that forest is late seral stands of coast redwood and other conifers (Wilzbach and Ozaki 2017). The Prairie Creek watershed is described by Wilzbach and Ozaki (2017) as follows:

> *Prairie Creek drains 103 km^2 of the northwestern portion of the 731 km^2 Redwood Creek basin, in coastal northern California. The largest and most pristine of the Redwood Creek tributaries, Prairie Creek, enters Redwood Creek close to its mouth, at river km 5.6. Redwood Creek flows into the Pacific Ocean 2.7 km west of the town of Orick, California. The Prairie Creek sub-basin is composed of forested terrain from approximately 8 m to 692 m in elevation, nearly all (98%) of which is in public ownership and managed by Redwood National and State Parks.*

The Project's eastern boundary encroaches onto RNSP property, which continues east, north and south and includes over 13,000 acres of contiguous forest habitat. This area is considered extremely biodiverse and comprises old growth and second growth redwood forest which supports a variety of common and special-status wildlife and plant species. See Table 4.4-1 (below) for a list of all special-status wildlife species known from or with potential to occur in the Project vicinity. The Project Area includes open grassland habitat, and riparian habitat adjacent to Prairie Creek, and previously disturbed areas including the Mill Site and Upper and Lower Roads, which are covered by asphalt.

Regulatory Setting

Federal

Endangered Species Act

The ESA of 1973 (16 USC 1531 et seq.) establishes a national policy that all federal departments and agencies provide for the conservation of threatened and endangered species and their ecosystems. Pursuant to the requirements of the ESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed or proposed species may be present in the project region, and whether the proposed project will result in a "take" of such species. The ESA prohibits "take" of a single threatened and endangered species except under certain circumstances and only with authorization from the USFWS or the National Oceanic and Atmospheric Administration (NOAA) Fisheries through a permit under Section 7 (for federal entities or federal actions) or 10(a) (for non-federal entities) of the Act. "Take" under the ESA includes activities such as "harass, harm, pursue, hunt shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Clean Water Act Section 404

The CWA (1977, as amended) establishes the basic structure for regulating discharges of pollutants into Waters of the U.S. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters, without a permit under its provisions. Proposed discharges of dredged or fill material into Waters of the U.S. requires USACE authorization under Section 404 of the CWA [33 U.S.C. 1344]. USACE regulations implementing Section 404 define "Waters of the U.S." to include intrastate waters (such as, lakes, rivers, streams, wetlands, and natural ponds) that the use, degradation, or destruction of could affect interstate or foreign commerce. Wetlands are defined for regulatory purposes as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3; 40 CFR 230.3).

Executive Order 11990

Executive Order 11990 (1977) furthers the protection of wetlands under NEPA through avoidance of long and short-term adverse impacts associated with the destruction or modification of wetlands where practicable. The order requires all federal agencies managing federal lands, sponsoring federal projects, or funding state or local projects to assess the effects of their actions on wetlands.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-711) as amended established federal responsibilities for the protection of nearly all species of birds, their eggs, and nests. A migratory bird is defined as any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. The MBTA prohibits the take, possession, buying, selling, purchasing, or bartering of any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Only exotic species such as Rock Pigeons (*Columba livia*), House Sparrows (*Passer domesticus*), and European Starlings (*Sturnus vulgaris*) are exempt from protection.

Bald and Golden Eagle Protection Act

The Bald Eagle Protection Act was originally enacted in 1940 to protect the national emblem of the United States, the Bald Eagle. At this time, the Bald Eagle was experiencing significant population pressures from hunting, egg collection, and habitat loss (Buehler 2000). This act was expanded upon in 1962 to include protections for the Golden Eagle (*Aquila chrysaetos*). Similarly, the Golden Eagle was also experiencing precipitous population declines due to habitat loss, hunting, and electrocution from power lines (Kochert et al. 2002).

Magnuson-Stevens Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) provides the federal government with the authority to manage fisheries in the U.S. Exclusive Economic Zone (EEZ) (from state waters which end 3 nautical miles offshore, to a distance of 200 nautical miles). In addition, the Act mandates inter-agency cooperation in achieving protection, conservation, and enhancement of Essential Fish Habitat (EFH). The Act defines EFH as "Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The Project Area is located within area designated as EFH (NOAA 2019a).

State

California Endangered Species Act

The California Endangered Species Act (CESA) includes provisions for the protection and management of species listed by the State of California as endangered, threatened, or designated as candidates for such listing (California Fish and Game Code (FGC) Sections 2050 through 2085). The CESA generally parallels the main provisions of the ESA and is administered by the CDFW, which maintains a list of state threatened and endangered species as well as candidate and species of special concern. The act requires consultation “to ensure that any action authorized by a state lead agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of the species” (Section 2053).

State Species of Special Concern

The CDFW maintains a list of species and habitats of special concern. These are broadly defined as species that are of concern to the CDFW because of population declines and restricted distributions, and/or they are associated with habitats that are declining in California. The criteria used to define special-status species are described by the CDFW. Impacts to special-status plants, animals, and habitats may be considered significant under CEQA.

Native Plant Protection Act

The CDFW administers the California Native Plant Protection Act (CNPPA) (Sections 1900–1913 of the CFGC). These sections allow the California Fish and Game Commission to designate rare and endangered plant species and to notify landowners of the presence of such species. Section 1907 of the CFGC allows the Commission to regulate the “taking, possession, propagation, transportation, exportation, importation, or sale of any endangered or rare native plants.”

Sensitive Natural Communities

CDFW provides oversight of habitats (i.e. plant communities) listed as sensitive in the California Natural Diversity Database (CNDDB), based on global and state rarity rankings according to the list of statewide natural communities, *Hierarchical List of Natural Communities*. The natural communities are broken down to the alliance level for vegetation types affiliated with ecological sections in California. The list and alliances coincide with A Manual of California Vegetation (Sawyer et al. 2009). According to the CDFW vegetation classification of natural community hierarchy list, habitats are listed as “high priority for inventory” based on global or state rarity rankings. CDFW considers alliances and associations with a S1 to S3 rank to be Sensitive Natural Communities (CDFW 2019a).

California Fish and Game Code

The CDFW enforces the California Fish and Game Code (CFGC), which provides protection for “fully protected birds” (Section 3511), “fully protected mammals” (Section 4700), “fully protected reptiles and amphibians” (Section 5050), and “fully protected fish” (Section 5515). With the exception of permitted scientific research, no take of any fully protected species is allowed.

Section 3503 of the CFGC prohibits the take, possession, or needless destruction of the nest or eggs of any bird. Subsection 3503.5 specifically prohibits the take, possession, or destruction of any birds in the orders Falconiformes (hawks and eagles) or Strigiformes (owls) and their eggs or nests. These provisions, along with the federal MBTA, essentially serve to protect nesting native birds. Non-native species, including the European Starling, Rock Dove, and House Sparrow, are not afforded protection under the MBTA or CFGC.

Streams, lakes, and riparian vegetation as habitat for fish and other wildlife species, are subject to jurisdiction by the CDFW under Sections 1600-1616 of the CFGC. A Section 1602 Lake and Streambed Alteration Agreement is required if a project:

- Substantially obstructs or diverts the natural flow of a river, stream, or lake,
- Substantially changes or uses any material from the bed, channel, or bank of a river, stream, or lake or
- Deposits or disposes of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

Project areas within creeks and extending to the outer drip line of riparian vegetation will fall within CDFW jurisdiction under Section 1602.

Porter-Cologne Water Quality Control Act

The State Water Resources Control Board (SWRCB) regulates construction storm water discharges through SWRCB Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges that Have Received State Water Quality Certification." The state's authority to regulate activities in wetlands and waters resides primarily with the SWRCB, which in turn has authorized the state's nine Regional Water Quality Control Boards (RWQCB) to regulate such activities. Under Section 401 of the federal CWA, every applicant for a federal permit for any activity that may result in a discharge to a water body must obtain State Water Quality Certification that the proposed activity will comply with state water quality standards.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate biological resources include the following:

CO-G4. Parks and Recreation

Well maintained and accessible parks offering a range of popular recreation opportunities and a regional trail system that meets future recreational and non-motorized transportation demands.

BR-G1. Threatened and Endangered Species

Sufficient recovery of threatened and endangered species to support de-listing.

BR-G2. Sensitive and Critical Habitat

A mapped inventory of sensitive and critical habitat where biological resource protection policies apply.

BR-G3. Benefits of Biological Resources

Fish and wildlife habitats protected on a sustainable basis to generate long-term public, economic, and environmental benefits.

BR-P1. Compatible Land Uses

Area containing sensitive habitats shall be planned and zoned for uses compatible with the long-term sustainability of the habitat. Discretionary land uses and building activity in proximity to sensitive habitats shall be conditioned or otherwise permitted to prevent significant degradation of sensitive habitat, to the extent feasible consistent with California Department of Fish and Wildlife guidelines or recovery strategies.

BR-P2. Critical Habitat

Discretionary projects which use federal permits or federal funds on private lands that have the potential to impact critical habitat shall be conditioned to avoid significant habitat modification or destruction consistent with federally adopted Habitat Recovery Plans or interim recovery strategies.

BR-P4. Development within Stream Channels

Development within stream channels shall be permitted when there is no lesser environmentally damaging feasible alternative, and where the best feasible mitigation measures have been provided to minimize adverse environmental effects. Development shall be limited to essential, non-disruptive projects as listed in Standard BR-S6 - Development within Stream Channels.

BR-P5. Streamside Management Areas

To protect sensitive fish and wildlife habitats and to minimize erosion, runoff, and interference with surface water flows, the County shall maintain Streamside Management Areas along streams including intermittent streams that exhibit in-channel wetland characteristics and off-channel riparian vegetation.

BR-P6. Development within Streamside Management Areas

Development within Streamside Management Areas shall only be permitted where mitigation measures (Standards BR-S8 - Required Mitigation Measures, BR-S9 - Erosion Control, and BR-S10 - Development Standards for Wetlands) have been provided to minimize any adverse environmental effects and shall be limited to uses as described in Standard BR-S7 - Development within Streamside Management Areas.

BR-P7. Wetlands Identification

The presence of wetlands in the vicinity of a proposed project shall be determined during the review process for discretionary projects and for ministerial building and grading permit applications, when the proposed building development activity involves new construction or expansion of existing structures or grading activities. Wetland delineation by a qualified professional shall be required when wetland characterization and limits cannot be easily inventoried and identified by site inspection.

BR-P10. Invasive Plant Species

The County shall cooperate with public and private efforts to manage and control noxious and exotic invasive plant species. The County shall recommend measures to minimize the introduction of noxious and exotic invasive plant species in landscaping, grading and major vegetation clearing activities.

BR-P11. Biological Resource Maps

Biological resource maps shall be consulted during the ministerial and discretionary permit review process in order to identify habitat concerns and to guide mitigation for discretionary projects that will reduce biological resource impacts to below levels of significance, consistent with CEQA.

BR-P12. Agency Review

The County shall request the California Department of Fish and Wildlife, as well as other appropriate trustee agencies and organizations, to review plans for development within Sensitive Habitat, including Streamside Management Areas. The County shall request NOAA Fisheries or U.S. Fish and Wildlife Service to review plans for development within critical habitat if the project includes federal permits or federal funding. Recommended mitigation measures to reduce impacts below levels of significance shall be considered during project approval, consistent with CEQA.

BR-P13. Landmark Trees

Establish a program to identify and protect landmark trees, including trees that exhibit notable characteristics in terms of their size, age, rarity, shape or location.

WR-G2. Water Resource Habitat.

River and stream habitat supporting the recovery and continued viability of wild, native salmonid and other abundant coldwater fish populations supporting a thriving commercial, sport and tribal fishery

S-P26. Protection of Native Plants

The County shall promote fire-safe practices that encourage conservation and use of native plants and native plant ecosystems, while protecting citizens, firefighters, and property.

Humboldt County Code Section 314-61 – Streamside Management Areas and Wetlands Ordinance

Section 61.1.2 Purpose

The purpose of this section is to provide minimum standards pertaining to the use and development of land located within Streamside Management Areas, wetlands and other wet areas such as: natural ponds, springs, vernal pools, marshes, and wet meadows.

The purpose of establishing the standards is to:

- Create a Streamside Management Areas and Wetlands ordinance within the zoning regulations of the County of Humboldt pursuant to the mandates of state law.
- Implement portions of the County's General Plan policies and standards pertaining to open space, conservation, housing, water resources, biological resources, and public facilities.

Impact Analysis

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service? (Less than Significant with Mitigation)

The Project includes development of amenities to serve the public and the restoration of ecological processes to benefit wildlife and unique habitats such as wetlands. Development components of the Project include the construction of the Visitor Center, CCT, Yurok Demonstration Site, and Canopy Walkway, and restoration components include enhancements to Prairie Creek and Libby Creek. Construction and operation of the Project have the potential to adversely affect special-status wildlife and plant species. This impact analysis section addresses special-status wildlife species followed by special-status plant species. If appropriate, mitigation measures are proposed to reduce the impact to a less than significant level.

Wildlife Resources

As described in the Special-status Wildlife Evaluation and Wildlife Surveys for the Redwood National and State Park Visitor Center and Restoration Project (GHD 2019c), which can be found in Appendix D of this ISMND, prior to initiating fieldwork, database searches were conducted of CDFW's California Natural Diversity Database (CNDDB) in 2018 and subsequently in 2019 (CDFW 2019b). GHD biologists also reviewed the USFWS Information for Planning and Consultation, and the NMFS listed/proposed threatened and endangered species lists to compile a list of potential special-status species that are known to occur in the study area and/or have the potential to occur at the Project Area. Relevant literature was also reviewed, including recovery plans, status reports, published articles, species lists maintained by various entities, and previous regulatory review documents, when available. Topographic maps and aerial photography were also consulted prior to and during the field survey to determine potential habitats for target special-status species occurrence.

Per the queries of databases listed above and site visits summarized in the Wildlife Evaluation and Survey Report (GHD 2019c), 77 special-status wildlife species with the potential to occur in the study area were identified. Three special-status species were observed in the study area, 32 special-status species have a moderate or high potential of occurring in the study area, ten special-status species have a low potential of occurring in the Project Area, and six special-status species have no potential of occurring in the study area (CNDDB 2019). These determinations are based on the presence or absence of suitable habitat. See Table 4.4-1 – Special-status Wildlife Species that May Occur in the Project Area for the list of special-status wildlife species with each species' potential to occur within the Project Area. The seven species with no potential to occur are found in marine or tidal habitats or are known to exist only within one distinct area, and were omitted from Table 4.4-1 due to the absence of suitable habitat within the study area and have been excluded from further consideration. These species include Western Snowy Plover (*Charadrius nivosus nivosus*), Short-tailed Albatross (*Phoebastria albatrus*), Green Sea Turtle (*Chelonia mydas*), Leatherback Sea Turtle (*Dermochelys coriacea*), Olive Ridley Sea Turtle (*Lepidochelys olivacea*), Tidewater Goby (*Eucyclogobius newberryi*), and Behren's Silverspot Butterfly (*Speyeria zeren behrensii*).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Mammals										
Antrozous pallidus	Pallid Bat	None	None	G5	S3	BLM-S, CDFW-SSC, IUCN-LC, USFS-S, WBWG-H	Chaparral | Coastal scrub | Desert wash | Great Basin grassland | Great Basin scrub | Mojavean desert scrub | Riparian woodland | Sonoran desert scrub | Upper montane coniferous forest | Valley & foothill grassland	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting.	Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Low Potential.** Project area does not provide xeric habitat preferred by this species. However, there is a record of this species from the vicinity of the Bald Hills (CDFW 2019b).
Arborimus pomo	Sonoma Tree Vole	None	None	G3	S3	CDFW-SSC, IUCN-NT	North coast coniferous forest | Old growth | Redwood	North coast fog belt from Oregon border to Sonoma County. In Douglas-fir, redwood & montane hardwood-conifer forests.	Feeds almost exclusively on Douglas-fir needles. Will occasionally take needles of grand fir, hemlock or spruce.	**High Potential.** Project Area located in North Coast fog belt, and Douglas-fir trees located within the Project area. Possible species detection in Centennial Tree (Sillett and Campbell-Spickler 2017).
Corynorhinus townsendii	Townsend's Big-eared Bat	None	None	G3G4	S2	BLM-S, CDFW-SSC, IUCN-LC, USFS-S, WBWG-H	Broadleaved upland forest | Chaparral | Chenopod scrub | Great Basin grassland | Great Basin scrub | Joshua tree woodland | Lower montane coniferous forest | Meadow & seep | Mojavean desert scrub | Riparian forest | Riparian woodland | Sonoran desert scrub | Sonoran thorn woodland | Upper montane coniferous forest | Valley & foothill grassland	Throughout California in a wide variety of habitats. Most common in mesic sites.	Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	**Moderate Potential.** No records of the species from the immediate Project Area. However, species is known to roost in Redwood basal hollows (Gellman and Zielinski 1996). Requisite roosting and foraging habitat is present in the Project vicinity.

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Erethizon dorsatum	North American Porcupine	None	None	G5	S3	IUCN-LC	Broadleaved upland forest | Cismontane woodland | Closed-cone coniferous forest | Lower montane coniferous forest | North coast coniferous forest | Upper montane coniferous forest	Forested habitats in the Sierra Nevada, Cascade, and Coast ranges, with scattered observations from forested areas in the Transverse Ranges.	Wide variety of coniferous and mixed woodland habitat.	**Low Potential.** The species is regionally rare. Although some habitat for the species is present at the Project Area, there are no recent records of this species from the Project vicinity (CDFW 2019b).
Lasionycteris noctivagans	Silver-haired Bat	None	None	G5	S3S4	IUCN-LC, WBWG-M	Lower montane coniferous forest | Oldgrowth | Riparian forest	Primarily a coastal and montane forest dweller, feeding over streams, ponds & open brushy areas.	Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes, and rarely under rocks. Needs drinking water.	**High Potential.** Suitable habitat for this species is present in the Project Area and there are records from the Project vicinity (CDFW 2019b, iNaturalist 2019).
Martes caurina humboldtensis	Humboldt Marten	None	Candidate Endangered	G5T1	S1	CDFW-SSC, USFS-S	North coast coniferous forest | Oldgrowth | Redwood	Occurs only in the coastal redwood zone from the Oregon border south to Sonoma County.	Associated with late-successional coniferous forests, prefer forests with low, overhead cover.	**Low Potential.** There have been two detections of this species in Prairie Creek Redwoods State Park in the last 15 years, although the Park does not appear to support a viable population. The primary existing populations are in Del Norte County (CDFW 2019b). Occurrence would be unlikely but not impossible.
Myotis evotis	Long-eared Myotis	None	None	G5	S3	BLM-S, IUCN-LC, WBWG-M		Found in all brush, woodland and forest habitats from sea level to about 9000 ft. Prefers coniferous woodlands and forests.	Nursery colonies in buildings, crevices, spaces under bark, and snags. Caves used primarily as night roosts.	**High Potential.** Suitable habitat exists in Project Area and there is a record of this species from the Project vicinity (CDFW 2019b).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Myotis yumanensis	Yuma Myotis	None	None	G5	S4	BLM-S, IUCN-LC, WBWG-L/M	Lower montane coniferous forest | Riparian forest | Riparian woodland | Upper montane coniferous forest	Optimal habitats are open forests and woodlands with sources of water over which to feed.	Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings or crevices.	**High Potential.** Suitable habitat exists in Project Area and there is a record of this species from the Project vicinity (CDFW 2019b).
Pekania pennanti	Pacific Fisher	None	Candidate Threatened	G5T2T3Q	S2S3	BLM-S, CDFW-SSC, USFS-S	North coast coniferous forest | Oldgrowth | Riparian forest	Intermediate to large-tree stages of coniferous forests and deciduous-riparian areas with high percent canopy closure.	Uses cavities, snags, logs and rocky areas for cover and denning. Needs large areas of mature, dense forest.	**Present.** This species has been detected onsite (in the centennial tree) and suitable habitat is present in the Project Area (Sillett and Campbell-Spicker 2017).
Birds										
Accipiter cooperii	Cooper's Hawk	None	None	G5	S4	CDFW-WL, IUCN-LC	Cismontane woodland | Riparian forest | Riparian woodland | Upper montane coniferous forest	Woodland, chiefly of open, interrupted or marginal type.	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	**Moderate Potential.** Suitable breeding and foraging habitat is present for this species in the Project Area. In addition, there are a few records of this species from the Project vicinity (eBird 2019).
Accipiter striatus	Sharp-shinned Hawk	None	None	G5	S4	CDFW-WL, IUCN-LC	Cismontane woodland | Lower montane coniferous forest | Riparian forest | Riparian woodland	Ponderosa pine, black oak, riparian deciduous, mixed conifer, and Jeffrey pine habitats. Prefers riparian areas.	North-facing slopes with plucking perches are critical requirements. Nests usually within 275 ft of water.	**Moderate Potential.** Suitable breeding and foraging habitat is present for this species in the Project Area. In addition, there are a few records of this species from the Project vicinity (eBird 2019).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Ardea herodias	Great Blue Heron	None	None	G5	S4	CDF-S, IUCN-LC	Brackish marsh | Estuary | Freshwater marsh | Marsh & swamp | Riparian forest | Wetland	Colonial nester in tall trees, cliffsides, and sequestered spots on marshes.	Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	**Moderate Potential.** There are species records from the vicinity and requisite foraging habitat may be present (eBird 2019).
Bonasa umbellus	Ruffed Grouse	None	None	G5	S3S4	CDFW-WL, IUCN-LC	North coast coniferous forest | Riparian forest | Upper montane coniferous forest	Extreme northern humid coastal strip, in Del Norte, Humboldt, and Siskiyou counties.	Inhabits dense canyon-bottom or stream-side growths, usually of mixed deciduous and coniferous trees.	**Moderate Potential.** Habitat onsite would be considered marginal for the species, and higher quality habitat is present to the east of the Project Area. However, there are a few species occurrences from the Project vicinity (eBird 2019).
Brachyramphus marmoratus	Marbled Murrelet	Threatened	Endangered	G3G4	S1	CDF-S, IUCN-EN NABCI-RWL	Lower montane coniferous forest | Old growth | Redwood	Feeds near-shore; nests inland along coast from Eureka to Oregon border and from Half Moon Bay to Santa Cruz.	Nests in old-growth redwood-dominated forests, up to six miles inland, often in Douglas-fir.	**High Potential.** Suitable habitat exists adjacent to Project Area. Known occurrences of this species have occurred within Project vicinity (CDFW 2019b).
Chaetura vauxi	Vaux's Swift	None	None	G5	S2S3	CDFW-SSC, IUCN-LC	Lower montane coniferous forest | North coast coniferous forest | Old growth | Redwood	Redwood, Douglas-fir, & other coniferous forests. Nests in large hollow trees & snags. Often nests in flocks.	Forages over most terrains and habitats but shows a preference for foraging over rivers and lakes.	**Moderate Potential.** Suitable habitat exists within Project Area and there are numerous records from the Project vicinity (eBird 2019).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Circus hudsonius	Northern Harrier	None	None	G5	S3	CDFW-SSC, IUCN-LC	Coastal scrub | Great Basin grassland | Marsh & swamp | Riparian scrub | Valley & foothill grassland | Wetland	Coastal salt & freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas.	Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	**Moderate Potential.** Species not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding and foraging habitat for the species is present adjacent to the Project Area (GHD 2019c, eBird 2019).
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Threatened	Endangered	G5T2T3	S1	BLM-S, NABCI-RWL, USFS-S, USFWS-BCC	Riparian forest	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape.	**Low Potential.** Although some riparian habitat is present at the Project Area, there are no records of this species from the Project vicinity and the riparian habitat is considered marginal. The closest recent occurrences of this species to the Project Area are from the Arcata Marsh (eBird 2019).
Empidonax traillii brewsteri	Little Willow Flycatcher	None	Endangered	G5T3T4	S1S2	USFWS-BCC	Meadow & seep | Riparian woodland	Mountain meadows and riparian habitats in the Sierra Nevada and Cascades.	Nests near the edges of vegetation clumps and near streams.	**Moderate Potential.** The species not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (GHD 2019c, eBird 2019). Some marginal breeding and foraging habitat for the species is present at the Project Area.

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Falco peregrinus anatum	Peregrine Falcon	Delisted	Delisted	G4T4	S3S4	CDF-S CDFW-FP, USFWS-BCC		Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures.	Nest consists of a scrape or a depression or ledge in an open site.	**Moderate Potential.** The species is relatively common in the Project vicinity, with known breeding pairs in the Park. Although the majority of the records for this species in the Project vicinity are located along the beach to the west, species presence at the site is possible (eBird 2019).
Haliaeetus leucocephalus	Bald Eagle	Delisted	Endangered	G5	S3	BLM-S, CDF-S, CDFW-FP, IUCN-LC, USFS-S, USFWS-BCC	Lower montane coniferous forest | Oldgrowth	Ocean shore, lake margins, and rivers for both nesting and wintering. Most nests within 1 mile of water.	Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	**Moderate Potential.** Species not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding habitat for the species is present within the Project vicinity (eBird 2019, GHD 2019c).
Icteria virens	Yellow-breasted Chat	None	None	G5	S3	CDFW-SSC, IUCN-LC	Riparian forest | Riparian scrub | Riparian woodland	Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses.	Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 ft of ground.	**Moderate Potential.** The species not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (GHD 2019c, eBird 2019). Some breeding and foraging habitat for the species is present at the Project Area.

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Nycticorax nycticorax	Black-crowned Night Heron	None	None	G5	S4	IUCN-LC	Marsh & swamp | Riparian forest | Riparian woodland | Wetland	Colonial nester, usually in trees, occasionally in tule patches.	Rookery sites located adjacent to foraging areas: lake margins, mud-bordered bays, marshy spots.	**Low Potential.** Project Area contains aquatic features, however the riparian forest habitat would be considered marginal for the species. Most records of this species from the Project vicinity are along Redwood Creek, close to the confluence (eBird 2019).
Pandion haliaetus	Osprey	None	None	G5	S4	CDF-S, CDFW-WL,| IUCN-LC	Riparian forest	Ocean shore, bays, freshwater lakes, and larger streams.	Large nests built in tree-tops within 15 miles of a good fish-producing body of water.	**High Potential.** Species not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Suitable breeding habitat for the species is present within the Project vicinity (eBird 2019, GHD 2019c).
Poecile atricapillus	Black-capped Chickadee	None	None	G5	S3	CDFW-WL, IUCN-LC	Riparian woodland	Inhabits riparian woodlands in Del Norte and northern Humboldt counties.	Mainly found in deciduous tree-types, especially willows and alders, along large or small watercourses.	**Moderate Potential.** Although the species was not detected during GHD surveys in 2018, 2019, there are numerous records of this species from the Project vicinity and some riparian habitat is present onsite (GHD 2019c, eBird 2019).
Riparia riparia	Bank Swallow	None	Threatened	G5	S2	BLM-S, IUCN-LC	Riparian scrub | Riparian woodland	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**Low Potential.** Project Area contains limited vertical banks. Incised channel of Libby Creek and Prairie Creek may provide marginal breeding habitat. Closest known species records are from the Thomas A. Kuchel Park Visitor Center (eBird 2019).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Setophaga petechia	Yellow Warbler	None	None	G5	S3S4	CDFW-SSC, USFWS-BCC	Riparian forest | Riparian scrub | Riparian woodland	Riparian plant associations in close proximity to water. Also nests in montane shrubbery in open conifer forests in Cascades and Sierra Nevada.	Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	**Moderate Potential.** The species not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (GHD 2019c, eBird 2019). Some breeding and foraging habitat for the species is present at the Project Area.
Strix occidentalis caurina	Northern Spotted Owl	Threatened	Threatened	G3T3	S2S3	CDF-S, CDFW-SSC, IUCN-NT, NABCI-YWL	North coast coniferous forest | Oldgrowth | Redwood	Old-growth forests or mixed stands of old-growth and mature trees. Occasionally in younger forests with patches of big trees.	High, multistory canopy dominated by big trees, many trees with cavities or broken tops, woody debris, and space under canopy.	**High Potential.** Suitable habitat exists adjacent to Project Area. Known occurrences of this species have occurred within Project vicinity (CDFW 2019b).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Reptiles										
Emys marmorata	Western Pond Turtle	None	None	G3G4	S3	BLM-S, CDFW-SSC, IUCN-VU, USFS-S	Aquatic | Artificial flowing waters | Klamath/North coast flowing waters | Klamath/North coast standing waters | Marsh & swamp | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters | South coast flowing waters | South coast standing waters | Wetland	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation.	Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**Moderate Potential.** Species was not noted during active season visits in May 2018 and September 2018; the fall visit focused on this species and it was conducted under good weather conditions (GHD 2019c). Although pond turtles are likely not abundant in the Project Area, in part because of relatively cool coastal conditions, they have been reported in low numbers within nearby park areas including in Redwood Creek (Personal comm. David Anderson, NPS 2018 and Justin Garwood, CDFW 2018).
Amphibians										
Ascaphus truei	Pacific Tailed Frog	None	None	G4	S3S4	CDFW-SSC, IUCN-LC	Aquatic | Klamath/North coast flowing waters | Lower montane coniferous forest | North coast coniferous forest | Redwood | Riparian forest	Occurs in montane hardwood-conifer, redwood, Douglas-fir & ponderosa pine habitats.	Restricted to perennial montane streams. Tadpoles require water below 15 degrees C.	**Moderate Potential.** Project Area contains suitable coniferous forest and cool perennial streams. Although the species was not detected during amphibian surveys onsite, there are numerous CNDDB records within a few miles of the Project Area (CDFW 2019b, GHD 2019c).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Plethodon elongatus	Del Norte Salamander	None	None	G4	S3	CDFW-WL, IUCN-NT	Oldgrowth	Old-growth associated species with optimum conditions in the mixed conifer/hardwood ancient forest ecosystem.	Cool, moist, stable microclimate, a deep litter layer, closed multi-storied canopy, dominated by large, old trees.	**Moderate Potential.** Project Area contains limited habitat, however there is abundant suitable habitat adjacent to Project Area. Species has been detected in the Project vicinity (iNaturalist 2019).
Rana aurora	Northern Red-legged Frog	None	None	G4	S3	CDFW-SSC, IUCN-LC, USFS-S	Klamath/North coast flowing waters | Riparian forest | Riparian woodland	Humid forests, woodlands, grasslands, and streamsides in northwestern California, usually near dense riparian cover.	Generally near permanent water, but can be found far from water, in damp woods and meadows, during non-breeding season.	**Present.** Various life stages of this species have been documented at the Project Area. The site likely provides habitat for the species year-round, including breeding sites (GHD 2019c).
Rana boylii	Foothill Yellow-legged Frog	None	Candidate Threatened	G3	S3	BLM-S, CDFW-SSC, IUCN-NT, USFS-S	Aquatic | Chaparral | Cismontane woodland | Coastal scrub | Klamath/North coast flowing waters | Lower montane coniferous forest | Meadow & seep | Riparian forest | Riparian woodland | Sacramento/San Joaquin flowing waters	Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats.	Needs at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis.	**Low Potential.** Confirmed immediately to the south (outside of Project Area) in Redwood Creek in September 2018. Tadpoles were observed about 80 meters directly south of the entrance gate, and the species is well documented from other parts of Redwood Creek. However, no optimal habitat is present for this species within the Project Area, and if the species enters the Area, it is likely as an occasional dispersing individual.

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Rhyacotriton variegatus	Southern Torrent Salamander	None	None	G3G4	S2S3	CDFW-SSC, IUCN-LC, USFS-S	Lower montane coniferous forest | Oldgrowth | Redwood | Riparian forest	Coastal redwood, Douglas-fir, mixed conifer, montane riparian, and montane hardwood-conifer habitats. Old growth forest.	Cold, well-shaded, permanent streams and seepages, or within splash zone or on moss-covered rocks within trickling water.	**Present.** Project Area contains well shaded, permanent streams. Species was observed onsite in both small tributaries of Prairie Creek. A large larvae was observed below the impoundment in Libby Creek in September 2017, and an adult was observed in Otter Creek a short distance to the north in May 2018 (GHD 2019c).
Fish										
Acipenser medirostris	Green Sturgeon - sDPS	Threatened	None	G3	S1S2	AFS-VU, CDFW-SSC, IUCN-NT NMFS-SC	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters	These are the most marine species of sturgeon. Abundance increases northward of Point Conception. Spawns in the Sacramento, Klamath, & Trinity Rivers.	Spawns at temps between 8-14 C. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.	**Low Potential.** Species typically found in large estuarine rivers. Project Area contains waterways that are too narrow and no records of the species are known from Prairie Creek.
Cottus klamathensis polyporus	Lower Klamath Marbled Sculpin	None	None	G4T2T4	S2S4	CDFW-SSC	Aquatic	Found in cold (<20°C) spring-fed streams that have a low gradient and adequate aquatic vegetation.	They tend to occupy pools or runs with cover. In some isolated streams, the species is found to have greater temperature tolerances and may be found in riffles and shallow water.	**Low Potential.** Although other sculpin species have been detected in Prairie Creek, there is no occurrence data for this species in the Project Area (Wilzbach 2016).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Oncorhynchus clarkii clarkii	Coastal Cutthroat Trout	None	None	G4T4	S3	AFS-VU, CDFW-SSC, USFS-S	Aquatic | Klamath/North coast flowing waters	Small coastal streams from the Eel River to the Oregon border.	Small, low gradient coastal streams and estuaries. Needs shaded streams with water temperatures <18C, and small gravel for spawning.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Oncorhynchus kisutch pop. 2	Coho Salmon - southern Oregon / northern California ESU	Threatened	Endangered	G4	S2?	AFS-EN	Aquatic	Federal listing = pops between Punta Gorda & San Lorenzo River. State listing = pops south of Punta Gorda.	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Oncorhynchus mykiss irideus	Steelhead - northern California DPS	Threatened	None	G5T2T3Q	S2S3	AFS-TH	Aquatic | Sacramento/San Joaquin flowing waters	Coastal basins from Redwood Creek south to the Gualala River, inclusive. Does not include summer-run steelhead.	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Oncorhynchus tshawytscha	Chinook Salmon - California Coastal ESU	Threatened	None	G5	S1	AFS-TH	Aquatic | Sacramento/San Joaquin flowing waters	Federal listing refers to wild spawned, coastal, spring & fall runs between Redwood Cr, Humboldt Co & Russian River, Sonoma Co	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Thaleichthys pacificus	Eulachon	Threatened	None	G5	S3		Aquatic | Klamath/North coast flowing waters	Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries.	Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand, and woody debris.	**Moderate Potential.** Suitable habitat exists in Project Area and the species has recently been detected in small numbers in Prairie Creek (Gustafson et al. 2016).
Lamprey										
Entosphenus tridentatus	Pacific Lamprey	None	None	G4	S4	AFS-VU, BLM-S, CDFW-SSC, USFS-S	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters | South coast flowing waters	Found in Pacific Coast streams north of San Luis Obispo County, however regular runs in Santa Clara River. Size of runs is declining.	Swift-current gravel-bottomed areas for spawning with water temps between 12-18 C. Ammocoetes need soft sand or mud.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Invertebrates										
Juga orickensis	Redwood Juga	None	None	G2	S1S2		Aquatic | Klamath/North coast flowing waters	High to low elevation coastal streams in northwestern California & southern Oregon.	Small spring-fed permament rivulets to creeks, often on gravel, always in unpolluted, clear, cold, running water.	**Moderate Potential.** Species has been reported in the vicinity of Orick and streams/creeks on the project site meet some of the requisite habitat characteristics for the species (CDFW 2019b).
Margaritifera falcata	Western Pearlshell	None	None	G2	S1S2		Aquatic	Aquatic.	Prefers lower velocity waters.	**Moderate Potential.** Species has been detected in nearby Redwood Creek and some marginal habitat is present in the Project vicinity (CDFW 2019b).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Bombus caliginosus	Obscure Bumble Bee	Endangered	None	G5T1	S1	XERCES-CI	Pacific coast fog-belt from British Columbia to Southern California (Hatfield, et al. 2015).	Coastal areas from Santa Barbara county to north to Washington state.	Food plant genera include Baccharis, Cirsium, Lupinus, Lotus, Grindelia and Phacelia	**Moderate Potential.** Some habitat exists for the species in the Project Area and there are records from the Project vicinity (CDFW 2019b).
Bombus occidentalis	Western Bumble Bee	None	None	G4?	S1S2	IUCN-VU		Once common & widespread, species has declined precipitously from central CA to southern B.C., perhaps from disease.		**Low Potential.** Although the project site falls within the species pre-2002 range (according to ICUN Redlist), the range has contracted significantly in the last decade and now only includes the intermountain west and cascade regions of the US (Hatield et al. 2015).

Table 4.4-1 Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur

Potential to Occur:

No Potential.	Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
Low Potential.	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 of 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	Known to occur based on GHD sites visits, citizen science data, or historical records.

Other Status Key:

AFS-TH/VU/EN	American Fisheries Society Ranks fish species as either Threatened, Vulnerable or Endangered.
BLM-S	Bureau of Land Management Sensitive Species: Sensitive species are those species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA (CDFW 2019c).
CDFW-SSC	California Department of Fish and Wildlife Species of Special Concern: CDFW has designated certain vertebrate species as SSC because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction (CDFW 2019c).
CDFW-FP	California Department of Fish and Wildlife Fully Protected. This designation was the State's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction (CDFW 2019c).
CDFW-WL	California Department of Fish and Wildlife Watch List. CDFW maintains a list consisting of taxa that were previously designated as Species of Special Concern, but no longer merit that status, or which do not yet meet SSC criteria but for which there is concern and a need for additional information to clarify status (CDFW 2019c).
CDF-S	California Department of Forestry and Fire Protection classified "sensitive species" as those species that warrant special protection during timber operations (CDFW 2019c).
IUCN-LC, NT, EN, VU	International Union for Conservation of Nature. This organization publishes a red list of the global conservation status of animals, fungi and plant species. Ranks include species of Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN) (CDFW 2019c)
NABCI-RWL/YWL	North American Bird Conservation Initiative. The coalition publishes an annual State of the Birds report which includes a watch list of bird species in need of conservation help. Species on the list are assigned to either the Red Watch List (RWL) for species with extremely high vulnerability, or Yellow Watch List (YWL) for species that may be range restrictive of may be more widespread but with declines and high threats (CDFW 2019c).
NMFS-SC	National Marine Fisheries Service Species of Concern are species about which NOAA Fisheries has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA (CDFW 2019c).
USFS-S	U.S. Forest Service Sensitive Species; defined as plant and animal species identified by a regional forester that are not listed or proposed for listing under the Federal ESA for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (CDFW 2019c).
USFWS-BCC	U.S. Fish and Wildlife Service's Birds of Conservation Concern (BCC). The goal of the BCC report (2008) is to accurately identify the migratory and non-migratory bird species (beyond those already designated as Federally Threatened or Endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action (CDFW 2019c).
WBWG-H,M, or L	Western Bat Working Group. Species are ranked as High, Medium, or Low Priority in each of 10 regions in western North America. The WBWG is composed of agencies, organizations, and individuals interested in bat research, management and conservation from the 13 western states and provinces (CDFW 2019c).
Xerces	The Xerces Society is an international non-profit organization dedicated to protecting biological diversity through invertebrate conservation. They publish a red list of species with the conservation status including: Data Deficient (DD), Vulnerable (V), Imperiled (I), Critically Imperiled (CI), and Possibly Extinct (PE) (Xerces 2019).

Table compiled from the California Department of Fish and Wildlife (CDFW) Natural Diversity Database, U.S. Fish and Wildlife Service (USFWS) Species Lists, and National Marine Fisheries Service (NMFS) Electronic Inventory searches of 6 USGS 7.5 Minute Quadrangles around the Orick Quad (CDFW 2019b; USFWS 2019; NMFS 2019).

Construction and operation components are summarized in Table 4.4-2 – Summary of Construction and Operation Methods by Project Component, in order to determine the potential for adverse impacts to the special-status wildlife species listed in Table 4.4-1.

Table 4.4-2 Summary of Construction and Operation Methods by Project Component

Project Component or Sub-component	Method of Completion or Maintenance
Construction	
Visitor Center	Earthwork (mostly fill); earth movement; asphalt removal; grading; structure, road and trail building; culvert replacements; utilities installation; stormwater retention basin excavation and installation (west and east of Visitor Center)
Prairie Creek Restoration Area	Earthwork (mostly cut); earth movement; riparian vegetation removal; invasive vegetation removal; grading; creek re-routing; creek dewatering; fish relocation; large wood installation; widening and potential realignment of Skunk Cabbage Creek; and trail building in southern extent.
Yurok Demonstration Site	Earthwork (cut and fill); earth movement; grading; structural building; trail building; utilities installation
Libby Creek Enhancement	Earthwork (mostly cut); earth/sediment movement; impoundment removal; culvert removal; open bottom culvert installation
California Coastal Trail	Earthwork (cut and fill); earth movement; grading; culvert replacements; trail building; tree removal (approx. 20-30) and chipping; clearing of landslide debris on Upper Road north of Canopy Walkway
Canopy Walkway	Limited earthwork (cut and fill); grading; structural support installation via ground drilling; tree removal (approx. 20-30) and chipping
Eastside Restoration Area	Earthwork (mostly fill); grading; tree removal (approx. 100) and chipping; tree planting
Southern Ditch Widening	Earthwork (mostly cut); grading; tree removal (approx. 150) and chipping; tree planting
Lower Road Trail	Earthwork (mostly cut); grading; trail building
Operation	
Visitor Center	Routine testing and where appropriate treatment of utilities including but not limited to: drinking water, fire suppression water, electricity, septic system; clearing of downed vegetation along roads, paths and parking lots, stormwater retention basins, culverts; invasive vegetation management (chemical, manual and/or mechanical); cleaning and maintenance of interpretive signage (including food prohibition signs)

Project Component or Sub-component	Method of Completion or Maintenance
Prairie Creek Restoration Area	Vegetation management (chemical, manual and/or mechanical); remedying log jams; sediment removal (if necessary); monitoring
Yurok Demonstration Site	Routine structural repairs; invasive vegetation management (chemical, manual and/or mechanical); cleaning and maintenance of interpretive signage (including food prohibition signs)
Libby Creek	Monitoring
California Coastal Trail	Routine clearing of downed vegetation along trail and in stormwater ditches and culverts; vegetation trimming; invasive vegetation management (chemical, manual and/or mechanical); cleaning and maintenance of interpretive signage (including food prohibition signs)
Canopy Walkway	Routine structural inspections; cleaning and maintenance of interpretive signage (including food prohibition signs)
Eastside Restoration Area	Monitoring
Southern Ditch Widening	Monitoring
Lower Road Trail	Routine clearing of downed vegetation along trail and in stormwater ditches and culverts; vegetation trimming; invasive vegetation management (chemical, manual and/or mechanical); cleaning and maintenance of interpretive signage (including food prohibition signs)

Project construction will relocate up to approximately 328,900 cy of material. Overall, the cut (excavation) plus up to 21,100 cy of imported material (gravel and aggregate base) are anticipated to equal the fill volumes, and off-site disposal hauling or material import will not occur (except potentially for some limited invasive-weed impacted soil). The most significant amount of earthwork will be completed within the Prairie Creek and Visitor Center areas, as up to approximately 239,300 cy of material will be excavated from the existing riparian corridor and meadow-like areas adjacent to Prairie Creek in order to create the network of main and back channels associated with the restoration of Prairie Creek. The excavated material will be repurposed onsite as foundation fill for the Visitor Center.

A matrix of construction and operational activities was developed to evaluate potential impacts to special-status wildlife species (Table 4.4-3 – Special-status Wildlife Species Impact Matrix). Operation of the Libby Creek Enhancement, Eastside Restoration Area, Southern Ditch Widening area, is expected to be minor and limited to vegetation monitoring to comply with permit conditions. Due to the expected minor level of operational effort in these areas, they have been excluded from the impact matrix (Table 4.4-3).

Table 4.4-3 Special-status Wildlife Species Potential Impact Matrix

Special-status Species	Construction									Operation				
	VC	Prairie Crk. Resto.	YDS	Libby Crk. Enhanc.	CCT	Canopy Walkway	ERA	South. Ditch Wide-ning	Lower Rd Trail	VC	Prairie Crk. Resto.	YDS	CCT	Canopy Walkway
Aquatic Species (Fish, Lamprey, Amphibians & Reptiles)														
Salmonids (Chinook, Coho, Coastal Cutthroat Trout, Steelhead)		X									X			
Eulachon		X									X			
Lower Klamath Marbled Sculpin		X									X			
Green Sturgeon		X									X			
Pacific Lamprey		X									X			
Northern Red-legged Frog	X	X	X	X	X	X	X	X	X		X			
Southern Torrent Salamander				X	X						X			
Del Norte Salamander				X	X				X					
Pacific Tailed Frog				X	X									
Foothill Yellow-legged Frog		X		X										
Western Pond Turtle		X	X	X				X	X		X			
Avian Species														
Northern Spotted Owl	X		X	X	X	X	X		X	X		X	X	X
Marbled Murrelet	X	X	X	X	X	X	X		X	X		X	X	X
Nesting Birds (MBTA)	X	X	X	X	X	X	X	X	X		X			X
Bald Eagle														
Cooper's Hawk		X	X					X	X		X			
Sharp-shinned Hawk		X	X	X				X	X		X			
Ruffed Grouse		X		X			X	X	X		X			

Table 4.4-3 Special-status Wildlife Species Potential Impact Matrix

Special-status Species	Construction									Operation				
	VC	Prairie Crk. Resto.	YDS	Libby Crk. Enhanc.	CCT	Canopy Walkway	ERA	South. Ditch Wide-ning	Lower Rd Trail	VC	Prairie Crk. Resto.	YDS	CCT	Canopy Walkway
Peregrine Falcon		X	X	X				X	X		X			
Osprey		X			X	X	X				X			
Black-capped Chickadee		X		X				X	X		X			
Northern Harrier		X						X	X		X	X		
Vaux's Swift		X	X	X	X	X	X	X	X		X	X		
Little Willow Flycatcher		X	X	X				X	X		X	X		
Yellow-breasted Chat		X	X	X				X	X		X	X		
Yellow Warbler		X	X	X				X	X		X			
Western Yellow-billed Cuckoo		X	X	X				X	X		X			
Bank Swallow		X	X	X										
Mammals														
Pacific Fisher	X	X	X	X	X	X	X		X				X	X
Humboldt Marten	X	X	X	X	X	X	X		X				X	X
Sonoma Tree Vole					X	X	X							
Townsend's Big-eared Bat		X			X	X	X	X						
Pallid Bat														
Invertebrates														
Redwood Jugga			X	X										
Western Pearlshell			X	X										
Obscure Bumble Bee														

Table 4.4-3 Special-status Wildlife Species Potential Impact Matrix

Special-status Species	Construction									Operation				
	VC	Prairie Crk. Resto.	YDS	Libby Crk. Enhanc.	CCT	Canopy Walkway	ERA	South. Ditch Wide-ning	Lower Rd Trail	VC	Prairie Crk. Resto.	YDS	CCT	Canopy Walkway
Western Bumble Bee	▨	▨	▨	▨	▨	▨	▨	▨	▨					
Legend: VC: Visitor Center | YDS: Yurok Demonstration Site | CCT: California Coastal Trail | ERA: Eastside Restoration Area														

Construction Impacts

Construction of the Project will involve up to approximately 328,900 cy of earthwork, vegetation removal, and regraded topography. During construction, workers may inadvertently adversely affect biological resources due to a lack of knowledge about the resource, which has the potential to result in a significant impact. Mitigation Measure BIO-1 will increase awareness, adequately convey avoidance measures to all project personnel, and avoid inadvertent adverse impacts to biological resources.

Mitigation Measure BIO-1: Worker Environmental Awareness Program (WEAP)

All supervisors, competent individuals, and team leaders performing demolition, construction, grading, operations or other work that could potentially affect biological resources shall receive training regarding the environmental sensitivity of the site and the need to minimize impacts through a Worker Environmental Awareness Program (WEAP). The WEAP shall be conducted by a qualified biologist for all Project workers prior to the initiation of work. The WEAP training shall include visual aids and the following:

- A description of sensitive habitats throughout the Project Area,
- A description of special-status species that may be encountered in each sensitive habitat area,
- A discussion of Roosevelt Elk and caution workers against close approach, especially during rutting season,
- Environmental laws,
- Permit requirements,
- Avoidance measures to prevent spill of hazardous materials, including equipment refuelling guidelines and spill response requirements,
- Safety topics, including the requirement that construction traffic shall not exceed 15 mph, and
- Training in implementation of stormwater BMPs for protection of water quality.
- Trash removal and proper storage of trash.
- Selected contractors shall sign a document stating that they have read, understand, and agree to the required resource avoidance measures, and shall have construction/maintenance crews participate in a training session on sensitive resources.

With implementation of Mitigation Measure BIO-1, significant impacts to biological resources due to improperly trained construction personnel will be avoided due to the environmental awareness training provided to them. This impact will be reduced to a **less than significant level with mitigation**.

Impacts to Aquatic Resources

Prairie Creek, Libby Creek, and surrounding riparian habitat provide suitable habitat for many aquatic species including threatened and endangered and special-status fish, amphibians and reptiles (see Aquatic Species in Table 4.4-3). The Project will significantly increase the quality of stream habitat over the long-term. The Prairie Creek Restoration component of the Project is earthwork intensive and will involve the use of construction equipment throughout the existing channel (once dewatered), and meadow-like area adjacent to Prairie Creek. The riparian vegetation bordering Prairie Creek will be removed. Short-term habitat impacts will result in long-term benefits consistent with ESA recommendations in NMFS and CDFW recovery plans, goals of RNSP to provide refugia habitat for endangered species, and RNSP's ongoing landscape scale recovery of former timber lands within the Redwood Creek basin involving road removal and reduction in fine sediment to improve aquatic habitat for endangered species. Amphibians or reptiles may be present in the footprint of this Project component and may be adversely impacted by the movement of construction equipment and removal of vegetation. Fish are not anticipated to be present in the Project footprint following dewatering and relocation, and therefore the presence and use of construction equipment following dewatering is not anticipated to adversely impact fish. Project work for the Libby Creek Enhancement component will include use of heavy equipment on the banks of Libby Creek downstream of and up to 100 feet upstream of the impoundment. Injury or mortality of special-status wildlife species that may be incidentally killed due to trampling, burying or crushing by heavy equipment will be a potentially significant impact. Mitigation Measures BIO-2, BIO-3 and BIO-4 will avoid potentially significant impacts from construction to these species during Project work around waterways.

Mitigation Measure BIO-2: Avoidance of Northern Red-legged Frogs

Construction in waterways and wetlands with standing water shall be limited to the period of the year between July 1 and October 30 to avoid disturbance to breeding Northern Red-legged Frogs (NRLF). If this is not possible, a qualified biologist shall conduct two surveys during the NRLF breeding-season (generally December to February) within areas of expected Project-related ground disturbance that provide suitable breeding habitat for NRLF. Any NRLF egg masses located shall be relocated to suitable aquatic habitat in areas of the site which will not be disturbed by the Project in consultation with CDFW and according to relevant permits. Throughout the Project Area, any juvenile or adult NRLF encountered during construction activities shall be allowed to leave the area on their own. If they do not move within a reasonable length of time (approximately two hours), they shall be relocated away from the limits of construction into nearby suitable habitat.

Mitigation Measure BIO-3: Avoidance of Stream-dwelling Amphibians During Impoundment Removal in Libby Creek

To minimize impacts to Torrent Salamanders, Pacific Tailed Frogs, and other larval and stream dwelling amphibians in Libby Creek during the impoundment/sediment removal, qualified biologists shall conduct pre-construction surveys 48 hours prior to impoundment/sediment removal within the stream a minimum 25 meters above and below the structure to be removed. Block nets shall be staked in place at the upper and lower survey limits and the intervening stream segment cleared of special status amphibians. Rocks shall be moved and substrate and detritus disturbed to dislodge larval and aquatic adult amphibians into a net positioned immediately below the area being investigated. SSC amphibians captured shall be relocated to a nearby stream segment with suitable habitat, most likely above the upstream block net and subject to field verification by an experienced amphibian biologist. At the discretion of Save the Redwoods League in coordination with RNSP biologists, non-SSC amphibians such as Coastal Giant Salamander (*Dicamptodon tenebrosus)* may also be relocated to maintain diversity. A qualified biologist shall conduct a follow up survey if work in Libby Creek stops for more than seven days following the same methods listed above. The species and number of individuals relocated shall be documented and reported to CDFW.

Mitigation Measure BIO-4: Avoidance of Western Pond Turtles

> Although Western Pond Turtles have not been observed in Prairie Creek or other Project Area habitat, they are present in Redwood Creek and could occasionally enter the Project Area. A pre-construction survey shall be conducted by a qualified biologist at least seven days prior to any in-water construction activity, and also immediately following dewatering of any channel segment. Any Western Pond Turtles encountered and able to be captured shall be relocated to nearby suitable aquatic habitat along Redwood Creek and these occurrences shall be documented and reported to CDFW.

Implementation of Mitigation Measures BIO-2, BIO-3 and BIO-4 will reduce impacts to special status aquatic species by requiring environmental awareness training, pre-construction surveys, relocation, and limited construction windows will minimize potential take of species. These impacts will be reduced to a **less than significant level with mitigation**.

To create the dry conditions within Prairie Creek and Project site tributaries to allow for in-channel earthwork to take place, creek flows will be diverted (dewatering) around the construction zone. In general channel dewatering consists of diverting the flow upstream of the work area and reintroducing the flow to the channel downstream of the work area. Depending on Project phasing the entire creek channel, or a portion of the channel will be dewatered, and dewatering could occur over multiple construction seasons. Dewatering activities typically occur some distance upstream and downstream of the work area to provide adequate room for operations and successful dewatering.

Typical channel dewatering activities include removing aquatic life from the channel within the work area, isolating the channel by installing diversion structures upstream and downstream of the work area, and diverting flow around the work area. Aquatic life removal consists of installing screens upstream and downstream of the diversion structure locations, capturing species, and releasing them upstream or downstream of the Project site. All dewatering and relocation will be reviewed by CDFW and NMFS through the permitting process prior to completion of ESA and CESA consultation and within the Biological Assessment required for the Project. Examples of in-channel diversion structures include cofferdams, sheetpile walls, and well points or infiltration basins installed in the streambed material, or a combination of these structures. Flow diversion begins at the upstream diversion structure and consists of diverting the channel flow by pumps, gravity flow, or a combination, and reintroducing the flow below the downstream diversion structure. Electric or gas-powered pumps are typically used, with electricity being supplied by generators or the power-grid. The diverted flow typically traverses the work area in plastic pipe, although open channels can be used if excess water loss by infiltration or evaporation can be prevented. It may be necessary to install intermediate dewatering facilities within the channel if tributaries, groundwater, springs and/or interflow add flow to the dewatered channel between the upstream and downstream diversion structures.

At the end of the construction activities the dewatered channel, or new channel, will need to be rewatered. Rewatering activities typically consist of allowing small amounts of flow to enter the upstream portion of the channel until the entire channel is flowing. If the flowing water has high turbidity, then the water can be pumped out at the upstream side of the downstream diversion structure and sent to the construction water dewatering facilities. The upstream channel flow is incrementally increased until downstream turbidity levels are at acceptable limits. Once the entire flow has been returned to the channel, all the remaining dewatering structures are removed.

If a special-status aquatic species were to be harmed or if there were any incidental take of special-status species during dewatering, a significant impact will occur. In order to avoid significant impacts from dewatering to these species, Mitigation Measures BIO-5, BIO-6, and BIO-7 are proposed.

Mitigation Measure BIO-5: Seasonal Work Windows.

To protect the most vulnerable life stages of sensitive fish species that occur within the Project Area, all in-channel work shall be restricted to the period between June 15 and October 15. This seasonal work window correlates to the period of the year when sensitive fish species are least likely to occur in the Project Area. With concurrence from resource agencies and dependent on weather conditions, the work window may be extended.

Mitigation Measure BIO-6: Native Aquatic Species Relocation.

Before any de-watering activities begin in any creeks or channels within the Project Area, earthen sediment plugs shall be constructed to separate the work area from the stream channel, and all native aquatic vertebrates and invertebrates including Western Pearlshell and Redwood Jugga, shall be relocated out of the construction area into a flowing channel segment by a qualified and agency approved fisheries biologist. Relocation will be limited to segmented reaches within the Project Area to minimize impacts. In deeper or larger areas, water levels shall first be lowered to manageable levels using methods to protect fish and other special status aquatic species, such as slow drawdown and the use of filters. A qualified fisheries biologist or aquatic ecologist shall then perform appropriate seining, dip netting, or other trapping procedures to a point at which the biologist is assured that almost all individuals within the construction area have been caught. These individuals shall be kept in insulated coolers equipped with battery operated aerators to meet required water quality parameters (e.g. water temperature and dissolved oxygen) and ensure survival, and shall be relocated to an appropriate flowing channel segment or other appropriate habitat as identified by the NMFS and/ or the CDFW. If fish mortalities occur, these individuals shall be collected and frozen for delivery to NMFS. Construction activities shall be prohibited from unnecessarily disturbing aquatic habitat. Introduced species shall be documented and reported to the CDFW. Introduced species may be euthanized contingent on permission from the CDFW. Sediment plugs shall not be removed until most sediment has settled, which will minimize water quality degradation from suspended sediment and turbidity in the estuary.

Mitigation Measure BIO-7: Dewatering

All work related to the dewatering of Prairie Creek shall be conducted during the instream work window (June 15-October 15). Screened fittings and filters compliant with NMFS and CDFW mesh requirements shall be maintained over hose ends during dewatering to prevent entrainment of any fish. With cofferdams or similar barriers in place, water management in and around the construction work area shall take place. Water held above the upstream cofferdam, or similar barrier, shall be diverted downstream via piping or other conveyance past the work area to be discharged below the downstream cofferdam, or similar barrier. The upstream intake end of the diversion piping shall be located between the cofferdam and the upstream fish screen and shall be screened or filtered as necessary to prevent entrainment of fish and to meet water quality standards indicated by the NCRWQCB Section 401 water quality certification. Likewise, the downstream discharge end of the diversion shall be located between the cofferdam and the downstream fish screen and shall be screened or filtered as necessary to meet water quality standards indicated by the Section 401 water quality certification. Diversion intake and discharge ends shall be located in the channel in a manner to promote water diversion while minimizing disturbance, sediment transfer, and water turbidity. Effort shall be made to achieve diversion of water around the work area through gravity piping, but pumping may be required due to area topography. As necessary, pumps shall be placed on absorbent pads and spill containment shall be available according to the SWPPP.

Once construction activities have been completed in a work location, cofferdams, erosion control measures, screens and other Project related products shall be removed and the channel returned to preconstruction and/or enhanced conditions (unless proposed for filling and abandonment). Construction areas shall not be allowed to be inundated or receive channel flow until the ground surfaces have stabilized.

A Biological Assessment will be prepared for this Project and may contain differently work or additional conservation measures to protect state and federally listed species. If conflicting, conservation measures in the Biological Assessment will supersede this Mitigation Measure.

Mitigation Measures BIO-5, BIO-6 and BIO-7 will reduce impacts to special-status fish, amphibians and reptiles by requiring seasonal work windows, the relocation of fish and lamprey species, and dewatering specifications. These impacts will be reduced to a **less than significant level with mitigation**.

Impacts from Vegetation Removal

Nesting Birds

Construction of the Prairie Creek Restoration, Libby Creek Enhancement, CCT, Canopy Walkway, Eastside Restoration Area, and the Southern Ditch Widening will require the removal or modification of vegetation such as shrubs, coniferous and deciduous trees. Onsite and adjacent vegetation provide habitat for avian species to forage and/or nest. If vegetation were to be removed while a special-status bird or bird protected under the MBTA were present (nesting), or be juxtaposed to vegetation with a nesting bird, it could be injured or abandon its nest, both of which will be considered a potentially significant impact. Mitigation Measure BIO-8 is designed to avoid adverse impacts to nesting birds resulting from vegetation removal during the breeding season. Bird species to be protected by this mitigation measure include all birds protected under the MBTA, Bald Eagle, Cooper's Hawk, Sharp-shinned Hawk, Ruffed Grouse, Peregrine Falcon, Osprey, Black-capped Chickadee, Northern Harrier, Vaux's Swift, Little Willow Flycatcher, Yellow-breasted Chat, Yellow Warbler, Western Yellow-billed Cuckoo, and Bank Swallow.

Mitigation Measure BIO-8: Nesting Birds

Contractors shall attempt to remove trees and other vegetation that could potentially contain nesting birds outside the bird nesting season (March 15 to August 15 in Northern California). If vegetation removal occurs outside the bird nesting season, no further mitigation is necessary. If vegetation removal or construction work occur adjacent to suitable nesting habitat between March 15 and August 15, a qualified ornithologist shall conduct pre-construction surveys within the vicinity of the impact area, to check for nesting activity of native birds and to evaluate the site for special-status bird species such as the Little Willow Flycatcher, Yellow, Warbler, and Yellow-breasted Chat. The ornithologist shall conduct a minimum of one pre-construction survey within the seven-day period prior to vegetation removal activities. If vegetation removal work or construction lapses for seven days or longer during the nesting season, a qualified ornithologist shall conduct a supplemental avian survey before Project work is reinitiated.

If an active nest of a special-status bird is found, the ornithologist shall determine the extent of an appropriate construction-avoidance buffer zone to be established around the nest

> and/or operational restrictions in consultation with the CDFW. For non special-status birds protected under the MBTA, the buffer zone shall be established based on the species present and its tolerance to nearby disturbance. Buffer zones shall be delineated with flagging and maintained until the nests have fledged or nesting activity has ceased. Buffer sizes shall take into account factors such as (1) noise and human disturbance levels at the construction site at the time of the survey and the noise and disturbance expected during the construction activity; (2) distance and amount of vegetation or other screening between the construction site and the nest; and (3) sensitivity of individual nesting species and behaviors of the nesting birds.

With implementation of Mitigation Measure BIO-8, the potential for impacts to special-status avian species will be reduced due to pre-construction surveys and buffer establishment, as necessary. Additionally, impacts to nesting birds will be offset by implementation of Mitigation Measure BIO-28 (Offset Impacts to Sensitive Natural Communities), and the expansion of the Prairie Creek riparian corridor as designed by the Project. These impacts to avian species will be reduced to a **less than significant level with mitigation**.

Bats

Vegetation and structures on the Project site provide habitat to a variety of bat species. Construction of the Project may adversely impact special-status bat species through the removal or modification of vegetation or structures and due to ground disturbance. If special-status bats were adversely affected, a significant impact would potentially occur. Mitigation Measure BIO-9 is designed to avoid adverse impacts to special-status bats which may be present in the Project Area, including the Townsend’s Big-eared Bat and Pallid Bat.

> **Mitigation Measure BIO-9: Special-status Bats.**
>
> Bat roost surveys shall be conducted during the spring or summer prior to construction in any areas where potential maternity roosts may be disturbed/removed. Surveys shall be conducted by a qualified biologist. Surveys shall include a visual inspection of the impact area and any large trees with cavities or loose bark. If the presence of a bat maternity colony or roost is confirmed, no activity generating noise greater than 90 dB shall occur within a maximum of 300 feet of the roost or within a distance to be determined in consultation with CDFW from April 1 through August 15 or until young have dispersed. If Project work will take place between August 16 and March 31, no surveys shall be required because there will be no impact to roosting bats, as this period is outside of the maternity season.

With implementation of Mitigation Measure BIO-9, the potential for impacts to special-status bat species from removal or modification of vegetation or structures and due to ground disturbance will be reduced due to the pre-construction surveys, and potential restrictions on construction activities. Impacts to bats from noise emitted during Project construction will be reduced in accordance with Mitigation Measure BIO-10 (Limitations to use of Equipment during Northern Spotted Owl and Marbled Murrelet Nesting Season) discussed below. Mitigation Measure BIO-10 is specific to Marbled Murrelet and Northern Spotted Owl, but will have incidental benefits to special-status bats. Impacts to bat species will be reduced to a **less than significant level with mitigation**.

Sonoma Tree Vole

Sonoma Tree Vole, a small rodent and special-status species, is known to be present within the Project Area. This species spends much of its life within mature or old growth coniferous trees.

Regionally mature coniferous trees are defined as approximately 101 to 200 years old, and old growth is defined as greater than 200 years old (Bingham and Sawyer 1991). No trees considered mature or old growth will be removed under the Project, and therefore no impact will occur to this species or its habitat. **No impact** will occur.

Noise Impacts

The noise generated by Project construction may result in potentially adverse impacts to Northern Spotted Owl and Marbled Murrelet during their nesting season, which occurs February 1 to July 9 and March 24 to September 15, respectively. Both species are listed under the federal and state Endangered Species Acts. Suitable habitat for these species exists to the east of the Project Area. Although the Centennial Tree is an old growth redwood tree, it is not considered suitable habitat because it is not in a contiguous stand of old growth trees. Furthermore, Marbled Murrelet and Northern Spotted Owl have not been documented in this location (Sillet and Spickler 2017). Noise impacts may also adversely impact migratory birds protected under the MBTA.

The USFWS 2006 Transmittal of Guidance, *Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California* (Guidance) was utilized in this analysis to determine whether construction and operation will adversely impact these species, and if appropriate, how to mitigate for those adverse impacts.

Activities that create elevated sound levels have the potential to significantly disrupt normal behavior patterns and can lead to incidental take of a listed species under the ESA (USFWS 2006). The definition of “take” prescribed by the ESA includes “harass,” however the CESA definition of “take” does not include harass (CDFW 2019e). Under the ESA, the USFWS assumes that harassment may occur when owls or murrelets demonstrate behavior suggesting that the safety or survival of the individual is at significant risk, or that a reproductive effort is potentially lost or compromised. The USFWS found that the following conditions may cause harassment to owls and murrelets:

- Project-generated sound exceeds ambient nesting conditions by 20-25 dB; or
- Project-generated sound, when added to existing ambient conditions, exceeds 90 dB.

To determine the appropriate setback of noise generating activities from existing suitable habitat, ambient noise data was collected by LACO (2012) and analyzed in accordance with the Guidance (USFWS 2006). The existing pre-Project ambient noise levels were determined to be Natural Ambient (<50 dB) to Very Low (51-60 dB) in the northern old growth habitat located east of the Project Area, and Very Low (51-60 dB) to Low (61-70 dB) in the southern old growth habitat also located east of the Project Area (LACO 2016). Based on the ambient noise data collected and Table 1 found within the Guidance (USFWS 2006), appropriate noise level threshold zones and a visual buffer were determined by LACO 2016. See Appendix E of this ISMND for the Orick Mill Site Construction Noise Constraints Memo (LACO 2016). The noise level threshold zones are shown in Figure 4.4-1– Noise Level Threshold Zones. Each noise level threshold zone represents the range of allowable noise that can be produced without causing harassment to Northern Spotted Owl or Marbled Murrelet.

Marbled Murrelet flights out of and into nests to feed nestlings and nest-tending exchanges are concentrated around dawn and dusk (Nelson and Hamer 1995 in USFWS 2006), and this time frame requires additional noise reduction to avoid harassment of Marbled Murrelet. Therefore, in accordance with the Guidance (USFWS 2006), the noise level threshold zones become more conservative (i.e. assume the constraints of the noise level threshold zone that is one category more restrictive within two hours of sunrise or sunset during the Marbled Murrelet nesting season) (USFWS 2006). Similar time-of-day considerations and adjustments are not required for Northern Spotted Owl (USFWS 2006). Therefore time-of-day noise constraints are not required during Feb 1 to March 24, during the Northern Spotted Owl nesting season and before the Marbled Murrelet nesting season. However, general noise constraints are required for both species from February 1 to September 15 and are further described below. Additionally, the Marbled Murrelet and raptor breeding seasons overlap the majority of the allowable in-water work season, which will require construction sequencing and balancing to comply with two potentially conflicting seasonal limitations. See Table 4.4-4 – Nesting and Breeding Seasons for a summary of nesting season dates and applicable restrictions.

Table 4.4-4 Nesting and Breeding Seasons

Protected Species	Breeding Season Starts	Breeding Season Ends	Typical Constraints
Northern Spotted Owl	February 1	July 9	Construction noise restrictions in accordance with Figure 4.4-1 (LACO 2016)
Raptor/Migratory Birds	March 1	August 15	Pre-construction nest surveys prior to tree or major brush removal. Construction setbacks from active nests in accordance with Mitigation Measure BIO-8 (Nesting Birds)
Marbled Murrelet	March 24	September 15	Construction and time-of-day noise restrictions in accordance with Figure 4.4-1 (LACO 2016).

The majority of equipment planned for use during construction of the Project will fall in the High noise category which is typically 81-90 dB, and few pieces of machinery will fall in the Very High noise category which is considered 91-100 dB or Moderate noise category which is 71-80 dB. Table 4.4-5 – Noise Level Categories and Constraints by Project Component during Northern Spotted Owl and Marbled Murrelet Nesting Season, lists the equipment to be used in each Project component during construction, the noise level category of the equipment, whether the equipment will be allowed to be used mid-day during the Northern Spotted Owl and Marbled Murrelet nesting season, and whether the equipment will be allowed to be used two hours before and after sunrise and sunset (assuming the more restrictive time-of-day constraint) during the Marbled Murrelet nesting season.

Table 4.4-5 Noise Level Categories and Constraints by Project Component during Northern Spotted Owl and Marbled Murrelet Nesting Season

Project Component	Expected Equipment	Equipment's Noise Level Category	Mid-day: Equipment Allowable During Nesting Season in Appropriate Zone?	Within Two Hours of Sunset and Sunrise: Equipment Allowable During MAMU Nesting Season in Appropriate Zone?
Visitor Center	Excavator with hammer	Very High (91-100 dB)	Partially: Approx. 5% yes, 95% no	No
	Hydro-mulcher	Very High (91-100 dB)	Partially: Approx. 5% yes, 95% no	No
	Scraper	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Front end loader	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Excavator (Backhoe)	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Bulldozer	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Grader	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Forklift	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Paver	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Cement mixer truck, concrete truck	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Tractor	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Dump truck (on- and off-highway)	High (81-90 dB)	Partially: Approx. 95% yes, 5% no	Partially: Approx. 5% yes, 95% no
	Roller	Moderate (71-80 dB)	Yes	Yes
Prairie Creek Restoration	Vibratory driver	Very High (91-100 dB)	Partially: Approx. 25% yes, 75% no	No
	Hydro-mulcher	Very High (91-100 dB)	Partially: Approx. 25% yes, 75% no	No
	Generator and pump	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
	Scraper	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
	Skid steer	High	Yes	Partially: Approx.

Project Component	Expected Equipment	Equipment's Noise Level Category	Mid-day: Equipment Allowable During Nesting Season in Appropriate Zone?	Within Two Hours of Sunset and Sunrise: Equipment Allowable During MAMU Nesting Season in Appropriate Zone?
	loader	(81-90 dB)		25% yes, 75% no
	Front end loader	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
	Excavator (Backhoe)	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
	Dump truck (on- and off-highway)	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
	Tractor	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
	Bulldozer	High (81-90 dB)	Yes	Partially: Approx. 25% yes, 75% no
Yurok Demonstration Site	Hydro-mulcher	Very High (91-100 dB)	No	No
	Excavator (Backhoe)	High (81-90 dB)	No	No
	Front end loader	High (81-90 dB)	No	No
	Dump truck (on- and off-highway)	High (81-90 dB)	No	No
	Skid steer loader	High (81-90 dB)	No	No
	Dumper	High (81-90 dB)	No	No
	Plate compactor	High (81-90 dB)	No	No
	Paver	High (81-90 dB)	No	No
	Roller	Moderate (71-80 dB)	Yes	No
Libby Creek Enhancement	Excavator (Backhoe)	High (81-90 dB)	No	No
	Front end loader	High (81-90 dB)	No	No
	Tractor	High (81-90 dB)	No	No
	Skid steer loader	High (81-90 dB)	No	No
	Generator &	High	No	No

Project Component	Expected Equipment	Equipment's Noise Level Category	Mid-day: Equipment Allowable During Nesting Season in Appropriate Zone?	Within Two Hours of Sunset and Sunrise: Equipment Allowable During MAMU Nesting Season in Appropriate Zone?
	pump	(81-90 dB)		
	Bulldozer	High (81-90 dB)	No	No
	Dump truck (on- and off-highway)	High (81-90 dB)	No	No
CA Coastal Trail	Large tree falling	Very High (91-100 dB)	No	No
	Dump truck (on- and off-highway)	High (81-90 dB)	No	No
	Skid steer loader	High (81-90 dB)	No	No
	Excavator (Backhoe)	High (81-90 dB)	No	No
	Front end loader	High (81-90 dB)	No	No
	Tractor	High (81-90 dB)	No	No
	Paver	High (81-90 dB)	No	No
	Roller	Moderate (71-80 dB)	Partially	No
Canopy Walkway	Vibratory driver	Very High (91-100 dB)	No	No
	Large tree falling	Very High (91-100 dB)	No	No
	Drill rig	High (81-90 dB)	No	No
	Dump truck (on- and off-highway)	High (81-90 dB)	No	No
	Excavator (Backhoe)	High (81-90 dB)	No	No
	Front end loader	High (81-90 dB)	No	No
	Tractor	High (81-90 dB)	No	No
East Side Restoration Area	Large tree falling	Very High (91-100 dB)	No	No

Project Component	Expected Equipment	Equipment's Noise Level Category	Mid-day: Equipment Allowable During Nesting Season in Appropriate Zone?	Within Two Hours of Sunset and Sunrise: Equipment Allowable During MAMU Nesting Season in Appropriate Zone?
	Chipper	Very High (91-100 dB)	No	No
	Hydro-mulcher	Very High (91-100 dB)	No	No
	Excavator (Backhoe)	High (81-90 dB)	No	No
	Front end loader	High (81-90 dB)	No	No
	Tractor	High (81-90 dB)	No	No
	Dump truck (on- and off-highway)	High (81-90 dB)	No	No
Southern Ditch Widening	Chipper	Very High (91-100 dB)	Partially: Approx. 40% yes, 60% no	No
	Hydro-mulcher	Very High (91-100 dB)	Partially: Approx. 40% yes, 60% no	No
	Excavator (Backhoe)	High (81-90 dB)	Yes	Partially: Approx. 40% yes, 60% no
	Front end loader	High (81-90 dB)	Yes	Partially: Approx. 40% yes, 60% no
	Tractor	High (81-90 dB)	Yes	Partially: Approx. 40% yes, 60% no
	Dump truck (on- and off-highway)	High (81-90 dB)	Yes	Partially: Approx. 40% yes, 60% no
Lower Road Trail	Excavator (Backhoe)	High (81-90 dB)	No	No
	Front end loader	High (81-90 dB)	No	No
	Tractor	High (81-90 dB)	No	No
	Dump truck (on- and off-highway)	High (81-90 dB)	No	No

Project components often span multiple noise level threshold zones, and therefore some Project activities, such as excavation, may be allowable in certain areas but not in other areas of the same Project component during the nesting season, such as in the western versus eastern portions of the Visitor Center footprint. It is anticipated that all construction work for the Yurok Demonstration Site, CCT (including culvert replacements), Canopy Walkway, and Eastside Restoration Area will not be possible during the Northern Spotted Owl and Marbled Murrelet breeding seasons spanning February

1 to September 15. However, if construction is undertaken in those areas (and if hand tools or other equipment were used that does not exceed the noise thresholds (Figure 4.4-1)), such construction activities will be permissible because it would not cause harassment. It is anticipated that the vast majority of construction of the Visitor Center and the Prairie Creek Restoration will be possible during the Marbled Murrelet and Northern Spotted Owl nesting season because the majority of these Project components are within the High (81-90 dB) and Very High (91-100 dB) noise level threshold zones and therefore equipment ranked High and Very High can be utilized in those areas (see Figure 4.4-1). The ERA, CCT and Yurok Demonstration Site are located in the Moderate (71-80 dB) noise level threshold zone, which does not permit the use of High (81-90 dB) or Very High (91-100 dB) equipment; therefore, there will be limits on when construction can occur and the type of equipment that can be used during the nesting season. Additionally, the two hour window before and after sunrise and sunset adds daily temporal restrictions to the use of equipment as discussed above.

To avoid noise-related impacts to these species, Mitigation Measures BIO-10 is proposed. Mitigation Measure BIO-10 identifies the partial or complete limitations to the type of equipment which can be used during Project construction in order to avoid harassment to the Northern Spotted Owl and Marbled Murrelet. The Project will also comply with requirements set forth in the Biological Assessment and Biological Opinion, pursuant to Section 7 of the ESA.

Mitigation Measure BIO-10: Limitations to Use of Construction Equipment during Northern Spotted Owl and Marbled Murrelet Nesting Season

The following measures will be implemented during February 1 to September 15 to avoid harassment of Northern Spotted Owl and Marbled Murrelet during their nesting seasons:

- Construction equipment or Project activities shall not be utilized or implemented in a particular location, if use of the equipment or implementation of the activity exceeds the allowable noise level threshold in that particular location. Noise generation values from Table 4.4-5 of this ISMND shall be assumed. Allowable noise level thresholds shall be in accordance with the zones depicted on Figure 4.4-1.
- During the Marbled Murrelet nesting season (March 24 to September 15) and within two hours before and after sunrise and sunset, the noise level threshold zones shown on Figure 4.4-1 will assume the constraints of the noise level threshold zone that is one category more restrictive. Construction equipment or Project activities shall not be utilized or implemented in a particular location during this time-of-day constraint, if use of the equipment or implementation of the activity exceeds the allowable noise level threshold in that particular location. This time-of-day constraint does not apply to Northern Spotted Owl, and therefore is not required during February 1 through March 23.
- Noise level threshold zones and the visual buffer line shall be clearly marked in the Project Area with spray paint or a similar substance.

With implementation of Mitigation Measure BIO-10, potentially significant construction-derived noise impacts to Northern Spotted Owl and Marbled Murrelet will be avoided in accordance with the noise level threshold zones, and the prohibition of equipment within the line-of-sight to suitable habitat within the visual disturbance buffer. These impacts to Northern Spotted Owl and Marbled Murrelet will be reduced to a **less than significant level with mitigation**.

Visual Impacts

Activities that result in close visual proximity of human activities at sensitive locations (e.g., nest trees), have the potential to significantly disrupt normal behavior patterns and can lead to incidental take of a listed species under the ESA (USFWS 2006). The visual impacts generated by Project construction could result in potentially adverse impacts to Northern Spotted Owl and Marbled Murrelet during their nesting season, which occurs February 1 to July 9 and March 24 to September 15, respectively. As mentioned above, the ESA considers harassment a form of "take." The USFWS found the following condition may cause harassment to owls and murrelets:

- When human activities occur within a visual line-of-sight distance of 40 meters or less from a nest.

To minimize potential harassment to owls and murrelets, a 40-meter (130-foot) visual buffer should be implemented to reduce the intensity of the Project activities that could result in harassment. The visual buffer is shown on Figure 4.4-1 and will be marked within the Project Area, per Mitigation Measure BIO-10 (Limitations to Use of Construction Equipment during Northern Spotted Owl and Marbled Murrelet Nesting Season).

Two areas of the Project are within the proposed visual buffer: the ERA and CCT (see Figure 4.4-1). However, both of these areas are shielded by dense forest to the east. Consequently, direct line-of-sight distance of human activities is not expected. Additionally, limited construction activities will take place within the ERA and CCT during the nesting season due to noise constraints. Therefore, due to the lack of line-of-sight views of human activities within these two Project areas that overlap the visual buffer, and due to the minimal amount of construction that will take place in these areas during the nesting season, visual harassment of Northern Spotted Owl or Marbled Murrelet is not expected. As discussed above, Mitigation Measure BIO-10 calls for noise level threshold zones and the visual buffer line to be clearly marked in the Project Area with spray paint or a similar substance and a prohibition of equipment within the line-of-sight to suitable habitat within the visual disturbance buffer. Impacts to Northern Spotted Owl and Marbled Murrelet due to visual proximity of human activities will be **less than significant with mitigation**.

Terrestrial Impacts

The Project involves an extensive amount of earthwork, involving the movement of heavy equipment throughout the Project Area. It is expected that special-status mammals which may occur in the Project Area will avoid the Project Area during construction due to the noise and ground disturbance. However, mammals, such as Pacific Fisher and Humboldt Marten, may enter the Project Area at night when equipment is not in use. There is potential for Pacific Fisher or Humboldt Marten to get stranded in areas of deep excavation, and potentially be harmed or killed as a result, which would be a potentially significant impact. Dogs and other pets of construction workers or the Project team may harass terrestrial wildlife species, which would be a potentially significant impact. Mitigation Measure BIO-11 will reduce the potential for stranding of Humboldt Marten, Pacific Fisher, and other mesocarnivores in the Project Area.

Mitigation Measure BIO-11: Limitations to Overnight Excavation Areas

> No steep sided excavations, defined as greater than two to one ratio shall be left open overnight during construction. If excavations cannot be covered, a ramp shall be placed at one end to prevent animals from becoming trapped. Contractors shall walk around large equipment prior to an early morning startup to ensure animals are not sheltering underneath. No loose dogs or other pets shall be allowed onsite during construction. Construction vehicle speed onsite shall not exceed 15 mph. Measures described in Mitigation Measure BIO-12 (Removal of Trash) to control and remove food waste will also reduce potential impacts to the Pacific Fisher, Humboldt Marten, and other mesocarnivores.

With implementation of Mitigation Measure BIO-11, impacts to special-status terrestrial species such as Pacific Fisher and Humboldt Marten would be reduced due to the restrictions on excavations, check of equipment prior to start up, pet control, and onsite speed limits. Impacts to terrestrial mammals will be reduced to a **less than significant level with mitigation**.

Human Impacts

Trash, food scraps, and debris left over from construction, such as food wrappers, may attract corvids which are known to be detrimental to breeding Marbled Murrelet. Corvids feed on Marbled Murrelet eggs (NPS 2008). Food scraps and trash are anticipated to be predominantly an operational impact discussed below in the operational impact analysis below. However food scraps and other debris are expected to accumulate during construction from personnel. If corvids become attracted to available food scraps and debris, there is the likelihood that the eggs of nearby breeding Marbled Murrelet may be preyed upon by the corvids, which would be a significant impact. In order to avoid this adverse impact, Mitigation Measure BIO-12 is proposed.

> **Mitigation Measure BIO-12: Removal of Trash**
>
> During construction and operation, trash containing food waste shall be bagged and consolidated onsite, stored in secure animal-proof containers, and properly disposed of at the close of each work week to avoid attracting corvids or other potential predators. Any trash cans installed as components of the Project at or within 200 feet of the Canopy Walkway must be secure and animal-proof.

With implementation of Mitigation Measure BIO-12, the potential for corvids to be attracted to food scraps and debris will be reduced due to food debris and trash handling restrictions during construction and operation of the Project. These impacts to avian species will be reduced to a **less than significant level with mitigation**.

Invasive Vegetation Removal

Treatment of invasive vegetation is often expensive, time intensive and requires extensive effort. To proactively approach this issue, management of invasive vegetation is proposed to take place before, during and after construction (see section below on Operational Impacts). Target invasive species include reed canary grass, western manna grass and Himalayan blackberry. The reed canary grass is located in the drainage ditch which connects the Libby Creek wetlands and Prairie Creek, and the western manna grass comprises an approximate 0.1 acre area near Prairie Creek (McBain Associates 2019). The manna grass within the Project Area is presumed to be western manna grass, however it may be water manna grass (*Glyceria fluitans*). Both species are considered invasive and will be a part of the removal efforts. Himalayan blackberry brambles are scattered throughout the Project Area and are concentrated at the boundary of the former Mill Site asphalt and at and around the former barn. Pre-construction treatment consists of identifying stands of invasive vegetation, which will be important for planning, measuring success and for protecting and enhancing sensitive habitats. During construction invasive vegetation will be excavated and buried onsite or hauled offsite. Operational invasive vegetation management techniques are described in Section 2.6.5 - Operations & Maintenance. During construction, invasive vegetation will be excavated to the appropriate depth to ensure all rhizomatous root matter that could potentially re-sprout, is removed. Removed vegetation will be buried within the Project Area beneath locations where structures are not proposed to be located at an appropriate depth to ensure it cannot re-sprout. Herbicide may be applied during pre-construction, construction and operation. The removal and burying of invasive vegetation, and potential use of herbicide, have the potential to adversely impact special-status wildlife or plant habitat, and water quality, which would be a potentially significant impact. In order to avoid potentially adverse environmental impacts from removal and treatment of invasive vegetation before, during and after construction, Mitigation Measures BIO-13, BIO-14, BIO-15, and BIO-16 are proposed.

Mitigation Measure BIO-13: Pre-construction Mapping and Treatment of Invasive Species

Prior to construction, the extent of reed canary grass, invasive manna grass, and Himalayan blackberry shall be mapped with a global positioning system (GPS) unit to create treatment maps using geographical information systems (GIS) software. Pre-construction treatment of these invasive species shall follow methodology outlined in the Invasive Species Management Plan (GHD 2019d, Appendix F of this ISMND) and may include a combination of chemical, mechanical, and manual methods. Other target invasive species identified in the Invasive Species Management Plan, and found within the Project Area, shall be treated according to the Invasive Species Management Plan.

Mitigation Measure BIO-14: Treatment of Invasive Species Vegetation during Construction

During each phase of construction reed canary grass, invasive manna grass, and Himalayan blackberry will be mechanically excavated to a depth adequate to remove the entire root systems of these species including the extensive rhizomes of reed canary grass. Invasive species will be buried on site as feasible, to a depth to prevent re-sprouting as specified in the Invasive Species Management Plan. Invasive plant material that cannot be buried on site shall be contained and disposed of at an appropriate off-site location, such as a landfill, outside of the Coastal Zone. Invasive plant material shall be disposed of in a manner that prevents the spread of invasive species. Areas of disturbance from invasive plant removal shall be minimized to the extent feasible and revegetated with native seed and/or container stock following removal.

A survey to map the extent of reed canary grass, invasive manna grass, and Himalayan blackberry shall take place prior to each year of construction and the identified populations shall be treated during construction and/or in the growing season in accordance with the Invasive Species Management Plan. Other target invasive species identified in the Invasive Species Management Plan, and found within the Project Area, shall be treated according to the Invasive Species Management Plan.

Mitigation Measure BIO-15: Manage Herbicide Control and Minimize Spill Risk

Herbicides shall be applied in accordance with application guidelines and manufacturer labels. The invasive species control program shall obtain coverage under the statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (SWRCB 2013). The specific measures that will be required are not known as this time. Herbicides shall be applied by or under the direct supervision of trained, certified, or licensed applicators. Herbicide mixtures shall be prepared by or under the direct supervision of trained, certified, or licensed applicators.

Whenever feasible, vegetation biomass shall be reduced by mowing, cutting, or grubbing before applying herbicide to reduce the amount of herbicide needed. In wetlands or riparian areas herbicides shall only be applied during the dry season (summer or fall). Herbicides shall not be applied directly to water, over water, or on to saturated soils. Only aquatically approved herbicides shall be applied through direct injection into the plant or by spot application, targeting individual plants. Herbicides shall not be applied within 48 hours of forecasted rain, or when the forecasted chance of rain is greater than 10 percent. Herbicide shall not be applied when wind exceeds 10 mph. Herbicide shall be sprayed between gusts when prevailing winds are below 10 mph, and work shall be performed from downwind toward upwind. Herbicides shall not be applied when vegetation is wet from rain or fog.

Mitigation Measure BIO-16: Accidents Associated with Release of Chemicals and Motor Fuel

Contractors and equipment operators on site during treatment activities shall be required to have emergency spill cleanup kits immediately accessible. The Spill Prevention and Response Plan which is included in the Invasive Species Management Plan, shall be followed in case of a spill. Training for herbicide applicators shall include familiarization with the Spill Response Plan.

With incorporation of Mitigation Measures BIO-13, BIO-14, BIO-15 and BIO-16, potential significant adverse impacts to special-status wildlife or plant habitat will be avoided through the mapping and marking of target invasive vegetation stands for removal via excavation and burying in accordance with the recommendations in the Invasive Species Management Plan. Invasive vegetation can displace native plants, prevent native plant growth, and can create monocultures which reduces biodiversity. Many wildlife species depend on native plants for food or habitat, and therefore invasive vegetation can also adversely affect wildlife species. The removal of invasive vegetation will have a long-term positive impact on wildlife and plant habitat enhancement. Use of herbicide will be in accordance with manufacturer’s recommendations and methods stated in the Invasive Species Management Plan, and accidents will be handled in accordance with the Spill Prevention and Response Plan included in the Invasive Species Management Plan. Collectively, with incorporation of Mitigation Measures BIO-13, BIO-14, BIO-15 and BIO-16, potentially adverse environmental impacts will be reduced to **less than significant**.

Operational Impacts

Operation of the Project will include use of the Visitor Center, CCT, and the Canopy Walkway by visitors, and vegetation monitoring and management to comply with permit conditions and to document achievement of habitat restoration goals, primarily within the Prairie Creek Restoration Area and Visitor Center, and secondarily within the Eastside Restoration Area and Southern Ditch Widening area. The Yurok Demonstration Site is anticipated to be utilized for various interpretive or ceremonial event. Up to four times per year it could be used for larger events, with each event expecting to have a maximum of 100 people per day in attendance and lasting up to four days. Impacts to biological resources may occur due to operation of the Project as discussed below.

Human Impacts

Corvid Minimization

Visitors from around the globe are expected to visit the Project Area and recreate on the CCT and Canopy Walkway. Arguably the most adverse impact to biological resources from operation of the Project is related to human use of the Project site. RNSP have demonstrated that where there are high numbers of park visitors with food, there are very high numbers of corvids, namely Steller’s jays. Due to the Steller’s Jay systematic foraging patterns, an increase in corvids results in a much higher chance of a Marbled Murrelet nest predation. To manage this impact to the endangered Marbled Murrelet, RNSP prepared a *Corvid Management Strategy* in 2008, which focuses on educating visitor and park employees about not feeding wildlife as well as properly storing and disposing of food. (NPS 2008). Additionally, the management strategy also includes infrastructure changes such as the removal of certain picnic areas adjacent to known Marbled Murrelet nesting areas, interpretive programming and greater enforcement of food rules from park law enforcement (NPS 2008). The goal of the Management Strategy is to decrease the density of corvids surrounding visitor use areas and facilities in the parks.

The 2018 Annual Progress Report (NPS 2019a) evaluated the Management Strategy by RNSP and concluded that the efforts and measures put forth in the 2008 plan have been effective in reducing corvid presence. The review observed a decline of Steller's Jay in campgrounds from 2011 to 2018, and statistical analysis shows a decline exceeding 39 percent between 2010 and 2016 (NPS 2019a). It is increasingly apparent that intense targeted corvid management methods are effective in reducing Steller's jay numbers in campgrounds. The original target reduction of corvids was set for approximately 50 percent, and this target is on the trajectory to being met (NPS 2019a).

The Project is designed to include a screened in eating area for visitors and staff, intended to reduce the amount of food scraps on the ground and reduce corvid pressure. However, if visitors eat outside of the screened in area, and either leave food scraps on the ground or do not dispose of their food waste properly, corvids may become attracted and reside in the Project vicinity. This will increase the potential for Marbled Murrelet eggs or chicks to be preyed upon, which would be a significant impact. To avoid and/or minimize this adverse impact, Mitigation Measures BIO-17, BIO-18, BIO-19 BIO-20, BIO-21, and BIO-22 are proposed. These Mitigation Measures are adapted from the 2008 Corvid Management Strategy (which are further described in the 2018 Annual Progress Report) which, as noted above, has proven effective in reducing corvid presence in RNSP campgrounds. These measures include the following:

Mitigation Measure BIO-17: Interpretative Signage at Key Visitor Access Points

Interpretive signage shall be provided at entrance kiosks and key walkway access points (including within 20 feet of the Canopy Walkway), indicating the prohibition on outdoor food to protect Marbled Murrelet from corvids that are attracted to food crumbs and debris.

Mitigation Measure BIO-18: Interpretive Brochures

A card with the "Keep It Crumb Clean" motto and logo on the front and a message on the reverse shall be available for every vehicle entering the Visitor Center entrance from May through September. When possible, entrance kiosk park staff shall provide a short verbal message reinforcing the "Keep It Crumb Clean" motto to vehicles entering the Visitor Center from May through September.

Mitigation Measure BIO-19: Social Media

A "Keep It Crumb Clean" educational social media video shall be broadcast in the Visitor Center for park visitors. The video shall also be made available on the parks' main webpage and social media webpages. The video can be directly viewed at: https://www.youtube.com/user/RedwoodNPS.

Mitigation Measure BIO-20: Interpretative Staff

During high use of eating areas, interpretive staff shall engage with visitors about food restrictions in the context of Marbled Murrelet for educational purposes. In addition, formal interpretive programs and Junior Ranger programs about the Keep It Crumb Clean campaign shall be conducted.

Mitigation Measure BIO-21: Law Enforcement

Law Enforcement shall be implemented as part of standard law enforcement practices within the Project Area and keep track of visitor littering/improper food disposal.

Mitigation Measure BIO-22: Facility Management

Garbage and recycling facilities within the Project Area, such as garbage cans, shall have wildlife-proof lids to prevent garbage accessibility by wildlife. Facility Management shall be implemented as part of the standard maintenance procedures of RNSP within the Project Area that include weekly garbage cans emptying and monitoring the functionality of the wildlife-proof lids.

Implementation of Mitigation Measures BIO-17, BIO-18, BIO-19, BIO-20, BIO-21, and BIO-22, will reduce impacts to Marbled Murrelet eggs and chicks from corvid predation to a less than significant level by using interpretive signage, brochures, an interpretive video playing in the Visitor Center and its availability on social media, staff concentrations during meal times, use of law enforcement, and facility management including utilization and maintenance of garbage cans with wildlife-proof lids, and weekly garbage removal. These impacts to Marbled Murrelet will be reduced to a **less than significant level with mitigation**.

Preparation of food at the Yurok Demonstration will take place indoors within the cookhouse with the exception of traditional foods which may be prepared outside during ceremonies. Outdoor food restrictions will be enforced in accordance with Mitigation Measures BIO-17, BIO-18, BIO-19, BIO-20, BIO-21, and BIO-22.

Large Mammal Presence

The Project Area and vicinity is known to support a population of migrating Roosevelt Elk. The elk may continue to use the Project Area during operation of the Project, particularly the open grassy area adjacent to the Restoration area and Visitor Center in the southern portion of the site. Other large mammals, such as Black Bears and Mountain Lions may be present in the Project Area. After construction and during operation, signs and other educational measures shall be used to inform the public of the potential presence of Roosevelt Elk, Mountain Lion and Black Bear and to discourage feeding, close approach, inappropriate behavior, or other negative interactions. RNSP may choose to utilize additional educational methods. **No impact** is anticipated.

Noise Impacts

Operation of the Project is not anticipated to produce noise levels that will adversely affect Northern Spotted Owl or Marbled Murrelet. The Project components that would host visitors close to suitable habitat include the California Coastal Trail, Yurok Demonstration Site, Canopy Walkway and the Visitor Center. Visitors will be engaging in verbal communication and generally making noise. According to the USFWS 2006 Guidelines, “conversations” registered 36 decibels (dB) at 50 feet, and “loud singing” registered 51 dB at 50 feet. According to the Guidelines, these noise values fall below “Moderate (71-80 dB)” noise level category, and therefore do not require noise buffers. Additionally, Marbled Murrelet and Northern Spotted Owl nests are high up in trees and therefore have additional distance to allow noise to attenuate. However, special events at the Yurok Demonstration Site may include singing, and/or drumming. Although the Guidelines state that “loud singing” registers to 51 dB at 50 feet, the combination of multiple people singing in conjunction with drumming will produce volumes louder than 51 dB. To avoid harassment of Marbled Murrelet and Northern Spotted Owl during the breeding season, mid-day maximum volume at the Yurok Demonstration Site will need to be less than 80 dB, and maximum volume within two hours of sunset or sunrise will need to be at or less than 70 dB. Operation of the Site during mid-day is expected to be at or less than 80 dB. However, volume produced at the site within two hours of sunset and sunrise, may be greater than 70 dB, which would cause harassment to Marbled Murrelet potentially nesting in the vicinity, and would therefore result in a potentially significant impact. To avoid this impact, Mitigation Measure BIO-23 is proposed.

> **Mitigation Measure BIO-23: Noise Control within Two Hours of Sunrise and Sunset at the Yurok Demonstration Site**
>
> During the Marbled Murrelet breeding season (March 24-September 15), no activities conducted at the Yurok Demonstration Site that produce volumes louder than 70 dB may be conducted two hours before and after sunset and sunrise. Activities that will be prohibited include: group singing (more than two people), group chanting (more than two people) and drumming and use of any instrument that generates volumes louder than 70 dB.

With incorporation of Mitigation Measure BIO-23 potentially significant impacts to nesting Marbled Murrelet due to noise-induced harassment will be avoided due to the prohibition of activities that will produce volumes over 70 dB within two hours before and after sunrise and sunset during the breeding season. With incorporation of Mitigation Measure BIO-23, the impact will be reduced to **less than significant**.

The utilities area within the Visitor Center footprint will contain the onsite wastewater treatment system, which will pump wastewater between a series of storage and processing tanks and ultimately to a leach field. The pumps are very quiet (below the "Very Low (51-60 dB)" range) and will not cause an operational impact to Northern Spotted Owl or Marbled Murrelet. There will be a back-up fuel-driven generator in the Fire Pump House building in the utilities area to provide electricity to re-fill the fire protection water storage tanks in case of an electricity outage following usage of the fire water. This scenario would be considered an emergency and would occur infrequently. The generator will emit noise levels in either approximately the "Moderate (71-80 dB)" or "High (81-90 dB)" noise level category range which will generally be allowed during the breeding season, except not within two hours of sunset or sunrise. Such a scenario will occur infrequently and noise from the generator will occur only until such time as electricity is restored. For these reasons, this impact is considered a **less than significant impact**.

Impacts to Aquatic Resources

To ensure the long term viability of the reconstructed stretch of Prairie Creek, operations and maintenance measures will be implemented as required by permit conditions. Operations are expected to include vegetation management to limit the establishment of non-native vegetation, and to promote the establishment of native flora. Control of invasive non-native vegetation, including reed canary grass, mannagrass and Himalayan blackberry, will include mechanical means such as hand pulling, the use of machinery such as mowers, weed eaters, or a small backhoe, and chemical measures such as the use of herbicides, compliant with permit conditions. Herbicides will not be applied directly over water and will be applied in compliance with Mitigation Measure BIO-15 (Managed Herbicide Control and Minimize Spill Risk), the Invasive Plant Management Plan (GHD 2019d, attached as Appendix F of this ISMND) and the *Invasive Plant Management Plan and Environmental Assessment for the Redwood National Park and Santa Monica Mountains National Recreation Area* (October 2017). Herbicides will be applied in wetlands, floodplains, and creek areas, but only when there is no standing water in the area of application (i.e., wetlands will not have standing water and application will occur in summer or fall). Native vegetation may need to be replaced or replanted if initial attempts are unsuccessful. Vegetation may need periodic trimming to facilitate topographical surveys or other monitoring efforts. Amphibians, reptiles or birds may be present in the area where vegetation management will take place. The use of hand tools for vegetation management is not expected to harm any special-status species, and therefore no impact is expected. Herbicides will be utilized in accordance with Mitigation Measure BIO-15 (Manage Herbicide Control and Minimize Spill Risk) which will avoid adverse impacts to special-status amphibian, reptile, bird species or sensitive habitat. The use of heavy mechanical equipment for vegetation management could inadvertently harm special-status species through crushing, which would be a potentially significant impact. Operational activities involving invasive vegetation management could also inadvertently spread invasive species, which would be detrimental to the success of the Project. To avoid potential adverse impacts to special-status species or sensitive plant communities and the inadvertent spread of invasive species during operation, Mitigation Measure BIO-24 is proposed.

Mitigation Measure BIO-24: Treatment of Invasive Species Post Construction

Following construction, invasive plants that remain within the Project Area shall be mapped and treated by a combination of chemical, mechanical, or manual methods. If mechanical methods are used, a field screening for wildlife in the area of impact will be conducted. If wildlife species are present, the species will be allowed to move out of the area of impact on their own for up to three hours. Following three hours, the species will be relocated by the field worker. If mechanical methods are used, invasive plants shall be excavated to a depth adequate to remove the entire root systems of these species including the extensive rhizomes of reed canary grass. Invasive plants will be buried on site as feasible to a depth adequate to prevent re-sprouting that is specified in the Invasive Species Management Plan depending on the species (Appendix F of this ISMND). Invasive plant material that cannot be buried on site shall be contained and disposed of at an off-site location. Invasive plant material shall be disposed of in a manner that prevents the spread of invasive species. Areas of disturbance from invasive plant removal shall be minimized to the extent feasible and revegetated with native seed and/or container stock following invasive species removal.

Mapping to determine the extent of reed canary grass, invasive manna grass, and Himalayan blackberry shall continue post construction, and the identified populations shall be treated. Other target invasive species identified in the Invasive Species Management Plan shall be treated according to the Plan.

With implementation of Mitigation Measure BIO-24, significant impacts to special-status species from vegetation maintenance will be avoided or minimized due to mapping and treatment methods in compliance with the Invasive Species Management Plan, and due to a field screening for wildlife that may be in the area when heavy equipment is proposed to be used. These impacts will be reduced to a **less than significant level with mitigation**.

Special-status Plant Species

According to the botanical survey of the Project Area completed in 2019 (GHD 2019e), there are 21 special-status plants either observed onsite or with low, moderate or high potential of occurring in the Project Area. Prior to field surveys, a target list of California Rare Plant Ranking (CRPR) plant species and sensitive natural with recorded occurrences in the Project vicinity was compiled by consulting the CNDDB (CDFW 2019b), the CNPS Inventory of Rare and Endangered Vascular Plants (CNPS 2018), and the list of federally listed plant species in the Information for Planning and Consulting database maintained by the USFWS (USFWS 2018). The CRPR list ranks plants on a scale of "1" to "4", with "1" being the rarest. Botanical species are considered special-status if they are ranked either "1" or "2" on the CRPR list. The CNDDB database was consulted for special status plant occurrences documented in the Project vicinity. In addition, LACO's 2012 Special Status Plant Survey Technical Memorandum was reviewed, and is appended to GHD's Updated Special Status Plant and Sensitive Natural Communities Survey (GHD 2019e; Appendix G of this ISMND).

On June 5 and August 6, 2018 the botanical survey study area was surveyed for special status plants (see Figure 2 in Appendix G – Updated Special Status Plant and Sensitive Natural Communities Survey 2018 and 2019 Technical Memorandum for the Prairie Creek Restoration Project, Humboldt County, CA for a map of the botanical survey study boundary). No special-status species were observed during the protocol level surveys in 2018. Similarly, no special-status species were observed by LACO during the 2012 surveys. However, one special-status plant, seaside bittercress (*Cardamine angulata),* was observed within the study area in July 2019 adjacent to Libby Creek within NPS property during the wetland delineation site visit. The 2018 survey covered a smaller project footprint than the 2019 survey.

See Table 4.4-6 – Special-status Plant Species known from or with Potential to Occur in the Project Area for the list of special-status plant species with either low, moderate or high potential to occur within the Project Area. Special-status plant species with no potential to occur in the Project Area due to lack of suitable habitat include pink sand verbena (*Abronia umbellata* var. *breviflora*), Bald Mountain milk-vetch (*Astragalus umbraticus*), Humboldt Bay owl's clover (*Castilleja ambigua* var. *humboldtiensis*), Oregon coast paintbrush (*Castilleja littoralis*), seaside pea (*Lathyrus japonicus*), Beach layia (*Layia carnosa*), Robust false lupine (*Thermopsis robusta*), and cylindrical trichodon (*Trichodon cylindricus*). See Table 1 in Appendix G for a list of all CRPR ranked plant species that could occur in the Project Area.

Table 4.4-6 Special-status Plant Species Known from or with Potential to Occur in the Project Area

Taxa	Common Name	CRPR Listing Status	Typical Habitat	Likelihood of Occurrence
Calamagrostis crassiglumis	Thurber's reed grass	2B.1	Coastal scrub | Freshwater marsh | Marsh & swamp | Wetland	High Potential
Cardamine angulata	seaside bittercress	2B.1	Lower montane & North coast (NC) coniferous forest | Wetland	Observed near/in Libby Creek
Carex lenticularis var. limnophila	lagoon sedge	2B.2	Bog & fen | Marsh & swamp | North coast coniferous forest	Moderate Potential
Carex leptalea	bristle-stalked sedge	2B.2	Bog, fen, freshwater marsh, Wetland, swamp, Meadow & seep	Moderate Potential
Carex praticola	northern meadow sedge	2B.2	Meadow & seep | Wetland	High Potential
Carex saliniformis	deceiving sedge	1B.2	Coastal prairie | Coastal scrub | Marsh & swamp | Meadow & seep | Wetland	Moderate Potential

Taxa	Common Name	CRPR Listing Status	Typical Habitat	Likelihood of Occurrence
Carex viridula ssp. viridula	green yellow sedge	2B.3	Bog & fen | Marsh & swamp | North coast coniferous forest | Wetland	Moderate Potential
Erythronium revolutum	coast fawn lily	2B.2	Bog & fen | broadleaved upland forest | North Coast coniferous | Wetland	Low Potential
Iliamna latibracteata	California globe mallow	1B.2	Chaparral | Lower montane coniferous forest | North coast coniferous forest | Riparian scrub	Moderate Potential
Kopsiopsis hookeri	small groundcone	2B.3	North coast coniferous forest	Moderate Potential
Lathyrus palustris	marsh pea	2B.2	Bog, fen, marsh, swamp | coastal prairie & scrub | lower montane & NC coniferous forest	Moderate Potential
Lycopodiella inundata	inundated bog club-moss	2B.2	Bogs and fens (coastal), Lower montane coniferous forest (mesic), Marshes and swamps (lake margins)	Low Potential
Moneses uniflora	woodnymph	2B.2	Broadleaved upland forest | North coast coniferous forest	Moderate Potential
Monotropa uniflora	ghost-pipe	2B.2	Broadleaved upland forest | NC coniferous forest	Low Potential
Montia howellii	Howell's montia	2B.2	Meadow, seep, wetland & vernal pool | NC coniferous	Moderate Potential
Oenothera wolfii	Wolf's evening-primrose	1B.1	Coastal bluff scrub | coastal dunes | coastal prairie	Moderate Potential
Piperia candida	white-flowered rein orchid	1B.2	Broadleaved upland forest | Lower montane coniferous forest | North coast coniferous forest | Ultramafic	Low Potential
Polemonium carneum	Oregon polemonium	2B.2	Coastal prairie, Coastal scrub, Lower montane coniferous forest	Low Potential
Sidalcea malviflora ssp. patula	Siskiyou checkerbloom	1B.2	Coastal bluff scrub | Coastal prairie | North coast coniferous forest	Moderate Potential
Silene scouleri ssp. scouleri	Scouler's catchfly	2B.2	Coastal bluff scrub | Coastal prairie | Valley & foothill grassland	Low Potential
Viola palustris	alpine marsh violet	2B.2	Bog & fen | coastal scrub | wetland	Low Potential
Non-vascular plants				
Fissidens pauperculus	minute pocket moss	1B.2	NC coniferous forest | redwood	Moderate Potential

Source: CNDDB and CNPS accessed 8/8/18. Assessment area consists of USGS 7.5 minute quadrangles: Orick, Fern Canyon, Ah Pah Ridge, Holter Ridge, Rodger's Peak, and Bald Hills.

Note: bold font in table denotes CRPR List 1 or 2 plant species, which are considered special-status. Plant species in normal font are List 3 or 4 species, which are provided herein for informational purposes and are not considered special-status.

California Native Plant Society Rare Plant Ranks (CRPR)

1A – Presumed Extirpated in California and either Rare or extinct elsewhere

1B – Rare, Threatened, or Endangered in California or elsewhere

Taxa	Common Name	CRPR Listing Status	Typical Habitat	Likelihood of Occurrence
2 – Rare, Threatened or Endangered in California, but more common elsewhere				
2A – Plants presumed Extirpated in California, but more common elsewhere				
2B – Plants Rare, Threatened, or Endangered in California, but more common elsewhere				
Threat Ranks:				
0.1 Seriously threatened in California				
0.2 Moderately threatened in California				
0.3 Not very threatened in California				
POTENTIAL TO OCCUR				
Low Potential	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 of 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.			

Construction Impacts

The Project includes the modification of the landscape in varying intensities across the majority of the Project Area. Construction activities which could adversely affect special-status plants, if present, include excavations, grading, vegetation removal, and the movement of heavy equipment throughout the area, particularly in the Prairie Creek Restoration Area, CCT, Libby Creek Enhancement Area, and Eastside Restoration Area due to the suitable habitat it provides for many of the special-status plants listed in Table 4.4-6. Seaside bittercress has been observed in the Project Area, adjacent to and mostly upstream of the concrete impoundment in Libby Creek, which is planned for removal (including removal upslope instream sediment/gravel). To complete this task, heavy equipment will need to access this area which would likely crush and potentially lead to mortality of this species. If a special-status plant were to be incidentally trampled or crushed during construction of the Project, resulting in harm or mortality of a substantial number of plants, a potentially significant impact would occur. To avoid potential adverse significant impacts to special-status plants, Mitigation Measure BIO-25 is proposed

Mitigation Measure BIO-25: Pre-construction Botanical Surveys

Seasonally appropriate pre-construction surveys for special-status plant species shall be performed by a qualified botanist and shall occur prior to construction in 2021 within the planned area of disturbance for each phase of the Project, during the appropriate blooming time (spring or summer) for the target species. If pre-construction surveys determine that special-status species are present within the Project footprint, these plants will be avoided to the extent feasible. If avoidance is not feasible, they shall be conserved by measures appropriate for the individual species which may include methods such as plant relocation, seed collection, and/or nursery plant propagation.

Plant relocation will be utilized for seaside bittercress when conducting Project work in the Libby Creek Enhancement area. Seaside bittercress will be removed using hand tools and stored in a basin (containers) for no longer than two weeks within the Project Area where it will receive adequate sunlight and water. The plants will be planted using hand tools as soon as possible in the vicinity of where they were removed.

With implementation of Mitigation Measure BIO-25, potentially significant impacts to special-status plants from construction will be avoided due to pre-construction surveys and the relocation of documented occurrences to near the location they were originally observed. Incorporation of Mitigation Measure BIO-25 reduces the potential impacts to special status plants to a **less than significant level with mitigation**.

It is notable that the invasive species, reed canary grass, was present in stream channels throughout the botanical survey study area. The previous botanical report by LACO identified Carolina canary-grass *(Phalaris caroliniana)* within the survey area. During GHD's botanical survey careful attention was paid to this genus and all *Phalaris* species observed were identified as reed canary grass. The Project involves the removal of reed canary grass from the ditch stream channel running between Libby Creek and Prairie Creek. The reed canary grass spoils will be buried at a depth of at least six feet below the surface in the Visitor Center footprint.

Tree removal is a planned component of the Project and is discussed in question (d) of Section 4.2 – Agriculture and Forest Resources.

Operation Impacts

Operation of the Project will include vegetation maintenance to promote the establishment of native flora and to limit the establishment of non-native plants. Vegetation maintenance will be implemented through mechanical and chemical means and in accordance with Project permits. The monitoring period to measure success of native vegetation establishment is anticipated to last for the period determined by Project-specific permits, and at a minimum there would be no net loss of native vegetation cover. To create and maximize the successful establishment of native vegetation, the most intensive management will likely occur immediately following Project implementation and in the first years thereafter. This management will include the application of herbicides, the use of mechanical equipment such as a mini excavator, and hand tools. The areas with the most intensive management is expected to be in the Prairie Creek Restoration Area, due to the extensive removal of vegetation cover from this area, and thus the increased ability for invasive species to establish, spread, and outcompete native plants. The Prairie Creek Restoration Area is also expected to be used frequently by wildlife, which may spread invasive vegetation seeds through their droppings or fur.

The approach to invasive vegetation management may include a sequencing of chemical and mechanical treatments to maximize results. An Invasive Species Management Plan (Appendix F of this ISMND) has been completed for the Project to guide management of invasive vegetation during and after Project implementation and before the property is transferred to NPS. No chemical vegetation treatments will be applied over open water. Chemical treatment may be applied to dry wetlands, or areas below the Ordinary High Water Mark that is dry. The Invasive Species Management Plan includes BMPs for effectively managing invasive vegetation at the Project Area. The Invasive Species Management Plan will be implemented, however invasive species management conducted during operation is not expected to impact special status plants because they are currently only present near Libby Creek. However pre-construction botanical surveys in 2021 may yield the presence of additional special status plant species. Furthermore, Project construction will result in approximately 328,900 cy of material relocated within the Project Area, which will denude available substrate of existing conditions. Project operation will contain different Project Area conditions than current conditions. When the Project Area is successfully transferred to the NPS, the site will be managed in accordance with the RNSP Vegetation Management Plan (NPS 2017a) and may continue to be managed using the Invasive Species Management Plan.

As stated in Mitigation Measure Bio-25 (Pre-construction Botanical Surveys), the Libby Creek Enhancement area will be surveyed before construction, and special-status plant seaside bittercress will be temporarily removed and stored in a basin or container during Project construction and planted in or near the area it was removed from as soon as possible. No monitoring is currently proposed following the replanting of this species. Any monitoring of this species will be determined by resource agencies during Project permitting. Potential vegetation monitoring at Libby Creek or any other Project component location is not expected to cause adverse impacts to special-status plants.

b, c) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service, including wetlands? (Less than Significant with Mitigation)

Within the Project Area, there are wetlands, riparian habitat, and other Sensitive Natural Communities. These resources, and impacts to each resource type and mitigation measures, if appropriate, are described below.

Wetland Resources

A wetland delineation was conducted on May 22, 2018 and January 22 and 24, 2019 by GHD, building upon previous efforts conducted by LACO and Humboldt State University. The wetland delineation (GHD 2019f) is included as Appendix H of this ISMND. To facilitate updating the wetland delineation, a GHD spatial analyst combined the shapefiles from the HSU and LACO delineations to create a field map of the combined delineation results which showed three parameter wetlands that met all three wetland attribute parameters (vegetation, soil, and hydrology). The GHD wetland delineation applied USACE criteria from the *Regional Supplemental to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (USACE 2010).

At the site visits, areas of standing water within the graveled and paved areas were observed and investigated to determine whether they met the USACE definition of a wetland. These areas, known as Gravel and Pavement Impoundments (or GI, and PI on Figure 4.4-2 – Wetland Delineation Overview), were determined to not meet the criteria of a wetland because they lack soil and therefore do not have hydric soil which is one of the three parameters constituting a wetland. The wetland delineation has been submitted to the USACE and the NCRWQCB and each concurred with the findings. Four wetland types were delineated that meet the three parameters: palustrine emergent wetlands, palustrine emergent ditch wetlands, palustrine forested wetlands, and palustrine scrub shrub (GHD 2019f). Wetlands are concentrated in the northern half and southern boundary area of the study area. Additionally, the Ordinary High Water Mark (OHWM) was determined on waterways within the study area from field measurements collected at two cross sections on Prairie Creek obtained from Northern Hydrology and Engineering (NHE) and field observations by GHD. Delineation of OHW is typically based on geomorphic and vegetative indicators (NHE 2018b). Indicators below, at, and above OHW as defined by Wohl (2016), were recorded in the Prairie Creek channel on July 26, 2018 by NHE. Additional analysis regarding secondary flow paths and larger scale depositional features were interpreted from LiDAR data, hydraulic modeling, aerial photography and high flow observations (NHE 2018b). See Figure 4.4-2– Wetland Delineation Overview for the locations of the Gravel and Pavement Impoundments, and wetland areas, and Appendix E within Appendix H – Wetland Delineation Report (GHD 2019f) for NHE’s OHWM investigation. The description of observed wetland type per the wetland delineation report (GHD 2019f) is summarized below.

Palustrine Emergent Wetland

Palustrine emergent wetlands within the grazed pasture contained a predominance of perennial non-native grasses such as Kentucky blue grass (Poa pratensis) and tall fescue (Festuca arundinacea), with components of annual non-native grasses and, primarily, non-native forbs. Other palustrine emergent wetlands contained a predominance of native perennial herbaceous species such as slough sedge (Carex obnupta) and panicled bulrush (Scirpus microcarpus). Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of both primary, being sediment deposits and saturation, and secondary indicators, being geomorphic position.

Palustrine Emergent Ditch

Wetlands identified as palustrine emergent ditch contained a predominance of native perennial species and occur adjacent to Bald Hills Road and adjacent to the Upper and Lower Roads, and on the eastern boundary of the Mill site. Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of both primary, being sediment deposits, surface water, groundwater and saturation, and secondary indicators, being drainage patterns.

Palustrine Forested Wetland

Forested wetlands had a predominance of trees at least 20 feet in height and dominant species included red alder (Alnus rubra), willows (Salix spp.), redwoods (Sequoia sempervirens) and Sitka spruce (Picea sitchensis). Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of primary indicators, being high water table and saturation.

Palustrine Scrub Shrub

Wetlands with a predominance of woody plants less than 20 feet tall were identified as palustrine scrub-shrub per the Cowardin definition (Federal Geographic Data Committee 2013), and contained willows (Salix spp.) and native and non-native shrub species. Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of primary indicators, being high water table and saturation.

Waters of the U.S. (OHWM)

Based on the geomorphic indicators and flood frequency analysis, the OHWM is estimated to occur when flows are roughly 800 cubic feet per second (cfs) and occupy approximately 12.25 acres of the Project Area, including the Prairie Creek channel, all connected tributaries and wetlands, and the ditch feature draining into Prairie Creek from the east (NHE 2018b). At this flow, the inundation area of OHW within the Prairie Creek channel is only 5.22 acres, indicative of the expansive network of wetlands within the Project Area. Physical indicators observed at the two measured cross sections primarily include tops of point bars, river erosion and vegetation destruction, and secondarily include soil development, depositional topography and secondary drainage development (NHE 2018b). GHD observed additional areas that can be considered OHWM areas directly above the inlet of Otter Creek and the unnamed tributaries on the northeastern side of the Project Area (GHD 2019f).

Using spatial analysis tools, ground disturbing impacts (including areas of cut and fill) were overlaid atop delineated wetland areas to determine areas of wetland impact. Table 4.4-7 – Acreage of Wetlands and Wetland Impacts lists acreages of delineated wetlands and areas of impact of those wetland areas. See Figure 4.4-4 Impacts to Wetlands and Sensitive Natural Communities for a visual representation of where impacts to wetlands will occur in the Prairie Creek Restoration, Skunk Cabbage Cree, Libby Creek Enhancement, and Lower Road areas. Please note that impact acreages were determined based on the conceptual site plan; final impact acreages may vary slightly and will be refined during the permitting phase of the Project based on advanced designs.

Table 4.4-7 Acreage of Wetlands and Waters of the US and Impacts

Wetland Type	Acres Present	Acres of Impact
Palustrine Emergent Ditch	1.00	0.47
Palustrine Emergent Wetland	6.85	2.43
Palustrine Forested Wetland	8.82	1.46
Palustrine Scrub-Shrub Wetland	3.58	0.29
Waters of the U.S. (OHWM)	5.60	4.87
Total	25.85	9.52

Wetlands are protected by federal, state and local regulations. Adverse impacts to wetlands (including waters at and below the OHWM) are considered a significant impact under CEQA. The Project will adversely affect approximately 9.52 acres of wetlands or Waters of the U.S., which is considered a potentially significant impact. However, a substantial amount of wetlands and Waters of the U.S. will be created as a result of Project implementation, particularly through the expansion of the Prairie Creek channel and backwater features, removal of fill associated with Yurok Demonstration Site, daylighting of Libby Creek, and other Project components that will create wetlands and other Waters of the U.S. All wetlands and Waters of the U.S. adversely impacted by the Project will be replaced at a minimum one to one ratio. Wetlands will be monitored in accordance with Project permits and the HMMP. The HMMP will include the following 1) baseline locations of existing wetlands, 2) identification of wetlands creation/enhancement sites, 3) reference sites, 4) monitoring protocols, 5) ecological performance standards for absolute/relative cover of native wetlands plants, absolute cover of target invasive plants, hydrology and survivability as appropriate, 6) corrective actions if performance standards are not met, and 7) responsible parties for report preparation and review.

There will be no net loss to wetlands or Waters of the U.S. Impacts to wetlands and Waters of the U.S. will be **less than significant**.

Construction of the Project and select operational activities including invasive vegetation management may inadvertently harm wetlands (that are not anticipated to be adversely affected) due to the movement of construction equipment in or adjacent to sensitive areas, which would be a potentially significant impact. To avoid temporary and short-term impacts to wetlands or Waters of the U.S., outside of the 9.52 acres of expected area of impact, Mitigation Measure BIO-26 is proposed.

Mitigation Measure BIO-26: Mitigate Temporary and Short-term Impacts to Wetlands and other Waters of the U.S. through Construction Minimization and Avoidance Measures

Because implementing the Project directly or indirectly has the potential to inadvertently harm wetlands or Waters of the U.S., the following avoidance and minimization measures will be incorporated into the Project:

- The locations of wetlands and other Waters of the U.S. to be retained onsite during construction shall be clearly identified in the contract documents (plans and specifications).
- Before clearing and grubbing commences, disturbance areas and exclusion zones shall be flagged to clearly define the limits of the work area in the field with flagging or orange construction fencing and no activities shall occur inside the exclusion zones.
- Flagging or fencing shall remain in place for the duration of construction in the vicinity of the protected resources and shall be periodically inspected and repaired as needed to maintain the exclusion zone.

With incorporation of Mitigation Measure BIO-26, inadvertent impacts to wetlands and other Waters of the U.S. outside the 9.52 acre area of impact will be reduced or avoided by clearly delineating boundaries of disturbance activities, utilizing existing disturbed areas for access roads and appropriate staging of construction equipment. These potential inadvertent impacts to wetlands and Waters of the U.S. outside of the 9.52 acres of impact, will be reduced to a **less than significant level with mitigation**. Overall, implementation of the Project is expected to enhance wetlands and Waters of the U.S. due to the expanded channel and backwater channel capacity of Prairie Creek, which will retain water for longer within the Project Area compared to existing conditions.

The activities implemented during operation of the Project which may adversely affect wetlands include invasive vegetation management. Chemical and mechanical methods of treatment will be applied to manage and control invasive vegetation to promote native vegetation establishment before, during and after construction. Chemical treatments, including the use of herbicide, will not be applied in standing water but may be applied to dry wetlands and areas below the OHWM when they are dry. All chemical treatment applications will be applied in accordance with the forthcoming Section 401 Water Quality Certification administered by the RWQCB, and in accordance with Mitigation Measure BIO-15 (Manage Herbicide Control and Minimize Spill Risk) which requires special application measures to be taken when herbicide is to be applied, Mitigation Measure BIO-16 (Accidents Associated with Release of Chemicals and Motor Fuel) which requires having spill kits onsite, and Mitigation Measure BIO-14 (Treatment of Invasive Species During Construction) and BIO-24 (Treatment of Invasive Species Post Construction) which requires implementation of the recommendations in the Invasive Species Management Plan before and during construction, and during Project operation, respectively. Mechanical methods of vegetation management will be implemented in accordance with Mitigation Measure BIO-26 (Mitigate Temporary and Short-term Impacts to Sensitive Habitats Including Wetlands Through Construction Minimization and Avoidance Measures and Replacement Requirements), which requires sensitive habitat areas, including wetlands, at are to be avoided to be clearly marked. With implementation of Mitigation Measure BIO-14, BIO-15, BIO-16, BIO-24 and BIO-26, operational impacts to wetlands will be **less than significant with mitigation**.

Sensitive Natural Communities

Vegetation mapping within the Project Area was conducted by McBain Associates in the *Redwood*

National and State Park Visitor Center and Restoration Project Basis of Revegetation Design Report (McBain Associates 2019), which is attached as Appendix I of this ISMND. See Figure 4.4-3 – Vegetation Cover Types for the locations of vegetation communities. GHD completed a botanical field visit and subsequent memo (GHD 2019e) to review the vegetation mapping on the ground; see Appendix G to this ISMND. Seven Sensitive Natural Communities are documented within the study area including arroyo willow thickets alliance, shining willow groves alliance, redwood forest alliance, Sitka spruce forest alliance, slough sedge swards alliance (including slough sedge, Himalayan blackberry – slough sedge, and tall fescue – slough sedge alliances) (GHD 2019e).

Four additional Sensitive Natural Communities were mapped within the study area by McBain Associates (2019), and will be adversely impacted by the Project. These Sensitive Natural Communities and the acreage (ac) of impact include: black cottonwood (*Populus trichocarpa*) forest alliance (0.07 ac), Coastal dune willow thicket (*Salix hookeriana*) shrubland alliance (0.02 ac), bishop pine-Monterey pine (*Pinus muricata-Pinus radiata*) forest alliance (0.00 ac), and Sitka willow thickets (*Salix sitchensis*) provisional shrubland alliance (0.01 ac). Field reconnaissance visits by GHD determined that the communities did not contain adequate individual species to be considered a sensitive natural community. Two other vegetation types are noted to occur in the study area, and will be adversely impacted by the Project including: Red Alder (*Alnus rubra*) forest alliance (4.13 ac), and Red Alder-Shining Willow (*Alnus rubra-Salix lasiandra*) vegetation type (3.98 ac). The Red alder forest alliance community is ranked S4 meaning it is not considered sensitive (ranks of S1 through S3 are considered sensitive), and is therefore not considered further in this analysis. The Red alder-Shiny willow vegetation type is not listed on the CDFW Sensitive Natural Community list, although it likely meets the criteria for consideration. Therefore, the Red alder-Shining willow vegetation type is not given further consideration as a Sensitive Natural Community in this analysis, however it is located within the riparian corridor; riparian resources are discussed below. See the Updated Special Status Plant and Sensitive Natural Communities Survey (GHD 2019e) attached as Appendix G for discussion and photographs of the four Sensitive Natural Communities not considered in this analysis.

Construction of the Project is expected to adversely impact some Sensitive Natural Communities due to excavation, and vegetation removal. Using spatial analysis tools, ground disturbing impacts (including areas of cut and fill) were overlaid atop Sensitive Natural Communities (as mapped by McBain Associates 2019) to determine areas of impact. To avoid analyzing impacts at the same location for two separate resource types (Sensitive Natural Communities and wetlands), impacts to wetlands already determined by spatial analysis are not included in the Sensitive Natural Community spatial impact analysis. See Figure 4.4-4 – Impacts to Wetlands and CDFW Recognized Sensitive Natural Communities for a visual representation of impacts to wetlands and Sensitive Natural Communities. Table 4.4-8 – Sensitive Natural Community Areas and Areas of Impact lists acreages of delineated Sensitive Natural Communities and areas of impact within each community. The vegetation zone associated with each Sensitive Natural Community is also listed. There are five vegetation zones in the Project Area (McBain Associates 2019). Although a Sensitive Natural Community may exist within a riparian vegetation zone, it is considered in this section because it is classified as a Sensitive Natural Community. Impacts to remaining non-Sensitive Natural Community riparian resources are considered below. See Table 2 within Appendix I – Basis of Revegetation Design Report for a full list of all vegetated and unvegetated cover types within the study area.

Table 4.4-8 Sensitive Natural Community Areas and Areas of Impact

Cover Type	Vegetation Alliance	CDFW Sensitive Community	Vegetation Zone	Pre-project Area (ac)	Area of Impact (ac)
Arroyo Willow	Arroyo willow (*Salix lasiolepis)* thicket shrubland alliance	Yes	Riparian	2.20	1.28
Shining Willow	Shining willow *(Salix lasiandra var. lasiandra)* groves alliance	Yes	Riparian	0.70	0.45
Redwood	Redwood (*Sequoia sempervirens)* Forest Alliance	Yes	Upland	7.80	1.22
Sitka Spruce	Sitka spruce (*Picea sitchensis)* Forest Alliance	Yes	Upland	6.00	2.02
Slough Sedge	Slough sedge (*Carex obnupta)* swards Herbaceous Alliance	Yes	Emergent	1.00	0.04
Himalayan Blackberry – Slough Sedge	Slough sedge (*Carex obnupta)* swards Herbaceous Alliance	Yes	Emergent	0.50	0.06
Tall Fescue – Slough Sedge	Slough sedge (*Carex obnupta)* swards Herbaceous Alliance	Yes	Emergent	0.10	0.01
			Totals:	18.32	5.08

A description of each Sensitive Natural Community, vegetation zone and anticipated impacts are described below.

Arroyo willow

The arroyo willow thickets shrubland alliance is located in the riparian vegetation zone, along the margins of Prairie and Libby creeks and freshwater bodies (both perennial and seasonal). Arroyo willow is the dominant woody plant in the arroyo willow thickets (*Salix lasiolepis* Shrubland Alliance). This alliance is commonly associated with stream margins and perennial and seasonal freshwater wetlands. Arroyo willow is a wet facultative wetland indicator species (Reed 1988 in McBain Associates 2019). Other species that may commonly occur as associates (but not co-dominants) in the canopy of this alliance include red alder, black cottonwood, Sitka willow, and Hooker's willow. The arroyo willow thickets cover 2.5 percent of the study area. Impacts to this alliance are expected to occur during the earthwork and removal of vegetation associated with the Prairie Creek Restoration (see Figure 4.4-4). This sensitive natural community is located in the riparian zone, which is expected to expand by 3.6 acres as a result of the Project (see Table 4.4-9 – Revegetation by Zone).

Table 4.4-9 Revegetation by Zone

Vegetation Zone	Existing Conditions (acres)	Projected Revegetation Area	Difference (acre)
In-channel	4.5	6.0	+ 1.5
Emergent	7.9	14.7	+ 6.8
Riparian	11.6	15.2	+ 3.6

Vegetation Zone	Existing Conditions (acres)	Projected Revegetation Area	Difference (acre)
Riparian-Upland Transition	15.2	14.0	- 1.2
Upland	50.0	39.2	- 10.8
Total	89.2	89.2	0.0

Source: McBain Associates 2019

Shining willow

The shining willow groves alliance is located in the riparian vegetation zone, along the margins of Prairie Creek, the eastern ditch tributary which drains to Prairie Creek, and along the southern ditch area. Pacific willow (also known as shining willow) is the dominant woody plant in the shining willow groves (*Salix lasiandra* Woodland Alliance). This alliance is commonly associated with stream margins, and perennial and seasonal freshwater wetlands. Pacific willow is a wet facultative wetland indicator species (Reed 1988 in McBain Associates 2019). Other species that may commonly occur as associates (but not co-dominants) in the canopy of this alliance type include red alder, black cottonwood, Sitka willow, and Hooker's willow. This sensitive natural community covers 0.8 percent of the study area. Impacts to this alliance are expected to occur during the earthwork associated with the Prairie Creek Restoration and the southern ditch widening Project components (see Figure 4.4-4). This sensitive natural community is located in the riparian zone, which is expected to expand by 3.6 acres as a result of the Project (see Table 4.4-9).

Redwood

The redwood *Sequoia sempervirens* forest alliance is located in the upland vegetation zone, which is dominated by coniferous plants associated with non-wetland habitats. Coast redwood is the dominant woody plant in the redwood forest (Sequoia sempervirens Forest Alliance). Coast redwood is not a wetland indicator species (Reed 1988 in McBain Associates 2019). Other species that may commonly occur as associates (but not co-dominants) in this cover type include Sitka spruce, hemlock (*Tsuga menziesii*), red elderberry, Douglas iris (*Iris douglasii*), redwood sorrel (*Oxalis oregana*), evergreen huckleberry (*Vaccinium ovatum*), sword fern (*Polystichum munitum*), and salal (*Gaultheria shallon*). The redwood forest alliance covers 8.8 percent of the study area. Impacts to this alliance are expected to occur during the earthwork associated with the CCT, Libby Creek Enhancement, and lesser so during the Prairie Creek Restoration and Visitor Center Project components (see Figure 4.4-4). This sensitive natural community is located in the upland zone, which is expected to decrease by 10.8 acres as a result of the Project (see Table 4.4-9).

Sitka spruce

Sitka spruce is the dominant woody plant in the Sitka spruce forest (*Picea sitchensis)* forest alliance. Sitka spruce is a facultative wetland indicator species (Reed 1988 in McBain Associates 2019). Other species that may commonly occur as associates (but not co-dominants) in this cover type include coast redwood, hemlock, Douglas iris, redwood sorrel, evergreen huckleberry, sword fern, and salal. The Sitka spruce forest alliance and covers 6.7 percent of the study area. Impacts to this alliance are expected to occur during the earthwork associated with the CCT, Libby Creek Enhancement, Eastside Restoration Area, and lesser so during the Prairie Creek Restoration Project components (see Figure 4.4-4). This sensitive natural community is located in the upland zone, which is expected to decrease by 10.8 acres as a result of the Project. There is a particular area of this community that contains highly biologically valuable habitat due to the established mixed wetlands and Sitka spruce forest that exists (see “Protected Sitka spruce Area” on Figure 4.4-4). If this area were to be adversely affected by the Project, a potentially significant impact would occur. In order to ensure this area is protected, Mitigation Measure BIO-27 is proposed.

> **Mitigation Measure BIO-27: Protection to Designated Sitka spruce Forest Area**
>
> No Project work including cutting, filling, vegetation removal or modification shall take place in the “Protected Sitka spruce Area” as shown on Figure 4.4-4, located west of the Lower Road. The boundary of this area shall be clearly marked in order for the contractor to avoid it.

With implementation of Mitigation Measure BIO-27, significant impacts to the highly valuable Sitka spruce area (denoted as “Protected Sitka spruce Area” on Figure 4.4-4) will be avoided due to the marking and avoidance of this area. These impacts will be reduced to a **less than significant level with mitigation**.

Slough Sedge Swards

The slough sedge swards herbaceous alliance includes a total of three cover types: slough sedge, Himalayan blackberry – slough sedge, and tall fescue – slough sedge. These cover types can be found in the emergent vegetation zone, located along the margins of Prairie Creek, Libby Creek, and various seasonal and perennial freshwater bodies within an elevation of three feet above the fall water surface. Slough sedge (Carex obnupta) is the dominant plant in the slough sedge swards. This alliance was commonly associated with perennial freshwater bodies. Slough sedge often grows in dense monotypic stands. Slough sedge is an obligate wetland indicator species (Reed 1988 in McBain Associates 2019). The three cover types associated with slough sedge swards cover 1.8 percent of the study area. Impacts to this alliance are expected to occur during the earthwork associated with the Prairie Creek Restoration Project component (see Figure 4.4-4). This sensitive natural community is located in the emergent zone, which is expected to increase by 6.8 acres as a result of the Project (see Table 4.4-9).

Although some of the vegetation zones within which Sensitive Natural Communities are expected to expand, an adverse impact to a sensitive natural community is considered potentially significant under CEQA. Therefore, loss of Sensitive Natural Communities is considered a potentially significant impact. Mitigation Measure BIO-28 will address adverse impacts to Sensitive Natural Communities from construction of the Project.

> **Mitigation Measure BIO-28: Offset Impacts to Sensitive Natural Communities**
>
> All areas considered Sensitive Natural Communities, as shown in Table 4.4-8, adversely impacted by the Project shall be replaced at a minimum one to one ratio in an appropriate location within the Project Area. Appropriate locations will be determined during development of the final revegetation plan based on the 65% design of restoration elements of the Project and are expected to include the ERA, Southern Drainage Ditch and Prairie Creek Restoration areas. Newly created Sensitive Natural Communities shall be monitored in accordance with Project permits and the HMMP. The HMMP will include the following 1) baseline locations of existing communities, 2) identification of Sensitive Natural Communities creation/enhancement sites, 3) reference sites, 4) monitoring protocols, 5) ecological performance standards for absolute/relative cover of native wetlands plants, absolute cover of target invasive plants, and survivability as appropriate, 6) corrective actions if performance standards are not met, and 7) responsible parties for report preparation and review.

> Monitoring is expected to take place intermittently for up to five years or until success criteria are met, whichever comes first.
>
> All areas considered Sensitive Natural Communities that will be retained onsite during construction shall be clearly identified in contract documents. Before construction activities commence adjacent to any Sensitive Natural Community that will remain onsite, flagging or fencing shall be installed at the limit of the work area to protect adjacent Sensitive Natural Communities. Flagging or fencing shall remain in place for the duration of construction in the vicinity of the protected resources and shall be periodically inspected and repaired as needed to maintain the exclusion zone.

With implementation of Mitigation Measure BIO-28, potentially significant impacts to Sensitive Natural Communities from construction disturbances will be reduced by replanting the impacted areas at a minimum one to one ratio in the same or similar location. These impacts will be reduced to a **less than significant level with mitigation**.

In total, construction of the Project will result in the removal of approximately 50 to 75 trees located along the Upper Road, including coast redwood, Sitka spruce, Douglas-fir, and approximately 100 trees within the ERA, including Douglas-fir, redwood, Sitka spruce, big leaf maple, red alder and cascara. Impacted vegetation within the Upper Road and ERA that are designated as Sensitive Natural Communities will be replaced in accordance with Mitigation Measure BIO-28 (Offset Impacts to Sensitive Natural Communities). It is expected that the entire ERA will be revegetated following construction.

Project work in the Southern Drainage Ditch will result in the removal of approximately 150 trees, including: big leaf maple, red alder and willow. The trees along the Southern Drainage Ditch do not comprise Sensitive Natural Communities and therefore impacts from the removal of these trees is not considered in this portion of the analysis. Trees along the Southern Drainage Ditch comprise riparian habitat, which is discussed below.

Operational impacts to Sensitive Natural Communities may occur during invasive vegetation management including use of chemical and mechanical treatments to promote native vegetation. With implementation of Mitigation Measure BIO-24 (Treatment of Invasive Species Post Construction), significant impacts to Sensitive Natural Communities from operation of the Project will be reduced or avoided by clearly delineating boundaries of invasive vegetation disturbance activities, utilizing existing disturbed areas for access roads, staging of invasive vegetation management equipment, and contractor education regarding locations of Sensitive Natural Communities. These potential impacts will be reduced to a **less than significant level with mitigation**.

Riparian Habitat

A dense band of riparian trees and shrubs exists along the banks of Prairie Creek. The area is overgrown with invasive Himalayan blackberry but provides habitat to birds, amphibians, small mammals, insects, and aquatic species. Large area of vegetation found within the Prairie Creek riparian corridor will be completely removed during construction of the Project, including approximately 150 trees. However, implementation of the Prairie Creek Restoration component will vastly expand riparian habitat due to the network of channels to be excavated in this area and the implementation of the revegetation design plan (McBain Associates 2019). The channels will vary in frequency of inundation, with the primary channel inundated most frequently, and the backwater channels inundated during high flow events. This variation in frequency of inundation will lead to increased biodiversity of vegetation which is captured in the Basis of Revegetation Design Report

(McBain Associates 2019) attached as Appendix I of this ISMND. Major revegetation components as described in McBain Associates (2019) include:

> *In-channel areas will not be planted unless the threat of invasive plant colonization establishment is considered to be high. Areas designated will be planted depending on proximity to the main channel, intended hydrologic function, and threat of invasive plant species recolonization. In those cases, native rhizomatous species should be planted.*
>
> *The emergent zone is the ecotone between the aquatic environment and the woody plant dominated riparian zone. The emergent zone is often occupied by semi-open substrate, herbaceous plants, and establishing woody plants. Deeper channel bed scour and deposition periodically occurs in this zone. Many projects choose not to plant within the emergent zone because the channel will adjust after the project is constructed and plantings within the emergent zone can inhibit short term channel adjustment and potentially limit the extent to which the channel can be dynamic in the future. However, plantings in the emergent zone can limit the amount of area that disturbance-dependent non-native plants can colonize (Wisconsin Reed Canary Grass Management Working Group 2009).* Plant species that could be used to revegetate *areas within the emergent zone* include slough sedge, rush, lady fern (*Athyrium filix-femina*), skunk cabbage (*Lysichiton americanus*), western crabapple (*Malus fusca*), Sitka willow, red alder, black cottonwood, western red cedar (*Thuja plicata*), and Sitka spruce (McBain Associates 2019).
>
> *The riparian zone is often occupied by a multi-layered vegetation that is dominated by woody plants. The riparian zone is inundated annually to semi-annually during the winter and early spring and is generally depositional. Tree and shrub species should be planted together and near each other to create a heterogeneous canopy structure that benefits neotropical birds (RHJV 2004).* Plants that could be used to revegetate areas within the riparian zone include slough sedge, Pacific reed grass (*Calamagrostis nutkaensis*), rush, California blackberry (*Rubus ursinus*), cascara, western crabapple, Sitka willow, shining willow, red alder, black cottonwood, western red cedar, and Sitka spruce.
>
> *The transition zone is the ecotone between the woody plants found in the riparian zone and the more drought tolerant plants found in the upland zone. Upland and riparian plants co-mingle in the transition zone, which is inundated infrequently, or about one or two times every five years.* Plants that could be used to revegetate areas within the transition *zone* include slough sedge, California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), beardless wildrye (*Elymus triticoides*), meadow barley (*Hordeum brachyantherum*), California oat grass (*Danthonia californica*), Pacific reed grass, rush, California blackberry, sword fern (*Polystichum munitum*), cascara, red elderberry (*Sambucus racemosa*), arroyo willow, Sitka willow, red alder, bigleaf maple, black cottonwood, and redwood.
>
> *The upland zone is rarely if ever inundated and is composed of more drought tolerant plant species*. Plants that could be used to revegetate areas within the upland zone include sword fern, evergreen huckleberry (*Vaccinium ovatum*), red elderberry, red alder, grand fir (*Abies grandis*), Douglas-fir, and redwood.

Riparian habitat also exists along the Southern Drainage Ditch and along Libby Creek. The Project will remove approximately 150 trees including big leaf maple, red alder and willow from the northern bank of the Southern Drainage Ditch. In addition to trees, debris, a berm and a dilapidated fence will be removed from the Southern Drainage Ditch. This area will by hydrologically connected to the proposed stormwater retention basins southeast of the Visitor Center. The Southern Drainage Ditch will be revegetated with similar species as to those that were removed, or with Sensitive Natural Communities. A few trees may be removed along Libby Creek, but no trees larger than 18 inches dbh will be removed. Invasive vegetation located along the banks including Himalayan blackberry will be removed during earthwork in this portion of the Project, which will benefit the establishment of native vegetation.

Due to the significant net increase in riparian habitat resulting from Project implementation, short-term adverse impacts to riparian vegetation during construction are not considered significant. Overall, the Project will significantly benefit riparian habitats within the Project Area. The restored riparian corridor will work in concert with the restored Prairie Creek stream channel to improve geomorphic function, long-term large wood recruitment, aquatic habitat, and wildlife habitat by increasing the extent and quality of riparian habitat and species diversity. A **less than significant impact** will occur, and ultimately a long-term positive impact will result from Project implementation.

The activities implemented during operation of the Project that may adversely affect riparian habitat includes invasive vegetation management. Access within the riparian corridor to conduct invasive vegetation management may adversely affect riparian habitat. However, no adverse operational impacts to riparian habitat will occur because the invasive vegetation management activities will be implemented in accordance with Mitigation Measure BIO-24 (Treatment of Invasive Species Post Construction), which requires that areas of disturbance from invasive plant removal be revegetated with native seed or container stock. With incorporation of Mitigation Measure BIO-24 potential impacts to riparian habitat from invasive vegetation management will be reduced to a **less than significant** level.

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? (Less than Significant with Mitigation)

Construction of the Project will include significant earthwork throughout the Project Area in open waters (Prairie Creek, Libby Creek, Otter Creek and the unnamed tributary), wetlands, and over dry upland terrain. Impacts to migratory wildlife resulting in a substantial interference with their movement would be a significant impact. Migratory wildlife in the Project Area, the habitat they utilize, their migratory season, and potential for occurrence are listed in Table 4.4-10 – Migratory Wildlife in the Project Area.

Table 4.4-10 Migratory Wildlife in the Project Area

Species	Habitat	Migratory Season	Potential for Occurrence
Chinook Salmon	Aquatic	Late Fall/Winter: November – January[1]	High Potential
Coho Salmon	Aquatic	Late Fall/Winter: November – January[1]	High Potential
Coastal Cutthroat Trout	Aquatic	Winter/Spring: December – June[1]	High Potential
Steelhead (winter run)	Aquatic	Winter/Spring: November – April[1]	High Potential

Species	Habitat	Migratory Season	Potential for Occurrence
Eulachon	Aquatic	Winter/Spring: December – June[2]	Moderate Potential
Green Sturgeon	Aquatic	Spring: March – June, or March – January[3]	Low Potential
Pacific Lamprey	Aquatic	Late Winter/Spring: February – June[4]	High Potential
Migratory Birds	Terrestrial	Migratory Season: variable, Nesting Season: March 15 – August 15	High Potential

Sources: 1: NPS 2017b; 2: NOAA 2019b; 3: CDFW 2019d; 4: USFWS 2008

Substantial interference with movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors will be temporary and limited to construction periods. The primary blockage will be during dewatering of Prairie Creek which will be of short duration. If migratory corridors within Prairie Creek were blocked during species' migratory seasons, a significant impact would occur. To avoid this potential significant impact Mitigation Measures BIO-5 (Seasonal Work Windows), BIO-6 (Native Aquatic Species Relocation) and BIO-7 (Dewatering) are proposed. With implementation of Mitigation Measures BIO-5, BIO-6 and BIO-7, significant impacts to migratory aquatic species from construction activities will be avoided due to allowable work windows, species relocation and dewatering requirements. These impacts will be reduced to a **less than significant level with mitigation**.

No continuous barriers to terrestrial wildlife movement are anticipated, and the project will not substantially interfere with migratory birds or aquatic species. Seven herds of Roosevelt Elk are present in the Project vicinity and remain within this range throughout the year (NPS 2017c). The Project Area is large and construction will be dispersed throughout it. Elk and other wildlife can move around areas of discrete construction to move through or across the Project Area. Construction will be short-term in duration and no permanent barriers will be constructed. Visitors will be informed of their potential presence and appropriate behavior. Aquatic and avian migration routes will not be impacted by operation of the Project, rather aquatic habitat will significantly improve and avian habitat will be unchanged. Consequently, there will be no impact to aquatic and avian migratory species during Project operation. Impacts to terrestrial wildlife movement during construction and operation of the Project are considered **less than significant**.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? (No Impact)

The local policies applicable to this question include the policies from the Humboldt County General Plan (2017) and Orick Community Plan, which are listed above under the "Regulatory Setting." The Project will require a Streamside Management Area permit, which will be bundled with the Conditional Use Permit, from Humboldt County. Impacts to the Streamside Management Area are offset by the creation of wetlands, and revegetation of Sensitive Natural Communities and riparian resources, which will exceed the amount of these resources that currently exist onsite. The Project does not conflict with any of the goals or policies listed above, as it will be constructed in accordance with all county, state and federal permits, and will improve wildlife habitat, ecosystem function, and visitor's appreciation and understanding of the natural world. **No impact** will occur.

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? (No Impact)

The Project is not located within the boundaries of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. As such, the Project will not conflict with the provisions of any such plan. **No impact** will occur.

An analysis of potential cumulative impacts on biological resources from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.5 Cultural Resources

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical 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?		✓		

Evaluation Criteria	Significance Thresholds	Sources
Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	Adverse alteration of those physical characteristics of a historical resource that justify its eligibility for the, California Register of Historical Resources (CRHR) or as a local landmark	CEQA Guidelines Appendix G, Checklist Item V (a)
Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	Adverse alteration of those physical characteristics of an archaeological resource that justify its eligibility for the CRHR or as a unique archaeological resource	CEQA Guidelines Appendix G, Checklist Item V (b)
Would the project disturb any human remains, including those interred outside of dedicated cemeteries?	Disturbance of human remains, including Native American human remains, associated grave goods, or items of cultural patrimony	CEQA Guidelines Appendix G, Checklist Item V (c) General Plan Policy CU-P4

This Section evaluates the potential impacts to cultural resources resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental and Cultural Setting

A cultural resources survey was conducted by PAR Environmental Services in 2019 within the Project Area and is the basis for analysis of this Section. The study area is termed the Area of Potential Effect (APE) in the accompanying cultural resources report, in compliance with Section 106 of the National Historic Preservation Act. The APE is slightly larger than the Project Area, and additionally includes the totality of APNs 519-231-018 and 520-012-013.

The APE is located in Yurok ancestral lands, and is surrounded by coniferous forest, Highway 101, Redwood Creek and a residential neighborhood to the west of Highway 101. Historically the northwestern California coast was often described as “impenetrable” (Sullivan 1934 in PAR 2019), which is one of the reasons for later contact with Native Americans in the vicinity of the APE as compared to southern and central California.

Regulatory Setting

Federal

National Historic Preservation Acct, Section 106

The proposed Project must comply with Section 106 of the National Historic Preservation Act (NHPA), because the Project requires a permit from the U.S. Army Corps of Engineers (USACE). Section 106 of the NHPA requires that, before beginning an undertaking, a federal agency, or projects that the USACE fund or permit, must take into account the effects of the undertaking on historic properties and afford the Advisory Council on Historic Preservation and other interested parties an opportunity to comment on these actions.

Section 106 of the NHPA prescribes specific criteria for determining whether a project would adversely affect a historic property, as defined in 36 Code of Federal Regulations (CFR) 800.5. An impact is considered significant when prehistoric or historic archaeological sites, structures, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP) are subjected to the following effects:

- Physical destruction of or damage to all or part of the property,
- Alteration of a property,
- Removal of the property from its historic location,
- Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance,
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property’s significant historic features,
- Neglect of a property that causes its deterioration, and
- Transfer, lease, or sale of the property.

Cultural resource significance is evaluated in terms of eligibility for listing in the NRHP. NRHP significance criteria applied to evaluate the cultural resources for this Project are defined in 36 CFR 60.4 as follows:

> *The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, association, and*
>
> *A. That are associated with events that have made a significant contribution to the broad patterns of our history; or*
>
> *B. That are associated with the lives of persons significant in our past; or*
>
> *C. That embody the distinctive characteristics of type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*
>
> *D. That have yielded, or may be likely to yield, information important in prehistory or history.*

Specific regulations regarding compliance with Section 106 state that, although the tasks necessary to comply with Section 106 may be delegated to others, the federal agency is ultimately responsible for ensuring that the Section 106 process is completed according to statue.

State

Office of Historic Preservation

The California State Office of Historic Preservation (OHP) is responsible for administering federally and state mandated historic preservation programs to further the identification, evaluation, registration and protection of California's irreplaceable archaeological and historical resources under the direction of the State Historic Preservation Officer and the State Historical Resources Commission.

OHP reviews and comments on federally sponsored projects pursuant to NHPA Section 106, and state programs pursuant to PRC Sections 5024 and 5024.5, which provide policies and plans for preserving and maintaining all state-owned historical resources or eligible historical resources. OHP also reviews and comments on local government and state projects pursuant to CEQA.

A variety of programs have been created by OHP in order to manage historic resources and to determine eligibility for classification as a historic resource. The programs that OHP administer includes: the NRHP, the CRHR, the California Historical Landmarks, and the California Points of Historical Interest. Each program has different eligibility criteria and procedural requirements.

California Register of Historic Resources

Cultural resource significance is evaluated in terms of eligibility for listing in the CRHR. The State Historical Resources Commission has designed the CRHR program for use by state and local agencies, private groups and citizens to identify, evaluate, register and protect California's historical resources. The Register is the authoritative guide to the state's significant historical and archaeological resources. CRHR criteria for designation include:

- **Criterion 1**. Associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States.
- **Criterion 2.** Associated with the lives of persons important to local, California or national history.
- **Criterion 3.** Embodies the distinctive characteristics of a type, period, region or method of construction or represents the work of a master or possesses high artistic values.
- **Criterion 4.** Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation.

The CRHR criteria is nearly identical to the federal NRHP criteria, and are used in tandem as "1/A" or "2/B" when identifying impacts. There is a slight difference in meaning between the CRHR and NRHP regarding Criterion 3 (Criterion C in the NRHP), which will be evaluated when determining impacts and significance.

California Public Resources Code

As part of the determination made pursuant to Public Resources Code (PRC) Section 21080.1, the lead agency must determine whether a Project would have a significant effect on archaeological and paleontological resources.

Several sections of the PRC protect cultural resources and PRC Section 5097.5 protects vertebrate paleontological sites located on public land. Under Section 5097.5, no person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site (including fossilized footprints), inscriptions made by humans, rock art, or any other archaeological, paleontological, or historical feature situated on public lands, except with the express permission of the public agency that has jurisdiction over the lands. Violation of this section is a misdemeanor.

PRC Section 5097.98 states that if Native American human remains are identified within a Project area, the landowner must work with the Native American Most Likely Descendant as identified by the NAHC to develop a plan for the treatment or disposition of the human remains and any items associated with Native American burials with appropriate dignity. These procedures are also addressed in Section 15046.5 of the CEQA Guidelines. Section 30244 of the PRC requires reasonable mitigation for impacts on paleontological and archaeological resources that occur as a result of development on public lands.

California Health and Safety Code

California Health and Safety Code (HSC) Section 7050.5 prohibits disinterring, disturbing, or removing human remains from a location other than a dedicated cemetery. Section 7050.5 also requires that construction or excavation be stopped in the vicinity of discovered human remains until the Coroner can determine whether the remains are those of a Native American. If determined to be Native American, the Coroner must contact the California NAHC.

California Native American Historical Cultural and Sacred Sites Act

This Act applies to both state and private lands. The Act requires that upon discovery of human remains, that construction or excavation activity cease and that the county Coroner be notified. If the remains are of a Native American, the Coroner must notify the NAHC. The NAHC then notifies those persons mostly likely to be descended from the Native American remains. The Act stipulates the procedures the descendants may follow for treating or disposing of the remains and associated grave goods.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate cultural resources include the following:

> *CU-G1. Protection and Enhancement of Significant Cultural Resources*
>
> Protected and enhanced significant cultural resources, providing heritage, historic, scientific educational, social and economic values to benefit present and future generations.
>
> *CU-P1. Identification and Protection*
>
> The potential for impacts to significant cultural resources shall be identified during ministerial permit and discretionary project review, impacts assessed as to significance, and if found to be significant, protected from substantial adverse change per California PRC Section 5020.1.
>
> *CU-P2. Native American Tribal Consultation*
>
> Native American Tribes (as defined below in CU-S3) shall be consulted during discretionary project review for the identification, protection and mitigation of adverse impacts to significant

cultural resources. Consultation on ministerial permits shall be initiated if it has been determined the project may create a substantial adverse change to a significant cultural resource. At their request, Tribes shall be afforded the opportunity to review and provide comments to the County early in project review and planning (screening) about known or potential Tribal cultural resources located in project areas within their respective tribal geographical area of concern.

CU-P3. Consultation with Other Historic Preservation Agencies and Organizations

Historic preservation agencies and organizations shall be consulted during discretionary project review for the identification, protection and mitigation of adverse impacts to significant cultural resources. These include, but may not be limited to, the County’s Cultural Resources Advisory Committee, Humboldt County Public Works Department and the Planning and Building Divisions, the Northwest Information Center of the California Historical Resources Information System (NWIC), the California Office of Historic Preservation, the Native American Heritage Commission, local historical societies, museums, colleges and universities, and incorporated cities historic preservation commissions or committees for their respective LAFCO sphere of influence, and local historians, cultural resources consultants and historic preservation staff affiliated with various state and federal agencies.

CU-P4. Avoid Loss or Degradation

Projects located in areas known, or suspected to be archeological sites or Native American burial sites shall be conditioned and designed to avoid significant impacts to significant sites, or disturbance or destruction to Indian burial grounds. Preserving Native American remains undisturbed and in place shall be selected as the preferred alternative unless substantial factual evidence is presented demonstrating that no alternative(s) are feasible. Conditions of approval shall include standard provisions for post review inadvertent archaeological discoveries and discovery and respectful treatment and disposition of Native American remains with or without funerary objects in accordance with state law (Health and Safety Code (HSC) Section 7050.5 and PRC Section 5097.98).

CU-P5. Findings Necessary for Loss or Destruction

Substantial adverse changes to significant cultural resources shall not be allowed through a ministerial or discretionary action unless:

A. The cultural resource has been found not to be significant based on consultation with culturally affiliated Native American Tribe(s) and other historic preservation agencies and organizations as required by CU-P2 and CU-P2x; or

B. There is an overriding public benefit from the project, and compensating mitigation to offset the loss is made part of the project.

CU-P6. Mitigation

Mitigation measures shall be required for any permitted project or County action that would adversely impact significant cultural resources.

Impact Analysis

a) Cause a substantial adverse change in the significance of a historical resource pursuant to PRC Section 15064.5? (Less than Significant Impact)

Five historical resources were identified and recorded within the APE during survey efforts, consisting of four historical roads and one impoundment within Libby Creek (PAR 2019). Four of the five historical resources were recommended to be ineligible for listing under both NRHP and CHRH criteria because of either a lack of historical importance, or a lack of integrity. The remaining historical resource, the segment of the 1894 Crescent City-Trinidad Wagon Road/Old Redwood Highway, is considered eligible for listing under the NRHP and CHRH because the resource meets Criterion A/1 for its importance in local transportation development and the economic growth of northern Humboldt County. This historical resource is known in present day as the Lower Road. The segment which is eligible for listing under the NRHP and CHRH spans between the intersection with the proposed California Coastal Trail and intersection of Highway 101. This section of road has a period of significance from 1918-1930. The road passes the Centennial Tree and winds through the forest with a narrow width which retains a sense of time and place to a historic redwood highway.

A portion of the ADA trail is proposed in this location on the present-day Lower Road. The segment of the Lower Road will not be widened to install the trail, rather the trail will comprise a portion of the width of the road. There is ground disturbance proposed adjacent to the historical resource to install the Canopy Walkway support beams. The Canopy Walkway would extend over this historical resource but would not physically alter it in one distinct section. This section of Lower Road will remain in use as an access road for emergency vehicles, which is consistent with its historical use and intent and will not result in a substantial adverse change. Additionally, an interpretive sign will be installed along the Lower Road which will relate both the history of the Trinidad to Crescent City Wagon Road. As a result of the limited footprint of the Canopy Walkway, and the trail upholding the intent of the Lower Road's historical use, there will be a **less than significant impact** to this historical resource.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5? (Less than Significant with Mitigation)

Four archaeological resources (three sites and one isolated artifact) were identified and recorded during the inventory and evaluation within the APE, consisting of the Orick Barn complex, Orick Mill A, 1950's era housing area, and a ditto machine (PAR 2019). None of the resources meet the NRHP and CRHR criteria and are not considered archaeological resources under CEQA (PAR 2019).

It is unlikely that archaeological materials would be discovered during construction of the Project. If buried cultural materials are encountered during construction, work shall stop in the immediate vicinity of the find(s) until Humboldt County can follow procedures for discovery of cultural resources during implementation of an undertaking, as described at 36 CFR 800.13. A substantial change to or destruction of these resources could be a potentially significant impact; therefore Mitigation Measure CR-1 and Mitigation Measure CR-2 are included, which are consistent with the Yurok Tribe's policy and procedures for inadvertent discovery of Yurok cultural items.

Mitigation Measure CR-1: Worker Cultural Awareness Training

All contractors that would be performing demolition, construction, grading, or other earth moving work and could encounter cultural resources or human remains at the site shall receive training regarding the cultural sensitivity of the site, the need to minimize impacts, and instructions for procedures to be taken if potential cultural resources of human remains are discovered. Contractors also shall be trained in implementation of construction BMPs for protection of cultural resources.

Mitigation Measure CR-2: Protect Archaeological Resources during Construction Activities

If cultural materials such as chipped or ground stone, historic debris, building foundations, or bone are discovered during ground-disturbance activities, work shall be stopped within 20 meters (66 feet) of the discovery. Work near the archaeological finds shall not resume until a professional archaeologist, who meets the Secretary of the Interior's Standards and Guidelines, has evaluated the materials and offered recommendations for further action. If the find is determined to constitute either an historical resource or a unique archaeological resource per CEQA Guidelines section 15064.5, the archaeologist shall develop appropriate mitigation to protect the integrity of the resource and ensure that no additional resources are affected. Mitigation could include but would not necessarily be limited to avoidance, preservation in place, archival research, subsurface testing, or excavation and data recovery. The Yurok Tribe's "Policy and Procedures for Inadvertent Discovery" requires that the tribe be contacted in the event that Native American cultural items are discovered. The tribe requires reburial of the items as soon as possible.

Implementation of Mitigation Measure CR-1 and CR-2 will reduce this impact to a less than significant level for both construction and operation because a mitigatory plan to address discovery of unanticipated buried cultural resources and to preserve and/or record those resources consistent with appropriate laws and requirements will be implemented. A **less than significant impact with mitigation** will occur.

c) Disturb any human remains, including those interred outside of formal cemeteries? (Less than Significant with Mitigation)

Based on field review/investigations, no evidence suggests that any prehistoric or historic-era marked or un-marked human interments are present within or in the immediate vicinity of the Project. However, the possibility of encountering human remains during construction cannot be completely discounted. The impact related to the potential disturbance or damage of previously undiscovered human remains, if present, is considered potentially significant and will be avoided through the implementation of Mitigation Measure CR-3.

Mitigation Measure CR-3: Protect Human Remains if Encountered During Construction

The contractor shall immediately notify the Humboldt County Coroner should human remains, associated grave goods, or items of cultural patrimony be encountered during construction, and the following procedures shall be followed as required by Public Resources Code § 5097.9 and Health and Safety Code § 7050.5.). The Yurok Tribe *Policy and Procedures of Inadvertent Discovery of Yurok Cultural Items* requires reburial of cultural items, and known funerary items as soon as possible. The Tribe requests that upon discovery of cultural items or human remains, ground disturbing activities in the immediate area must stop and the tribe be notified immediately. A reasonable protective barrier shall be established around the find (using flagging tape or similar identifier) and the find should be protected, with appropriate dignity, until an agreement is made with the Yurok Tribe regarding the appropriate action to take. The agreement should take into consideration leaving the find in situ without removal, or, if that approach is not feasible, developing the appropriate excavation, removal, recordation, analysis, custodianship, and final disposition of the human remains and associated or unassociated funerary objects. Mitigation Measure CR-3 would reduce the impact of inadvertent discovery of human remains to a less than significant level by addressing discovery of unanticipated remains, associated grave goods, or items of cultural patrimony consistent with appropriate laws and requirements. A **less than significant impact with mitigation** would occur. Operational impacts on human remains are not anticipated as operation of the Project does not include earth disturbance.

An analysis of potential cumulative impacts on cultural resources from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.6 Energy

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impacts 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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the project result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	Result in environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources	CEQA Guidelines Appendix G, Checklist Item VI (a)
Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	Conflict with SB 100 or the Humboldt County General Plan Policy E-P3	CEQA Guidelines Appendix G, Checklist Item VI (b) General Plan Policies E-P3 California SB 100

This Section evaluates the potential impacts to energy resources resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area is the same as the Project Area. Energy resources in Humboldt County consist primarily of fossil fuels such as natural gas deposits, and local biomass resources sourced from lumber mill wood residue. The majority of primary energy used in Humboldt County is imported, with the exception of biomass energy. Although natural gas deposits exist in Humboldt County, the County imports approximately 90 percent of its natural gas. Active gas wells in Humboldt County are concentrated in the Tompkins Hill Gas Field in the Eel River basin in Humboldt County. There is no record of geothermal production in Humboldt County. The Project Area is not located on or near any substantial known energy source and receives energy from Pacific Gas & Electric Company (PG&E) grid. Roughly half of the electricity serving Humboldt County is generated at the PG&E Humboldt Bay Generating Station, a natural gas-fired power plant (Humboldt County 2017). PG&E service is delivered to the Project Area via the existing energy infrastructure located on site (power poles) connected from the west across Highway 101. However, the two power poles located within the Project Area are planned to be removed during construction. Two additional customer-owned poles also exist within the Project Area, however they do not contain any electrical infrastructure. Future power to the site will either be delivered by PG&E via Bald Hills Road, or through an array of photovoltaic panels (as described in “Utilities and Amenities” within Section 2.6.1).

Regulatory Setting

Federal

There are no federal regulations that apply to the Project related to energy resources in Humboldt County.

State

State of California Energy Action Plan

In 2003, the three key energy agencies in California— the California Energy Commission (CEC), the California Power Authority (“CPA”), and the California Public Utilities Commission (CPUC)— jointly adopted an Energy Action Plan (“EAP”) that listed goals for California’s energy future and set forth a commitment to achieve these goals through specific actions. In 2005, the CPUC and the CEC jointly prepared the EAP II to identify the further actions necessary to meet California’s future energy needs. To the extent that efficiency, demand response, renewable resources, and distributed generation are unable to satisfy increasing energy and capacity needs, the EAP II supports the use of clean and efficient fossil-fired generation. The plan recognizes that concurrent improvements are required to the bulk electricity transmission grid and distribution facility infrastructure to support growing demand centers and the interconnection of new generation, both on the utility and customer side of the meter.

Senate Bill 1389

Senate Bill (SB) 1389, the *California Integrated Energy Policy*, was adopted in August 2002 and requires the CEC to prepare an Integrated Energy Policy Report (IEPR) for electricity, natural gas, and transportation fuels. The IEPR contains an analysis of the policies and actions that are necessary to ensure that the state has adequate energy resources—including a range of alternative energy resources—to meet its needs. The IEPR also includes recommendations to reduce energy demand and to improve the state‘s energy infrastructure.

Senate Bill 100

SB 100, *California’s Commitment to 100 Percent Clean Energy,* was signed by Governor Brown on September 10, 2018. It commits California to operating off of 100 percent clean energy by 2045, speeding up the state’s timeline for moving to carbon-free power sources. Under the law 60 percent of the power purchased by California utilities must come from renewable sources by 2030. The additional 40 percent of the power California’ utilities will deliver to residents, businesses and government agencies must come from ‘zero-carbon’ sources. This is a term still waiting to be defined by California’s policy makers.

Assembly Bill 1007

Assembly Bill 1007, (Pavley, Chapter 371, Statutes of 2005) required the CEC to prepare a state plan to increase the use of alternative fuels in California (State Alternative Fuels Plan). The CEC prepared the State Alternative Fuels Plan in partnership with the California Air Resources Board and in consultation with other state, federal, and local agencies. The final State Alternative Fuels Plan, published in December 2007, would attempt to achieve an 80-percent reduction in greenhouse gas emissions associated with personal transportation, even as California's population increases.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate energy include the following:

> *E-G2. Increase Energy Efficiency and Conservation*
>
> Decrease energy consumption through increased energy conservation and efficiency in building, transportation, business, industry, government, water and waste management.
>
> *E-G3. Supply of Energy from Local Renewable Sources*
>
> Increased local energy supply from a distributed and diverse array of renewable energy sources and providers available for local purchase and export.
>
> *E-P1. Energy Conservation Standards and Incentives*
>
> Develop incentives to encourage residential and commercial building plans that exceed California Building Standards Code requirements for energy.
>
> *E-P3. Local Renewable Energy Supply*
>
> The County shall support renewable energy development projects including biomass, wind, solar, "run of the river" hydroelectric, and ocean energy, consistent with this Plan that increases local energy supply.
>
> *E-P10. Transportation Management Plans*
>
> Major commercial, business, or industrial, facility developments shall be required to submit a transportation management plan that addresses energy conservation measures such as connectivity to alternative transportation modes; preferential parking for carpools, vanpools, motorcycles, mopeds, and bicycles; shuttle services; alternative fueling stations; transit passes; bike lockers; and locker-room facilities. Develop incentives for projects not deemed as major that incorporate such energy conservation measures.
>
> *E-P11. Energy-efficient Landscape Design*
>
> Encourage and incentivize energy efficient landscape design in development projects, subdivisions, and in new and existing streets and parking areas in order to reduce impervious surfaces, minimize heat and glare, control soil erosion, and conserve water.
>
> *E-P13. Incentives for Using Alternative Energy*
>
> Encourage the use of renewable energy and environmentally preferable distributed energy generation systems in the County.
>
> *E-P14. Renewable Energy Overlay Zones*
>
> Develop renewable energy overlay zones based on community input to protect the unique value of sites that are identified as having substantial renewable energy potential and/or will be critical for renewable energy infrastructure while still allowing uses permitted in the underlying zone.

AQ-P14. Solar Electric System Capacity

Encourage and provide incentives to increase solar-electric capacity in residential, commercial, and industrial sectors.

AQ-P15. Energy Efficient Building Design

Encourage and provide incentives for construction of buildings and energy saving measures beyond Title 24 requirements for residential and commercial projects.

AQ-P16. Electric Vehicle Accommodations

Encourage and provide incentives for commercial and residential design that supports the charging of electric vehicles.

WR-P13. Small and Micro Hydroelectric

Encourage small and micro hydroelectric development when impacts to surface water flows, aquatic species, and habitat have been adequately mitigated and are in conformance with state and federal permits and standards.

Orick Community Plan

There are no policies within the Orick Community Plan which address energy resources.

Impact Analysis

a) Result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation? (Less than Significant Impact with Mitigation)

Construction of the Project will involve a variety of earthwork and building practices, involving the use of heavy equipment as discussed in Sections 2.6 and 2.7. Construction will require the use of fuels, primarily gas, diesel, and motor oil. Construction emissions were estimated using CalEEMod version 2016.3.2, and are estimated to be approximately 1,687 MTCO$_2$e from all construction activities over the four-year construction period (GHD 2019b). The Project's construction emissions equal 56.2 MTCO$_2$e per year when annualized over the assumed 30-year lifespan of the Project (GHD 2019b). Trips associated with Project construction will consist of less than 30 per day, and construction equipment will remain staged in the Project Area once mobilized. All excavated material is expected to be reused on-site, except for the asphalt and concrete to be demolished at the former Mill Site. Additional consumption of energy to support off-site hauling will not be required (except for some possible off hauling of invasive-species impacted soil).

Inefficient construction-related operations will also be avoided due to the measures in Mitigation Measure AQ-1 (BMPs to Reduce Air Pollution). Equipment idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes or less (as required by Mitigation Measure AQ-1). Because construction will not encourage activities that will result in the use of large amounts of fuel and energy in a wasteful manner, and with the incorporation of Mitigation Measure AQ-1 which will reduce idling time, impacts related to the inefficient use of construction-related fuels will be **less than significant with mitigation**.

Operation of the Project will include periodic maintenance of infrastructure, including structural repairs, road, parking area, and trail maintenance, as well as ongoing management of non-native vegetation in the Prairie Creek Restoration area. These activities will generally be supported by vehicles and use of hand-held tools, although some activities (e.g., mechanical removal of hearty invasive species such as reed canary grass or Himalayan blackberry) may require use of heavy equipment. The use of fossil-fuel powered equipment to support these operational and maintenance activities will be periodic and short-term (occurring intermittently between August 1 and March 15 for a period of five years after Project construction). These activities will not result in a substantial increase in energy use, and will not result in inefficient, wasteful, or unnecessary consumption of fuels or other energy resources.

Recreational uses of the site will be the site's central function, such as hiking, recreating at the Visitor Center and wildlife viewing, and will require use of personal vehicles to access the site. Thousands of visitors are expected to access the site annually, which will result in an increase in fuel consumption as compared to existing fuel consumption in the area. However, the Project will include a transit bus to shuttle visitors from the Visitor Center to other RNSP locations, and will be an available stopping point on the local Redwood Transit Service line.

Project operations also require energy to sustain the Visitor Center, such as power and heating. The Visitor Center will exemplify passive lighting and heating techniques, and will contain interpretive signage explaining the significance of the building design for energy efficiency. The Project will use the minimal amount of energy necessary to operate utilities such as drinking water, wastewater, and telecommunications. Where possible, piping will be gravity fed rather than reliant on the use of pumps. Operation of the Project will not use a substantial amount of machinery. Additionally, operation of the Project will educate and inspire visitors about the natural world, including the importance of energy conservation. Because of the public transit opportunities that the Project will offer, educational interpretive signage about energy conservation and environmental stewardship, and energy efficient Visitor Center, operation of the Project will not result in wasteful or inefficient energy usage. The impact will be **less than significant**.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency? (Less than Significant Impact)

The Project will not conflict with or inhibit the implementation of the State EAP, SB 1389, SB 100, AB 1007, or other state regulations that are applicable to the Project because the Project will not inefficiently utilize energy due to incorporation of Mitigation Measure AQ-1 which limits idling time and provides measures to protect air quality, and will use energy sourced from the PG&E grid which is in compliance with the aforementioned plans. Furthermore, if feasible, the Project will utilize photovoltaic panels to supplement its energy supply, which upholds the plans. In regards to greenhouse gases and energy efficiency, Project facilities will comply with applicable state requirements, such as Title 24 energy efficiency standards and the California Green Building Standards mandatory measures unless exemptions apply, which is further discussed in Section 4.8 – Greenhouse Gas Emissions. The Project will temporarily require the use of construction equipment in order to construct the components of the Project, however these activities will be temporary and will not interfere with the broader energy goals of the state. The Project will therefore not conflict with or obstruct a state or local plan for renewable energy or energy efficiency, as no component of the Project will require an energy source, beyond the temporary use of construction equipment. A **less than significant impact** will occur.

An analysis of potential cumulative impacts on energy from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.7 Geology and Soils

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the Project:				
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?		✓		

Evaluation Criteria	Significance Thresholds	Sources
Would the Project directly or indirectly cause potential substantial adverse effects involving 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?	Placement of a structure intended for human occupancy within an Alquist-Priolo earthquake fault zone	CEQA Guidelines Appendix G, Checklist Item VII(a)(i) General Plan Policy S-P7
Would the Project directly or indirectly cause strong seismic ground shaking?	Non-compliance with California Building Code Non-compliance with recommendations of Project-specific geotechnical reports Proposed development demonstrates that it would create or contribute to, or be impacted by, geologic instability or geologic hazards.	CEQA Guidelines Appendix G, Checklist Item VII(a)(ii) General Plan Policy S-P11 Humboldt County Geologic Hazards Ordinance
Would the Project directly or indirectly cause seismic-related ground failure, including liquefaction?	Non-compliance with California Building Code Non-compliance with recommendations of Project-specific geotechnical reports Proposed development demonstrates that it would create or contribute to, or be impacted by, geologic instability or geologic hazards.	CEQA Guidelines Appendix G, Checklist Item VII(a)(iii) California Building Code Section 1803.5.11 and 1803.5.12 Humboldt County Geologic Hazards Ordinance General Plan Policy S-P11
Would the Project directly or indirectly cause landslides?	Non-compliance with California Building Code Non-compliance with recommendations of Project-specific geotechnical reports Proposed development demonstrates that it would create or contribute to, or be impacted by, geologic instability or geologic hazards.	CEQA Guidelines Appendix G, Checklist Item VII(a)(iv) California Building Code Section 1803.5.11 and 1803.5.12 Humboldt County Geologic Hazards Ordinance General Plan Policy S-P11

Evaluation Criteria	Significance Thresholds	Sources
Would the Project result in substantial soil erosion or the loss of topsoil?	Non-compliance with the Streamside Management Area Ordinance Non-compliance with the Grading, Excavation, Erosion and Sedimentation Control County Code language. Non-compliance with the Humboldt County General Plan's Erosion Control policy.	CEQA Guidelines Appendix G, Checklist Item VII(b) Streamside Management Area Ordinance (Humboldt County Code Section 314-61). Grading Excavation, Erosion and Sedimentation Control (Humboldt County Code Section 331-14). General Plan Policy WR-P10 and Standard BR-S9
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?	Non-compliance with California Building Code Non-compliance with recommendations of Project-specific geotechnical reports	CEQA Guidelines Appendix G, Checklist Item VII(c) California Building Code Section 1803.5.11 and 1803.5.12 General Plan Policy S-P1 Humboldt County Geologic Hazards Ordinance
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?	Non-compliance with Uniform Building Code Non-compliance with recommendations of Project-specific geotechnical reports	CEQA Guidelines Appendix G, Checklist Item VII(d) 1994 Uniform Building Code Chapter 18, Division 1, Table 18-1-B and Standard 18-2 General Plan Policy S-P1
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?	Non-compliance with recommendations of Project-specific geotechnical reports	CEQA Guidelines Appendix G, Checklist Item VII(e) General Plan Policy IS-P7
Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Disturbance of a known vertebrate fossil locality or within a geologic unit that has high sensitivity for vertebrate fossils	CEQA Guidelines Appendix G, Checklist Item VII(f)

This Section evaluates potential impacts related to geology and soils resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines. A geotechnical investigation was conducted for the Project (SHN 2019a, see Appendix J of this ISMND) and was used as a basis for evaluating potential applicable impacts.

Environmental Setting

The study area for this Section is defined as the entire Project Area inclusive of the Visitor Center, Prairie Creek Restoration Area, canopy walkway, and all other Project components detailed in Section 2.6. Native, subsurface soil conditions are based on continuous cored borings and test pits by LACO (2010 and 2011a) and SHN (2018, 2019) and monitoring well logs (McBain Associates 2019, LACO 2011b). The southerly portion of the Project Area closest to Redwood Creek consists of loam soils grading to sandy loam and loamy sand and then to sand, and likely represent overbank deposits from Redwood Creek. The lower sandy layers are interbedded with coarser sands and gravels and are interpreted to represent former channel deposits within abandoned Redwood and Prairie Creek meander bends (LACO 2011b). Soils in the northerly portion of the Project Area consist of finer grained sand, silts and clays then exist on the southerly end and likely originate from Prairie Creek overbank deposits. The northerly soils consist of silt and silty sand grading to sandy clays and dense, fine grained clays.

Regulatory Setting

Federal

Uniform Building Code

The International Conference of Building Officials published the family of Uniform Codes to provide jurisdictions with a complete set of building-related regulations for adoption. Standard 18-2 provides the Expansion Index Test, and Table 18-1-B includes a classification of expansive soil.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with this act, the State Geologist established regulatory zones, called “earthquake fault zones,” around the surface traces of active faults and published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Because many active faults are complex and consist of more than one branch, each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace.

Title 14 of the California Code of Regulations (CCR), Section 3601(e), defines buildings intended for human occupancy as those that would be inhabited for more than 2,000 hours per year. The proposed Project Area does not cross an Alquist-Priolo Earthquake Fault Zone (CGS 2018). Therefore, the provisions of the act do not apply to the Project.

Seismic Hazards Mapping Act

Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act of 1990 (Public Resources Code [PRC] Sections 2690 to 2699.6) is intended to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act-the state is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, with cities and counties required to regulate development within mapped Seismic Hazard Zones.

Under the California Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development. Specifically, cities and counties are prohibited from issuing development permits for sites within Seismic Hazard Zones until appropriate site-specific geologic and/or geotechnical investigations have been conducted by a state-licensed engineering geologist or civil engineer, and measures to reduce potential damage have been incorporated into the development plans.

According to the CGS, the California Earthquake Hazards Zone Application (or EQ Zapp) is the best official resource for locating Seismic Hazard Zones. However official Seismic Hazard Zone Maps are also available in certain areas. The CGS has not yet published an official Seismic Hazard Zone map for the study area (CGS 2019). The EQ Zapp includes information on fault traces and fault zones in the study area, but has not evaluated the study area for liquefaction or seismically induced landslides (DOC 2019c). According to the EQ Zapp, the closest fault line to the study area is approximately 40 miles to the south near Arcata, California. Cities and counties are to incorporate the Seismic Hazard Zone Maps into the Safety Element of their General Plan. Liquefaction Hazard Zones have been mapped in Humboldt County (Humboldt County Planning and Building 2015).

California Building Code

The State of California provides minimum standards for building design through the California Building Code (CBC). Where no other building codes apply, CBC Chapter 29 regulates excavation, foundations, and retaining walls. The CBC applies to building design and construction in the state and is based on the federal Uniform Building Code (UBC) used widely throughout the country. The CBC has been modified for California conditions with numerous more detailed and/or more stringent regulations. Specific minimum seismic safety and structural design requirements are set forth in CBC Chapter 16. The Code identifies seismic factors that must be considered in structural design. Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

Section 1803.5.11

For structures assigned to Seismic Design Category C, D, E or F, a geotechnical investigation shall be conducted, and shall include an evaluation of all of the following potential geologic and seismic hazards:

- Slope instability;
- Liquefaction;
- Total and differential settlement;
- Surface displacement due to faulting or seismically induced lateral spreading or lateral flow.

Section 1803.5.12

For structures assigned to Seismic Design Category D, E or F, the geotechnical investigation required by Section 1803.5.11 shall also include all of the following as applicable:

1. The determination of dynamic seismic lateral earth pressures on foundation walls and retaining walls supporting more than 6 feet (1.83 m) of backfill height due to design earthquake ground motions.
2. The potential for liquefaction and soil strength loss evaluated for site peak ground acceleration, earthquake magnitude and source characteristics consistent with the maximum considered earthquake ground motions. Peak ground acceleration shall be determined based on one of the following:
    a. A site-specific study in accordance with Section 21.5 of ASCE 7;
    b. In accordance with Section 11.8.3 of ASCE 7.
3. An assessment of potential consequences of liquefaction and soil strength loss including, but not limited to, the following:
    a. Estimation of total and differential settlement;
    b. Lateral soil movement;
    c. Lateral soil loads on foundations;
    d. Reduction in foundation soil-bearing capacity and lateral soil reaction;
    e. Soil downdrag and reduction in axial and lateral soil reaction for pile foundations;
    f. Increases in soil lateral pressures on retaining walls;
    g. Flotation of buried structures.
4. Discussion of mitigation measures such as, but not limited to, the following:
    a. Selection of appropriate foundation type and depths;
    b. Selection of appropriate structural systems to accommodate anticipated displacements and forces;
    c. Ground stabilization;
    d. Any combination of these measures and how they shall be considered in the design of the structure.

Water Quality

The Porter Cologne Water Quality Control Act is the primary state statute for protection of water quality in California. Under the Act, the nine RWQCBs, with oversight from the SWRCB, regulate discharges to waters of the State based on the regulatory standards and objectives set forth in Water Quality Control Plans (also referred to as Basin Plans) prepared for each region. The North Coast RWQCB has regulatory oversight of the study area, with standards and objectives provided in the Water Quality Control Plan for the North Coast Region (NCRWQCB 2018).

Responsibility for implementation of Section 402 of the Clean Water Act has also been delegated to the SWRCB/RWQCBs, where they implement and enforce the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (Order No. 2009-0009, as amended by Order No. 2010-0014). The Order applies to discharges from construction sites that include one or more acre of soil disturbance. Construction activities include clearing, grading, grubbing, excavation, stockpiling, and reconstruction of existing facilities involving removal or replacement.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate impacts to geology and soils include the following:

RL-P2. On-Site Water and Septic Systems

Cumulative impacts of water withdrawal from surface and groundwater sources, and cumulative impacts from on-site sewage disposal systems, shall be assessed during the zoning and subdivision and, in critical watersheds, any other discretionary review of development

WR-G11. Wastewater Management

Individual wastewater systems that do not contaminate surface and groundwater.

WR-P10. Erosion and Sediment Discharge

Ministerial and discretionary projects requiring a grading permit shall comply with performance standards adopted by ordinance and/or conditioned to minimize erosion and discharge of sediments into surface runoff, drainage systems, and water bodies consistent with BMPs, adopted Total Maximum Daily Loads (TMDLs), and non-point source regulatory standards.

WR-P42. Erosion and Sediment Control Measures

Incorporate appropriate erosion and sediment control measures into development design and improvements.

S-P1. Reduce the Potential for Loss

Plan land uses and regulate new development to reduce the potential for loss of life, injury, property damage, and economic and social dislocations resulting from natural and manmade hazards, including but not limited to, steep slopes, unstable soils areas, active earthquake faults, wildland fire risk areas, airport influence areas, military operating areas, flood plains, and tsunami run-up areas.

S-P7. Structural Hazards

The County shall protect life and property by applying and enforcing state adopted building codes and Alquist-Priolo requirements to new construction.

S-P11. Site Suitability

New development may be approved only if it can be demonstrated that the proposed development will neither create nor significantly contribute to, or be impacted by, geologic instability or geologic hazards.

IS-P7. Capacity of Facilities and Land Use Decisions

The County shall evaluate the capacity and sizing of road and drainage facilities in coordination with water and wastewater service providers to determine adequacy for proposed land uses and discretionary development.

The following standard within the Humboldt County General Plan which is applicable to the regulation of geology and soil resources includes the following:

BR-S9. Erosion Control

Includes detailed erosion control measures for development within Streamside Management Areas.

Humboldt County Geologic Hazards Ordinance

Humboldt County Code Section 336 regulations apply to those projects and activities which fall within the County's land use and development jurisdiction. The purpose of these regulations is to ensure that risks to life and property in moderate and high geologic hazard areas are minimized and further to assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability or destruction of development sites or surrounding areas.

Humboldt County Code Title VI Division 1 Water and Sewage

Provides local authority for management of onsite wastewater treatment systems.

Humboldt County Streamside Management Ordinance

Humboldt County Code Section 314-61 regulates excavation, grading, and erosion control near streams, floodplains, and wetlands, including setback requirements.

Humboldt County Grading Excavation, Erosion and Sedimentation Control Ordinance

Humboldt County Code Section 331-14 regulates grading activities exceeding 50 cubic yards.

Impact Analysis

a, 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)

There are no Alquist-Priolo earthquake faults in Project vicinity (DOC 2019c). There is little risk of fault-related ground rupture at the site during earthquakes; therefore, rupture impacts are considered **less than significant.**

a, ii) Strong seismic ground shaking? (No Impact)

As is the case with the entire north coast region, the Project is situated within a seismically active area close to several seismic sources capable of generating moderate to strong ground motions. Given the proximity of the Cascadia subduction zone offshore to the west, the Project Area could experience strong ground shaking during the life span of the proposed development.

The Project is not located within an Alquist-Priolo earthquake fault zone, in which the state requires special studies for structures for human occupancy. Due to the distance from the Project to the nearest recognized active fault, and based on the information available, the potential for ground surface fault rupture to occur at the Project is considered low. Project construction or operation will not increase risk of strong seismic ground shaking or exposure to strong seismic ground shaking above existing conditions, therefore **no impact** will occur.

a.iii, a.iv, c, d) Liquefaction, landslides, or otherwise unstable soils? (Less than Significant Impact)

Liquefaction is a phenomenon involving loss of soil strength, and resulting in fluid mobility through the soil. Liquefaction typically occurs when loose, uniformly-sized, saturated sands or silts are subjected to repeated shaking in areas where the groundwater is less than 50 feet below ground surface. In addition to the necessary soil and groundwater conditions, the ground acceleration must be high enough, and the duration of the shaking must be sufficient, for liquefaction to occur. The geotechnical investigation conducted for the project concluded there is a high potential for liquefaction to occur at the Project Area, and potentially liquefiable soils are present down to medium dense sands at a depth of approximately 50 feet below ground surface (SHN 2019a).

Environmental Protection Action 1 – Implement Geotechnical Design Recommendations (Section 2.11.1) will require the Visitor Center, the Canopy Walkway and other new buildings to be designed with foundations that can withstand anticipated liquefaction settlement without any life safety threat. Additionally, implementation of Environmental Protection Action 1 will ensure fire suppression water storage tanks be designed to remain operational following an occurrence of a “design earthquake” and require geological fill further designed to protect the Project Area from liquefaction and earthquake-related impacts. With the implementation of Environmental Protection Action 1, the potential impact resulting from liquefaction or a “design earthquake” will be less than significant.

The Project Area is generally flat and gently sloping, located in alluvial coastal bottomlands north of the community of Orick. Topographically, the site slopes very gently toward the south-southwest and toward Bald Hills Road (SHN 2019a). Steep slopes and hillslopes are present at the eastern boundary of Project Area. The Project includes the removal of landslide debris along a segment of the proposed CCT north of the Canopy Walkway. This area will be stabilized through vegetation planting and stormwater improvements to limit erosion through removal of existing improper flow pathways, and to maintain shear strength and integrity. Implementation of the Project will improve the stability of this area. With incorporation of Environmental Protection Action 1, the potential for a landslide occurrence will not increase as a result of construction or operation of the Project. The potential impact will be **less than significant**.

b) Result in substantial soil erosion or the loss of topsoil? (Less than Significant Impact)

Erosion is the action of surface processes such as water flow or wind that remove soil, rock or dissolved materials from the Earth’s surface, and then transports it to another location. Construction activities, including cut, fill, removal of vegetation, and operation of heavy equipment will disturb soil and, therefore, have the potential to cause erosion. The Upper Road Assessment lists points on the Upper Road that are prone to erosion (SHN 2019b). The Prairie Creek Restoration component of the Project will increase the potential for onsite erosion due primarily to short-term impacts associated with construction, however as vegetation becomes established the potential erosion will diminish towards natural erosional conditions which will likely be less than existing conditions (J. Anderson pers. comm. 2019). For a detailed discussion on the Prairie Creek Restoration component of the Project in relation to erosion, please reference Section 4.10 – Hydrology and Water Quality.

Implementation of Environmental Protection Action 2 - Stormwater Pollution Prevention Plan (SWPPP, Section 2.11.2) will require erosion control prevention measures during and after construction to ensure substantial soil erosion does not occur within the Project Area. Additionally, erosion control BMPs will be implemented to prevent soil erosion and loss of top soil. All grading areas will be revegetated and bare or exposed soils will not occur. Erosion control and revegetation BMPs and detailed under Environmental Protection Action 3 – Construction BMPs (Section 2.11.3). With the implementation of the above referenced Environmental Protection Actions, the risk of substantial soil erosion or loss of topsoil will be minimized, and the potential impact will be **less than significant**.

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? (Less than Significant Impact)

An onsite wastewater treatment system will be installed and will include a leach field to accommodate wastewater disposal needs for the site. A feasibility investigation was conducted for on-site wastewater treatment and is discussed in Section 4.10 – Hydrology and Water Quality, which concluded that soil and groundwater conditions were suited for a leachfield (LACO 2010, LACO 2011b). The leachfield will be positioned such that it meets the setback requirements defined by the RWQCB and the Humboldt County Department of Health, and the leachfield will be above the estimate 100-year floodplain (SHN 2018). The Project will adhere to permit conditions required by the RWQCB to construct and operate the on-site wastewater system, which will include permanent monitoring wells, periodic groundwater monitoring to verify adequate treatment of effluent, and a waste discharge permit (LACO 2010).

The wastewater treatment system will be compliant with design standards and permit requirements for Humboldt County, as stated in the Humboldt County Onsite Wastewater Regulations and Technical Manual inclusive of soil specifications (Humboldt County DHHS 2017). In addition, the geotechnical investigation recommends wastewater pipes should be deep enough to provide minimum cover of 36 inches of finished grade (SHN 2019a), which will be implemented as part of Environmental Protection Action 1 - Implement Geotechnical Design Recommendations (Section 2.11.1). Based upon the LACO 2011b report, Project soils in the southwesterly portion of the Mill Site have the capacity of supporting the onsite wastewater treatment system, which will be designed consistent with regulatory standards and technical recommendations develop during Project-related geotechnical and engineering investigations; there will be a **less than significant impact**.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? (Less than Significant with Mitigation)

The Project will include excavation and grading to construct a Visitor Center, Prairie Creek Restoration Area, and other Project elements detailed under Section 2.6 (Project Components). The proposed improvements will not require modification of any known unique geologic features. Excavation and earthmoving activities will primarily occur within highly disturbed areas associated with the Visitor Center, the Yurok Demonstration Site and the Upper and Lower roads that are underlain by engineered soils and/or fill therefore it is unlikely that Project construction will impact paleontological resources. Work for the Prairie Creek Restoration is associated with a geomorphically relatively new landscape (due to flooding, creek meandering and scouring) and unique paleontological resources are not expected to be encountered. However the potential exists for encountering previously undiscovered resources during Project construction. The potential impact is considered significant, therefore Mitigation Measure GEO-1 is included in the event paleontological resources are inadvertently discovered within the Project Area during construction, reducing the potential impact to **less than significant with mitigation**.

Mitigation Measure GEO-1: Protect Paleontological Resources during Construction

In the event that fossils are encountered during construction (i.e., bones, teeth, or unusually abundant and well-preserved invertebrates or plants), construction activities shall be diverted away from the discovery within 50 feet of the find, and a professional palaeontologist shall be notified to document the discovery as needed, to evaluate the potential resource, and to assess the nature and importance of the find. Based on the scientific value or uniqueness of the find, the palaeontologist may record the find and allow work to continue, or recommend salvage and recovery of the material, if it is determined that the find cannot be avoided. The palaeontologist shall make recommendations for any necessary treatment that is consistent with currently accepted scientific practices. Any fossils collected from the area shall then be deposited in an accredited and permanent scientific institution where they will be properly curated and preserved.

Mitigation Measure GEO-1 will reduce the impact of construction activities on unknown paleontological resources to a less-than-significant level by addressing discovery of unanticipated buried resources and preserving and/or recording those resources consistent with appropriate laws and requirements.

An analysis of potential cumulative impacts on geology and soils is considered in Section 4.21 – Mandatory Findings of Significance.

4.8 Greenhouse Gas Emissions

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the Project:				
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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Generation of 25,000 MT CO_2e	CEQA Guidelines Appendix G, Checklist Item VIII (a) CA Air Resources Board Cap and Trade
Would the Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Conflict with the State's adopted Scoping Plan	CEQA Guidelines Appendix G, Checklist Item VIII (b)

This Section evaluates the potential impacts to greenhouse gas (GHG) emissions resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse. The accumulation of GHGs has been implicated as the driving force for global climate change. The primary GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N2O), ozone (O_3), and water vapor (H_2O).

The principal GHGs contributing to global warming are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated compounds. While GHGs in the atmosphere are naturally occurring, the emission rate of CO_2, CH_4 and N_2O has been accelerated by human activities. These gases allow visible and ultraviolet light from the sun to pass through the atmosphere, but they prevent heat from escaping back out into space. Emissions of CO_2 are largely a by-product of fossil fuel combustion, whereas CH_4 results from off-gassing associated with such activities as agricultural practices and landfills. Other GHGs include hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride, which are generated during certain industrial processes. GHGs are typically reported in "carbon-dioxide-equivalent" (CO_2e) measures. GHG emissions can be reduced to some degree by improved coordination of land use and transportation planning at the city, county and subregional level, and other measures to reduce automobile use. Energy conservation measures also can contribute to reductions in GHG emissions.

The Project Area is located within a rural area generally comprised of agricultural land, recreational uses, and single-family residences. There are agricultural activities (mostly dairies and ranching operations) which generate GHG emissions in the Project vicinity. Due to the rural nature of the Project Area, the demand for fossil fuels in the form of transportation is low. The majority of trips are associated with traveling north or south along Highway 101, to nearby areas for recreational or commercial purposes, residents traveling to their respective homes, or traveling within town. No other sources of GHG emissions exist in the Project vicinity.

Regulatory Setting

Federal

On February 18, 2010, the Council on Environmental Quality (CEQ) provided a draft guidance memorandum for public consideration and comment on the ways in which federal agencies can improve their consideration of the effects of greenhouse gas emissions and climate change in evaluations of proposals for federal actions under the NEPA (CEQ 2010). The CEQ updated that draft in 2014, and provided a final guidance on August 2, 2016 (CEQ 2016).

The CEQ's 2010 draft guidance proposed to advise federal agencies to consider, in scoping their NEPA analyses, whether analysis of the direct and indirect greenhouse gas emissions from their proposed actions may provide meaningful information to decision makers and the public. Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of carbon dioxide equivalent ($MTCO_2e$) emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 $MTCO_2e$, CEQ encouraged federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ did not propose this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of greenhouse gas emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of greenhouse gases. The CEQ removed the direct emissions criteria from the 2016 final guidance, which contains no numeric recommendations. For comparison, the EPA's Greenhouse Gas Reporting Program requires mandatory reporting for 'large' industrial sources of GHG to report GHG data, and defines large industrial sources as those that emit more than 25,000 $MTCO_2e$ per year.

State

Executive Order S-3-05

In 2005, the Governor of California signed Executive Order S-3-05, which established greenhouse gas emission reduction targets to reduce emissions as follows:

- By 2010, reduce GHG emissions to 2000 levels,
- By 2020, reduce GHG emissions to 1990 levels, and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The Secretary of the California Environmental Protection Agency (Secretary) was designated to coordinate oversight of the multi-agency efforts made to meet the targets.

The Cal/EPA Secretary must also submit biannual reports to the governor and California Legislature describing the progress made toward the emissions targets, the impacts of global climate change on California's resources, and mitigation and adaptation plans to combat these impacts. To comply with the executive order, the Secretary of Cal/EPA created the California Climate Action Team (CAT), made up of members from various state agencies and commissions. The team released its first CAT Report in March 2006, with its most recent S-3-05-mandated CAT Report released in 2010. The report proposes to achieve the targets by building on the voluntary actions of California businesses, local governments, and communities and through state incentive and regulatory programs.

Assembly Bill 32, California Global Warming Solutions Act of 2006

In 2006, the Governor of California signed the Global Warming Solutions Act of 2006 (Assembly Bill 32), committing the State of California to reducing GHG emissions to 1990 levels by 2020. The statute requires the CARB to track emissions through mandatory reporting, determine the 1990 emission levels, set annual emissions limits that will result in meeting the 2020 target, and design and implement regulations and other feasible and cost effective measures to ensure that statewide GHG emissions will be reduced to 1990 levels by 2020. In December 2007, the CARB approved the 2020 emissions limit at 427 MMT CO_2e. The Intergovernmental Panel on Climate Change (IPCC), which assesses scientific, technical, and socioeconomic information relevant to the understanding of climate change, has since revised the global warming potential of GHGs. Therefore, CARB recalculated the 2020 emissions limit as 431 MMT CO_2e. Projected business-as-usual emissions for 2020 are 509 MMT CO_2e. A reduction of 78 MMT CO_2e is needed to meet the goal (CARB 2012).

Climate Change Scoping Plan

In December 2008, pursuant to AB 32, the CARB adopted the Climate Change Scoping Plan (Scoping Plan), which outlined measures to attain the 2020 GHG emissions limit. The Scoping Plan estimated that implementation of identified measures would result in a reduction of 105.3 MMT CO_2e from various sectors including transportation, energy, forestry, and high global warming potential gas sectors (originally reported as 174 MMT CO_2e, but updated to 105.3 MMT CO_2e in the Status of Scoping Plan Recommended Measures [found at the CARB website]). This is 24 percent more than is needed to meet the 2020 mandate. AB 32 requires CARB to update the Scoping Plan at least every five years.

CARB approved the *First Update to the Climate Change Scoping Plan* (Updated Scoping Plan) in May 2014. The Updated Scoping Plan describes the progress made to meet the near-term (2020) objectives of AB 32 and defines California's climate change priorities and activities for the next several years (CARB 2014). The Updated Scoping Plan also updated the 2020 emissions limit and business-as-usual emissions for 2020. The 2020 limit is now 431 MMT CO_2e and the business-as-usual forecast is 509 MMT CO_2e. Finally, the Updated Scoping Plan provides recommendations for establishing a mid-term emissions limit that aligns with the long-term (2050) goals of Executive Order S-3-05. The recommendations cover the energy, transportation, agriculture, water, waste management, natural and working lands, short-lived climate pollutants, green building, and cap-and-trade sectors.

The second update to the Scoping Plan, the 2017 Climate Change Scoping Plan (2017 Scoping Plan), was released in November 2017 and approved in December 2018. The 2017 Scoping Plan demonstrates that the state is on-track to achieve and exceed the AB 32 emissions reduction goals of achieving 1990 emissions levels by 2020. The 2017 Scoping Plan provides California's climate policy portfolio and recommended strategies to put the state on a path to achieve the 2030 target. The scenario includes ongoing and statutorily required programs, continuing the Cap-and-Trade Program, and high-level objectives and goals to reduce GHGs across multiple economic sectors. Existing programs, also known as "known commitments", identified by the 2017 Scoping Plan include: SB 350, the Low Carbon Fuel Standard Program, CARB's Mobile Source Strategy, Senate Bill 1383 for short-lived climate pollutants, California's Sustainable Freight Action Plan. The high-level objective and goals recommendations cover the energy, transportation, industry, water, waste management, agriculture, and natural and working lands, and are to be implemented by a variety of state agencies.

The recommendations are broad policy and regulatory initiatives that will be implemented at the state level and do not relate to the construction and operation of individual projects such as the project. Although project construction and operation may benefit from some of the state-level regulations and policies that will be implemented, such as SB 100's requirement that 100 percent or retail sales of electricity be renewable by 2045, the project would not impede the state developing or implementing the greenhouse gas reduction measures identified in the Updated Scoping Plan. The Project facilities will comply with applicable state requirements, such as Title 24 energy efficiency standards and the California Green Building Standards mandatory measures, unless exemptions apply. The Project will not conflict with this statewide policy document.

The ARB's Cap-and-Trade Program relies on data collected through the Mandatory Reporting of Greenhouse Gas Emissions Regulation (MRR) to identify major sources of greenhouse gas emissions in California. The MRR was originally adopted in 2007 and was updated in 2011. Industries that emit 10,000 or $MTCO_2e$ are required to report their GHGs to ARB; a subset of industrial facilities with annual emissions equal to or greater than 25,000 metric tons of CO_2e are required to comply with the Cap-and-Trade Program.

Executive Order B-30-15

On April 29, 2015, California Governor Jerry Brown signed E.O. B-30-15, which contains the target of reducing GHG emissions to 40 percent below 1990 levels by 2030. The emission reduction is an interim-year goal to provide substantial progress toward the ultimate goal of reducing emissions by 80 percent below 1990 levels by 2050.

Senate Bill 32 and Assembly Bill 197

Senate Bill (SB) 32, passed in 2016, extended the goals of AB 32 and codifies the GHG reduction target of 40 percent below 1990 levels by year 2030, consistent with EO B-30-15. The companion bill to SB 32, AB 197 provides additional direction to CARB in developing each update to the Scoping Plan.

Local

North Coast Unified Air Quality Management District

In 2011, the North Coast Unified Air Quality Management District (NCUAQMD) adopted Rule 111 (Federal Permitting Requirements for Sources of Greenhouse Gases) to establish a threshold above which New Source Review (NSR) and federal Title V permitting applies, and to establish federally enforceable limits on potential to emit GHGs for stationary sources. This Project does not include any new stationary sources; therefore, Rule 111 would not apply.

The NCUAQMD has not adopted regulations regarding the evaluation of GHG emissions in a CEQA document. The NCUAQMD has not established CEQA significance criteria to determine the significance of impacts with regard to GHGs that would result from projects such as the proposed Project.

For construction emissions, the NCUAQMD has indicated that emissions are not considered significant for projects whose construction will be of relatively short in duration, lasting less than one year (e.g., the proposed Project), and of average construction intensity. For project construction lasting more than one year or that involves above average construction intensity in volume of equipment or area disturbed, construction emissions may need to be discussed with NCUAQMD staff to determine a project specific approach.

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate GHG emissions include the following:

> *AQ-G4. Greenhouse Gas Emissions*
>
> Successful mitigation of greenhouse gas emissions associated with this Plan to levels of non-significance as established by the Global Warming Solutions Act and subsequent implementation of legislation and regulations.
>
> *AQ-P1. Reduce Length and Frequency of Vehicle Trips*
>
> Reduce the length and frequency of vehicle trips through land use and transportation policies by encouraging mixed-use development, compact development patterns in areas served by public transit, and active modes of travel.
>
> *AQ-P9. County Climate Action Plan*
>
> Through public input and review, develop and implement a multi-jurisdictional Climate Action Plan to achieve reductions in greenhouse gas emissions consistent with the state Global Warming Solutions Act and subsequent implementing legislation and regulations.
>
> *AQ-11. Review of Projects for Greenhouse Gas Emission Reductions*
>
> The County shall evaluate the GHG emissions of new large scale residential, commercial and industrial projects for compliance with state regulations and require feasible mitigation measures to minimize GHG emissions.
>
> *AQ-P13. Forest Sequestration and Biomass Energy*
>
> Provide incentives for increased carbon sequestration on forest lands and encourage the reduction of smoke production through the utilization of excess forest biomass for sustainable energy generation and other uses.
>
> *AQ-P17. Preservation and Replacement of On-site Trees*
>
> Projects requiring discretionary review should preserve large trees, where possible, and mitigate for carbon storage losses attributable to significant removal of trees.

Orick Community Plan

There are no policies within the Orick Community Plan which address GHG emissions.

Humboldt County Climate Action Plan

The County released a draft Climate Action Plan in January 2012, which contains an emissions inventory and forecast. The draft Climate Action Plan also includes a proposed emissions reduction target. However, the County has not yet adopted the Climate Action Plan.

Impact Analysis

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? (Less than Significant Impact)

The local NCUAQMD has not adopted regulations regarding the evaluation of GHG emissions in a CEQA document, and has not established CEQA significance criteria to determine the significance of impacts with regard to GHGs (J. Davis. pers. comm. 2019). The NCUAQMD recommends considering the GHG emission CEQA standards from the Bay Area Air Quality Management District (BAAQMD) (J. Davis pers. comm. 2019), however the BAAQMD does not contain quantitative GHG emission thresholds for Project construction (BAAQMD 2017). Therefore due to a lack of local thresholds, the State Coastal Conservancy, as Lead Agency for the Project, has elected to apply the ARB's industrial Cap-and-Trade threshold of 25,000 $MTCO_2e$ per year to determine the Project's impact for generation of GHGs. This threshold is also consistent with the CEQ's 2010 draft guidance and EPA's Greenhouse Gas Reporting Program reporting threshold for 'large' industrial sources. In order to assess the potential impact of construction-generated emissions, the construction GHG emissions are annualized over an assumed 30-year project lifespan and added to operational emissions.

Based on CalEEMod modeling (attached as Appendix C), Project construction activities will result in a temporary increase in GHG emissions, including exhaust emissions from on-road trucks, worker commute vehicles, and off-road heavy-duty equipment. Construction will require clearing, earthmoving, and delivery equipment, as used for similar projects, and which have been accounted for in the State's emission inventory and reduction strategy for both on and off-road vehicles. Construction emissions were estimated using CalEEMod version 2016.3.2, and are estimated to be approximately 1,687 $MTCO_2e$ from all construction activities over the four-year construction period. The Project's construction emissions equal 56.2 $MTCO_2e$ per year when annualized over the assumed 30-year lifespan of the Project.

Project operational emissions were estimated using CalEEMod version 2016.3.2 and Project-specific trip generation from the Traffic Impact Study. Emissions were modeled for year 2024. Table 4.8-1—Operational Greenhouse Gas Pollutant Emissions (2024) summarizes Project construction and operational-related GHG emissions model results. Emissions during construction would not be a considerable contribution to the cumulative greenhouse gas impact, given that construction would be temporary, of short duration, and would not require a large fleet of earthmoving equipment and soil off hauling beyond the normal equipment and activities related to such utility or infrastructure projects. Additionally, as shown in Table 4.8-1, the Project's operational emissions will not exceed the identified emission thresholds. As such, the Project will not result in substantial long-term operational emissions of GHGs. Therefore, the Project will generate a **less than significant impact**.

Table 4.8-1 Operational Greenhouse Gas Pollutant Emissions (2024)

Parameter	Emissions (metric tons per year)
Area	0.0
Energy	8.4
Mobile	5,197.9
Waste	18.5
Water	50.0
Annualized Construction	56.2
Total Operation	5,331.0
Threshold of Significance	*25,000*

Significant Impact?	*No*

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases? (Less than Significant Impact)

The Project is evaluated for consistency with the CARB *2017 Climate Change Scoping Plan*. As discussed in the Regulatory setting above, the 2017 Scoping Plan provides California's climate policy portfolio and recommended strategies to put the state on a path to achieve the 2030 target. The scenario includes ongoing and statutorily required programs, continuing the Cap-and-Trade Program, and high-level objectives and goals to reduce GHGs across multiple economic sectors. Existing programs, also known as "known commitments," identified by the 2017 Scoping Plan include: SB 350, the LCFS, CARB's Mobile Source Strategy, Senate Bill 1383 for short-lived climate pollutants and California's Sustainable Freight Action Plan. The high-level objective and goals recommendations cover the energy, transportation, industry, water, waste management, agriculture, and natural and working lands, and are to be implemented by a variety of state agencies.

Project construction will cause a temporary increase in GHGs, however as discussed above operational emissions will not exceed the identified emission thresholds. Project construction is analyzed for consistency with the *2017 Climate Change Scoping Plan* below.

Table 4.8-2. Consistency Analysis between Project and Climate Change Scoping Plan

Scoping Plan Reduction Measures	Consistency/Applicability Determination
California Cap-and-Trade Program Linked to Western Climate Initiative. Implement a broad-based California Cap-and-Trade program to provide a firm limit on emissions. Link the California cap-and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.	**Consistent**. This is a statewide measure that cannot be implemented by the Project applicant or lead agency. PG&E obtains 19 percent of its power supply from renewable sources such as solar and geothermal. It is required to increase this percentage to 33 percent by the year 2020 pursuant to various regulations. The Project will utilize PG&E and photovoltaic panels (if feasible).
California Light-Duty Vehicle Greenhouse Gas Standards. Implement adopted standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals	**Consistent**. This is a statewide measure that cannot be implemented by the Project applicant or lead agency. However, the standards will be applicable to the light-duty vehicles that will access the Project site.

Energy Efficiency. Maximize energy efficiency building and appliance standards; pursue additional efficiency including new technologies, policy, and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California.	**Consistent**. This is a measure for the state to increase its energy efficiency standards in new buildings. The Project is required to build to the latest standards and will increase its energy efficiency through compliance.
Renewable Portfolio Standard. Achieve 33 percent renewable energy mix statewide. Renewable energy sources include (but are not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.	**Consistent**. This is a statewide measure that cannot be implemented by the Project applicant or lead agency. PG&E obtains 19 percent of its power supply from renewable sources such as solar and geothermal. It is required to increase this percentage to 33 percent by the year 2020 pursuant to various regulations. The Project will utilize PG&E and photovoltaic panels (if feasible) which meets this standard.
Low Carbon Fuel Standard. Develop and adopt the Low Carbon Fuel Standard.	**Consistent**. This is a statewide measure that cannot be implemented by the Project applicant or lead agency. When this measure is initiated, the standard will be applicable to the fuel used by vehicles that will access the Project site.
Regional Transportation-Related Greenhouse Gas Targets. Develop regional greenhouse gas emissions reduction targets for passenger vehicles. This measure refers to SB 375.	**Not applicable.** This is a statewide measure calling for the development of GHG emission reduction targets.
Vehicle Efficiency Measures. Implement light-duty vehicle efficiency measures.	**Not applicable.** This is a statewide measure that cannot be implemented by the Project applicant or lead agency.
Goods Movement. Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.	**Not applicable.** The Project does not propose any changes to modes of transportation of goods.
Million Solar Roofs Program. Install 3,000 MW of solar-electric capacity under California's existing solar programs.	**Consistent.** This measure is intended to increase solar power throughout California, which is being done by various utility companies and solar programs. The Project will comply with Title 24 unless exemptions apply, which requires new buildings to be "solar ready", and will install

	and use photovoltaic panels to supplement energy (if feasible).
Medium/Heavy-Duty Vehicles. Adopt medium and heavy-duty vehicle efficiency measures.	**Not applicable.** This is a statewide measure that cannot be implemented by the Project applicant or lead agency.
Industrial Emissions. Require assessment of large industrial sources to determine whether individual sources within a facility can cost- effectively reduce greenhouse gas emissions and provide other pollution reduction co-benefits. Reduce greenhouse gas emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.	**Not applicable.** This measure will apply to the direct GHG emissions at major industrial facilities. The Project is not industrial.
High Speed Rail. Support implementation of a high-speed rail system.	**Not applicable.** This is a statewide measure that cannot be implemented by the Project applicant or lead agency.
Green Building Strategy. Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.	**Consistent.** The Project will comply with the California Energy Code and thus include the required energy efficiency features.
High Global Warming Potential Gases. Adopt measures to reduce high global warming potential gases.	**Consistent.** This measure is applicable to the high global warming potential gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6) found in air conditioning and commercial refrigerators. The Project may include a commercial grade refrigerator within the Visitor Center, and will utilize equipment that complies with this measure.
Recycling and Waste. Reduce methane emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.	**Consistent.** The Project does not include a landfill. The Project will reduce waste with implementation of state mandated recycling and reuse mandates.
Sustainable Forests. Preserve forest sequestration and encourage	**Consistent.** The Project will utilize biomass for habitat enhancement, and reforest areas of trees that are

the use of forest biomass for sustainable energy generation.	removed during Project construction. There will be a net increase in tree cover following Project implementation.
Water. Continue efficiency programs and use cleaner energy sources to move and treat water.	**Consistent.** This is a measure for State and local agencies. However, the Project will adhere to California Green Building Standards Code regulation, and will retain the runoff sourced from the 95th percentile of rainfall which will replenish the groundwater aquifer.
Agriculture. In the near-term, encourage investment in manure digesters and at the five- year Scoping Plan update determine if the program should be made mandatory by 2020.	**Not applicable.** The Project does not include agricultural production.

Source of Scoping Plan Reduction Measures: CARB 2008

As described in Table 4.8-2, the Project is consistent with AB 32, as outlined in the 2008 and 2017 Climate Change Scoping Plans. Therefore, the Project will not conflict with AB 32 or the Climate Change Scoping Plan, and will result in a **less than significant impact**.

An analysis of potential cumulative impacts on greenhouse gas emissions from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.9 Hazards and Hazardous Materials

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the Project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Potential for improper transport, use, disposal, or accidental release of hazardous materials or wastes due to non-compliance with State and federal hazardous materials or waste regulations	CEQA Guidelines Appendix G, Checklist Item IX (a) Humboldt County General Plan S-P33, S-S16 and S-S17 Hazardous Materials Transportation Act of 1975 Resource Conservation and Recovery Act of 1978 (RCRA)
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?	Potential for improper transport, use, disposal, or accidental release of hazardous materials or wastes due to non-compliance with State and federal hazardous materials or waste regulations	CEQA Guidelines Appendix G, Checklist Item IX (b) Humboldt County General Plan S-P33, S-S16 and S-S17 Hazardous Materials Transportation Act of 1975 Resource Conservation and Recovery Act of 1978 (RCRA)
Would the Project emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	Use, storage, or emission, of acutely hazardous materials or waste within 0.25 mile of a school	CEQA Guidelines Appendix G, Checklist Item IX (c)
Would the Project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment (State CEQA Guidelines Section 15186)?	Location of Project on or adjacent to a site with presence or likely presence of hazardous substances or petroleum products	CEQA Guidelines Appendix G, Checklist Item IX (d)
Would the Project be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for the people residing or working in the area?	Location of Project within an airport land use plan or within two miles of an airport and introduction of new or increased safety hazard	CEQA Guidelines Appendix G, Checklist Item IX (e) Humboldt County General Plan S-P29
Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	Location of Project in areas that impair or interfere with an adopted emergency plan,	CEQA Guidelines Appendix G, Checklist Item IX (f)

Evaluation Criteria	Significance Thresholds	Sources
	including emergency access routes	Humboldt County General Plan S-P1
Would the Project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	Non-conformance with State Responsibility Area fire safe regulations	CEQA Guidelines Appendix G, Checklist Item IX (g) Humboldt County General Plan S-P19

This Section evaluates the potential impacts related to hazards and hazardous materials resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

The study area for this section includes the Project Area and adjoining waterbodies (i.e. Prairie Creek and Redwood Creek) that may be impacted by the use of hazardous materials or herbicides under the Project. Historical land use information on the Project Area was determined using historical and cultural resource reports prepared for the Project or within the Project vicinity, and include the following: Cultural Resource Study for the Former Orick Mill Site (Clayburn 2013), Cultural Resources Inventory and Evaluation, Redwood National and State Park Visitor Center and Restoration Project, Orick, Humboldt County, California (PAR 2019),

From approximately 1908, the Project Area was used to support timber harvesting and processing. Sometime between 1908 and the mid 1950's the southern portion of the Project Area was used to support timber harvesting and processing, and in the late 1950s "Mill Site A" was built (known as the Mill Site in this document) (PAR 2019). The Mill Site was designed to process defective lumber and was supposed to produce as much as 150,000 board feet of lumber in eight hours (PAR 2019). The Mill Site contained: company office and employee areas, sawmill, green chain, de-barker, hog (waste bark and scrap) conveyors and overhead bins, shops for working on mill equipment and small buildings for housing fuel and oil (Roscoe and Van Kirk 2010 in PAR 2019). The Mill Site was in use until 2009, and was demolished in 2013 (PAR 2019). Chemicals and additives are commonly used in timber processing and milling, and are assumed to have been used at the Mill Site during operation. In the early 1900's, the western portion of the Project Area supported a ranch (PAR 2019). Ranching operations in the western portion of the Project Area persist to this day in a much smaller capacity, as this area is periodically used to support horse grazing. It is unclear whether chemicals were utilized during historic ranching operations, however it is assumed that the use of chemicals has not been used within the Project Area to support ranching since approximately the 1950s. Phase I and Phase II Environmental Site Assessments were performed at this site in 2010 and 2011, respectively (SHN 2011). Several recognized environmental conditions were identified and were investigated to determine if a significant release of hazardous materials had occurred (SHN 2011). Low levels of petroleum hydrocarbons and metals were detected in site soils and shallow groundwater, however the levels do not appear to be a significant threat to human health and the environment (SHN 2011). The site has been adequately characterized and no significant benefit to the environment would occur through further investigation or remediation (SHN 2011). The Project site is not included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5, also known as the Cortese list.

Regulatory Setting

Federal

The primary federal agencies with responsibility for hazardous materials management are the USEPA, OSHA, and the DOT. Federal laws, regulations, and responsible agencies relevant to the Project are summarized in Table 4.9-1 – Federal Regulations Related to Hazardous Materials Management.

Table 4.9-1 Federal Regulations Related to Hazardous Materials Management

Classification	Law or Responsible Federal Agency	Description
Hazardous Materials Management and Soil and Groundwater Contamination	Community Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA)	Imposes requirements to ensure that hazardous materials are properly handled, used, stored, and disposed of and to prevent or mitigate injury to human health, or the environment, in the event that such materials are accidentally released.
	Comprehensive Environmental Response, Compensation and Liability Act of 1980 (amended by SARA 1986 and Brownfields Amendments 2002)	Regulates the cleanup of sites contaminated by releases of hazardous substances.
Hazardous Materials Transportation and Handling	U.S. Department of Transportation	Regulates the safe transportation of hazardous materials. The DOT regulations govern all means of transportation except packages shipped by mail (49 CFR).
Occupational Safety	Occupational Safety and Health Act of 1970	OSHA sets standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries (29 CFR).

State and local agencies often have either parallel or more stringent regulations than federal agencies. In most cases, state law mirrors or overlaps federal law and enforcement of these laws is the responsibility of the state or of a local agency to which enforcement powers are delegated. For these reasons, the requirements of the law and its enforcement are discussed under either the state or local regulatory section.

State

Soil and Groundwater Contamination

The clean-up of sites contaminated by releases of hazardous substances is regulated primarily by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), which was amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA), the Brownfields Amendments (2002) and by similar state laws. Under CERCLA, the EPA has authority to seek the parties responsible for releasing hazardous substances and to ensure their cooperation in site remediation.

Section 30232 (Oil and hazardous substance spills) of the California Coastal Act provides for the protection against the spillage of crude oil, gas, petroleum products, or hazardous substances in relation to any development or transportation of such materials. Effective containment and clean-up facilities and procedures shall be provided for accidental spills that do occur.

The DTSC's Hazardous Waste and Substances Sites List (Cortese List, Government Code Section 65962.5) identifies sites with leaking underground fuel tanks, hazardous waste facilities subject to corrective actions, solid waste disposal facilities from which there is a known migration of hazardous waste, and other sites where environmental releases have occurred. Before a local agency accepts an application as complete for any development project, the applicant must certify whether or not the project site is in the Cortese List. Databases that provide information regarding the facilities or sites identified as meeting Cortese List requirements are managed by the DTSC and State Water Resources Control Board (SWRCB).

Hazardous Materials Transportation

The State of California has adopted DOT regulations for the intrastate movement of hazardous materials. State regulations are contained in Title 26 of the CCR. In addition, the State of California regulates the transportation of hazardous waste originating in the state and passing through the state. Both regulatory programs apply in California. The two state agencies that have primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies are the California Highway Patrol (CHP) and Caltrans.

Occupational Safety

Worker health and safety is regulated at the federal level by the U.S. Department of Labor Occupational Safety and Health Administration (OSHA). Under this jurisdiction, workers at hazardous waste sites (or workers coming into contact with hazardous wastes that might be encountered during excavation of contaminated soils) must receive specialized training and medical supervision according to the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations. Worker health and safety in California is regulated by Cal/OSHA. California standards for workers dealing with hazardous materials (including hazardous wastes) are contained in CCR Title 8. The DTSC and Cal/OSHA are the agencies that are responsible for overseeing that appropriate measures are taken to protect workers from exposure to potential soil or groundwater contaminants.

Emergency Response

California has developed an emergency response plan to coordinate emergency services provided by federal, state, and local government agencies. Responding to hazardous materials incidents is a part of this plan. The plan is administered by the State Office of Emergency Services (OES), which coordinates the responses of other agencies such as local fire and police agencies, emergency medical providers, California Highway Patrol (CHP), the CDFW and Caltrans.

Humboldt County has an adopted Humboldt County Operational Area Hazard Mitigation Plan as identified below. FEMA approved the Humboldt Operational Area Hazard Mitigation Plan on March 20, 2014.

Fire Regulation

The California Public Resources Code (PRC) sets forth fire safety regulations for applicable projects that include the following:

- Earthmoving and portable equipment with internal combustion engines must be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (PRC Section 4442).

- Appropriate fire suppression equipment must be maintained during the highest fire danger period – from April 1 to December 1 (PRC Section 4428).
- On days when a burning permit is required, flammable materials must be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor must maintain the appropriate fire suppression equipment (PRC Section 4427).
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines must not be used within 25 feet of any flammable materials (PRC Section 4431).

Cal Fire also provides oversight for all prescribed fire in the study area.

Water Quality

See Section 4.7 – Geology and Soils, subsection State within the Regulatory Setting for a discussion of water quality protective regulations applicable to hazards and hazardous materials.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate hazards and hazardous materials include the following:

WM-G3. Reduce Waste Toxicity.

A low toxicity waste stream that reduces risk of exposure to residents, solid waste and recycling industry workers, and the environment.

WR-P41. Oil/Water Separation

Parking lot storm drainage shall include facilities to separate oils from stormwater in accordance with Public Works requirements and the recommendations of the Stormwater Quality Association’s California Stormwater Best Management Practices Handbooks or their equivalent.

WR-P45. Reduce Toxic Runoff

Minimize chemical pollutants in stormwater runoff such as pesticides, fertilizers, household hazardous wastes, and road oil by supporting education programs, household hazardous waste and used oil collection, street and parking lot cleaning and maintenance, use of bioswales and other stormwater BMPs described in the California Stormwater Best Management Practices Handbooks or their equivalent.

S-P1. Reduce the Potential for Loss

Plan land uses and regulate new development to reduce the potential for loss of life, injury, property damage, and economic and social dislocations resulting from natural and manmade hazards, including but not limited to, steep slopes, unstable soils areas, active earthquake faults, wildland fire risk areas, airport influence areas, military operating areas, flood plains, and tsunami run-up areas.

S-P3. Hazard Education

Encourage the education of the community regarding the nature and extent of hazards and community disaster preparation and response.

S-P4. Disaster Response Plans

The County shall prepare and maintain current disaster response plans. The County shall support and participate in the preparation of disaster response plans by community organizations, companies, cities, and state and federal agencies.

S-P5. Hazard Mitigation

The County shall actively seek opportunities to reduce the impacts of disasters through hazard mitigation planning.

S-P7. Structural Hazards

The County shall protect life and property by applying and enforcing state adopted building codes and Alquist-Priolo requirements to new construction.

S-P11. Site Suitability

New development may be approved only if it can be demonstrated that the proposed development will neither create nor significantly contribute to, or be impacted by, geologic instability or geologic hazards.

S-P12. Federal Flood Insurance Program

The County shall participate in the Federal Flood Insurance Program and maintain Flood Damage Prevention regulations in the County Code to regulate land uses in flood hazard areas in order to minimize loss of life and property and public flood-related expense.

S-P22. Prescribed Burning

Encourage the use of prescribed burning as a management tool for hazardous fuels reduction, timber management purposes, livestock production, and enhancement of wildlife habitat.

S-P23. Hazardous Fuel Reduction

Encourage land management activities that result in the reduction of hazardous fuels and also support timber management, livestock production, and the enhancement of wildlife habitat, through the use of prescribed burning, hand or mechanical methods, firewise plants, biomass utilization, and animal grazing.

S-P33. Hazardous Waste

Eliminate the use of toxic materials within Humboldt County, where feasible, and require the reduction, recycling, and reuse of such materials, to the greatest extent possible, where complete elimination of their use is not feasible. Require new development which may generate significant quantities of hazardous wastes to be consistent with all the goals and policies of the Hazardous Waste Management Plan (Appendix H).

S-P34. Pre-disaster Planning and Mitigation

The County shall proactively reduce known hazards through pre-disaster planning and mitigation efforts.

S-P35. Hazard Mitigation Plan

The County incorporates by reference into this Safety Element the Humboldt Operational Area Hazard Mitigation Plan for unincorporated areas (Volume I and the Humboldt County Annex and the Appendices of Volume II) as adopted and amended by the Board of Supervisors, in accordance with the Federal Disaster Mitigation Act of 2000 and California Government Code, Section 65302.6.

Humboldt County Operational Area Hazard Mitigation Plan

The 2014 Humboldt County Operational Area Hazard Mitigation Plan Update is the county's plan to identify and reduce hazards before any type of hazard event occurs (Humboldt County 2014). The Hazard Mitigation Plan aims to reduce losses from future disasters such as dam failure, drought, earthquake, fish losses, flooding, landslide, severe weather, tsunami, and wildfire. The Hazard Mitigation Plan also includes a vulnerability analysis and proposed initiatives designed to minimize future hazard-related damage.

Humboldt County Emergency Operations Plan

The 2015 Humboldt County Emergency Operations Plan (EOP) Humboldt Operation Area addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies in or affecting Humboldt County (Humboldt County 2015). The EOP addresses integration and coordination with other governmental levels when required. The EOP accomplishes the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting Humboldt County.
- Identifies the policies, responsibilities, and procedures required to protect the health and safety of Humboldt County communities, public and private property, and the environmental effects of natural and technological emergencies and disasters.
- Establishes the operational concepts and procedures associated with field response to emergencies, County Emergency Operations Center (EOC) activities, and the recovery process.

Impact Analysis

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? (Less than Significant Impact with Mitigation)

Construction and operation of the Project will not routinely transport, use, or dispose of hazardous materials, however limited portions of Project construction and operation will include the management of hazardous materials including:

- demolition and removal of the former Mill Site and former barn foundations,
- use of herbicides during Project construction and operation, and
- potential use and management of propane tanks during Project operation.

Construction of the Project will include the demolition of approximately 20 acres of asphalt and concrete remnant building foundations, located in the Mill Site area. This Mill Site area (barn and mill foundations and suspect material) was sampled and tested for asbestos in June 2019 and laboratory analysis yielded an absence of asbestos (GHD 2019g). Demolition and removal of the Mill Site and former barn foundations will be conducted in accordance with Environmental Protection Action 3 which states that the contractor will make adequate preparations, including training and providing equipment, to contain oil or other hazardous materials spills, and in accordance with Mitigation Measure AQ-1 (BMPs to Reduce Air Pollution) which states that all haul trucks transporting loose material off-site shall be covered. Due to the absence of asbestos in the foundation removal areas, and incorporation of Environmental Protection Action 3 and Mitigation Measure AQ-1, the potential environmental impact from transportation and disposal will be reduced to **less than significant with mitigation**.

Herbicides may be applied within the Project Area to control invasive vegetation during construction and operation of the Project. Herbicide application will comply with Mitigation Measures BIO-15 (Manage Herbicide Control and Minimize Spill Risk) which states requirements to manage herbicide and control and minimize spill risk, and Mitigation Measure BIO-16 (Accidents Associated with Releases of Chemicals and Motor Fuel) which requires contractors and equipment operators onsite during chemical treatment activities to have emergency spill cleanup kits. Therefore, with incorporation of Mitigation Measures BIO-15 and BIO-16, potential environmental impacts will be reduced to **less than significant with mitigation**.

Propane will be utilized as a backup power source for the Project and will be filled onsite by a knowledgeable and experienced propane equipment professional. No adverse environmental impact from the use of propane is expected.

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?? (Less than Significant Impact with Mitigation)

Construction of the Project will include the use of heavy equipment and vehicles, which will require consistent re-fueling which has the potential to spill and therefore release hazardous materials into the environment. This would be a potentially significant impact. With incorporation of Environmental Protection Actions 2 and 3, which require the use of a Stormwater Pollution Prevention Plan (SWPPP), and Construction BMPs, respectively, spills would be avoided and will reduce this potential impact to be **less than significant.**

Construction and operation of the Project will include the use of herbicides to control invasive vegetation. If herbicides were to spill, a potentially significant impact would occur. With incorporation of Mitigation Measure BIO-16 (Accidents Associated with Release of Chemicals and Motor Fuel), which requires operators to have spill cleanup kits onsite during herbicide application, this potentially significant impact will be reduced to **less than significant with mitigation**.

As mentioned above, re-filling of the propane tank, should it be used, will be completed onsite by a professional fuel operator. **No impact** will occur. No other operational or construction related upset or accident conditions involving the release of hazardous materials into the environmental are expected.

c) 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)

The Orick School is located approximately 1.25 miles south of the Project Area via Highway 101. No hazardous emissions or handling of acute hazardous materials are expected as a result of Project construction and operation. Due to the distance of the Orick School occurring greater than 0.25 miles away and the lack of hazardous material emissions or handling of acute hazardous materials associated with the Project, **no impact** will occur.

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? (No Impact)

The Project site is not included on a list of hazardous material sites compiled on the Cortese list. Therefore **no impact** will occur.

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)

The Project is not located within an airport land use plan, or within two miles of a public airport. Therefore, **no impact** will occur.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? (No Impact)

Construction and operation of the Project will not impair implementation of or physically interfere with the Humboldt County Emergency Operations Plan (2015), Humboldt County Community Wildfire Protection Plan (2019), or the Redwood National Fire Management Plan (2010), because the Project will provide emergency access routes and will not restrict or remove the use of current evacuation routes, will conduct routine vegetation management in order to reduce hazardous fuels in accordance with the RNSP Vegetation Management Plan (following transfer of the property to RNSP), and will contain fire water storage tanks and infrastructure to provide water to combat a fire should the situation arise (as described in Section 2.6.1). Therefore, the proposed Project does not impair or physically interfere with an adopted emergency response or evacuation plan, and **no impact** will occur. See Section 4.20 – Wildfire for additional discussion of the Project’s compliance with emergency evacuation plans.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires? (Less than Significant)

The Project is anticipated to draw visitors from around the world to experience RNSP. It can be reasonably expected that people will be utilizing the study area during operating hours when a natural disaster such as a wildland fire could occur. Should a wildfire or natural disaster occur in the vicinity and unsafe conditions arise in the Project Area, either a portion of the Project or the entire Project Area will be closed to visitors, evacuated, and cease to operate until safe conditions are restored. Interpretive signage is a planned component of the Project, and will include information on natural disasters including wildfire, and what to do in the event of a natural disaster in order to educate visitors and to avoid adverse impacts to people. With the incorporation of interpretive signage describing what to do in case of emergency, and reasonable closures due to unsafe conditions, a **less than significant impact** will occur. See Section 4.20 – Wildfire, for additional discussion of potential impacts the Project may impose on wildfire risk.

An analysis of potential cumulative impacts on hazards and hazardous materials from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.10 Hydrology and Water Quality

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the Project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater 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 off-site?			✓	
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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the Project violate any water quality standards or waste discharge requirements, or otherwise substantially degrade surface or groundwater quality?	Non-compliance with the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Alteration of the course of a stream, river, or waterway in a manner that creates erosion or siltation Creation of increased quantity of runoff such that capacity of storm drains would be exceeded	CEQA Guidelines Appendix G, Checklist Item X (a) (e) General Plan Policies WR-P1, WR-P2, WR-P9, WR-P10, WR-P12, WR-P14, WR-P16, WR-P21, WR-P35, WR-P36, WR-P37, WR-P38, WR-P39, WR-P40, WR-P41, WR-P42, WR-P43, WR-P44, WR-P45, S-P1, S-P15, RL-P2, AG-P11, IS-P13, IS-P16, BR-P4, BR-P5, BR-P6, BR-P7, BR-P8 General Construction Permit (Order No. 2009-0009, as amended by Order No. 2010-0014 & 2012-006) Redwood Creek Basin Assessment (Cannata et al. 2006)
Would the Project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	Creation of a deficit in aquifer volume or lowering of groundwater levels Creation of a substantial amount of new impervious surfaces that would interfere with groundwater recharge	CEQA Guidelines Appendix G, Checklist Item X (b) (e) Redwood Creek Basin Assessment (Cannata et al. 2006)
Would the Project substantially alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation on- or off-site?	Uncontrolled runoff from construction site	CEQA Guidelines Appendix G, Checklist Item X (c)(i) Humboldt County General Plan WR-P10 Humboldt County Grading, Excavation, and Erosion and Sediment Control Ordinance
Would the Project substantially alter the existing drainage pattern of the site or area in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	Creation of a substantial amount of new impervious surfaces that would result in an increase in runoff from or within the Project Area	CEQA Guidelines Appendix G, Checklist Item X (c)(ii) Humboldt County General Plan S-P15, S-P34 FEMA flood protection standards

Evaluation Criteria	Significance Thresholds	Sources
Would the Project substantially alter the existing drainage pattern of the site or area in a manner which would 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?	Installation of stormwater retention basins that do not comply with County standards, are not sustainable, and would increase erosion or sedimentation.	CEQA Guidelines Appendix G, Checklist Item X (c)(iii) Humboldt County Low Impact Development Stormwater Manual Humboldt County General Plan WR-P1, WR-P36, WR-P37
Would the Project substantially alter the existing drainage pattern of the site or area in a manner which would impede or redirect flood flows?	Project actions would result in on-site or off-site flooding.	CEQA Guidelines Appendix G, Checklist Item X (c)(iv)
In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation?	Placement of facilities in a 100-year flood hazard area Non-compliance with the Humboldt County Flood Damage Prevention Ordinance	CEQA Guidelines Appendix G, Checklist Item X (d), and Item VIII (b) General Plan Standard S-P15 Humboldt County Flood Damage Prevention Ordinance
Conflict with or obstruct implementation of a water quality plan or sustainable groundwater management plan?	Conflict with Basin Plan or groundwater management planning.	CEQA Guidelines Appendix G, Checklist Item X (a) (e) Redwood Creek TMDL Redwood Creek Basin Assessment (Cannata et al. 2006)

This Section evaluates the potential impacts to hydrology and water quality resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental and Hydrologic Setting

For the purpose of this section, the study area includes the Project Area and the northern extent of Prairie Creek within APN 519-231-018. Two technical memos were prepared for this Project by NHE and are attached as Appendix K – Overview of Historic and Existing Conditions Influencing Channel and Floodplain Morphology and Function Draft Memo (NHE 2019a) and Appendix L – 100-year Flood Comparison between Existing Conditions and the Integrated Project Draft Memo (NHE 2019b). These technical memos serve as the basis for this analysis.

The Redwood Creek basin contains approximately 285 square miles of mostly forested and mountainous terrain, and averages only about six miles wide (Cannata et al. 2006). Elevation ranges from sea level near the town of Orick up to 5,200 feet at the headwater near Board Camp Mountain, located at the southeast end of the basin. With the exception of Prairie Creek most tributary streams are relatively short and steep, while the mainstem Redwood Creek is low gradient until rising to the headwaters (Cannata et al. 2006). The majority of the Prairie Creek watershed basin is contained within RNSP. Prairie Creek drains mostly forested terrain and is the largest most northerly tributary to Redwood Creek. The 40 square mile Prairie Creek basin makes up approximately 14.4 percent of the 285 square mile Redwood Creek basin below the confluence with Prairie Creek.

Prairie Creek flows along the entire length of the westerly study area before joining Redwood Creek approximately 1,300 feet downstream of the study area (3.1 miles above the Pacific Ocean). Four tributaries (Skunk Cabbage Creek, Libby Creek, Otter Creek, and an unnamed tributary) and the ephemeral Southern Drainage Ditch join Prairie Creek either directly or via subsurface flow within the study area. See Figure 2 in Appendix L (NHE 2019b), for a visual representation of the hydrography within the Project Area. Libby Creek, Otter Creek and the unnamed tributary flow through culvert crossings at the Upper and Lower roads before discharging into the easterly wetland. These tributaries do not have defined channels within wetland habitats. The easterly wetland area drains into the drainage ditch that flows into Prairie Creek. The Southern Drainage Ditch ephemerally flows along the southeastern and southern boundary of the study area before discharging into the southern wetland. The southern wetland does not contain a defined channel. A southern wetland drains into Prairie Creek at the most downstream extent of the study area. A westerly wetland exists between the Highway 101 road fill prism and Prairie Creek just upstream of the Skunk Cabbage Creek confluence with Prairie Creek that receives flood flows from Prairie Creek and Skunk Cabbage Creek. The remaining portions of the study area consist of riparian habitat and wetlands along Prairie Creek, formerly grazed pasture, the Lower and Upper road, patches of redwood-dominant forest, and the approximate 20-acre former Mill Site consisting of asphalt and concrete foundations. The Project will transform the existing deep and narrow single Prairie Creek channel into a more complex braided channel consisting of a main channel(s), off channels and backwater features that are interconnected floodplains.

Regulatory Setting

Federal

Clean Water Act

The federal CWA enacted by Congress in 1972 and amended several times since, is the primary federal law regulating water quality in the United States and forms the basis for several state and local laws throughout the country. The CWA established the basic structure for regulating discharges of pollutants into the waters of the United States. The CWA gave the EPA the authority to implement federal pollution control programs, such as setting water quality standards for contaminants in surface water, establishing wastewater and effluent discharge limits for various industry categories, and imposing requirements for controlling nonpoint source pollution. At the federal level, the CWA is administered by the EPA and USACE.

Section 303(d) of the Federal Clean Water Act requires state governments to present the EPA with a list of "impaired water bodies," defined as those water bodies that do not meet water quality standards, even after point sources of pollution have been equipped with the minimum required levels of pollution control technology.

The Redwood Creek total maximum daily load (TMDL) levels for sediment and temperature are established, under Section 303(d) of the CWA, because the State of California has determined that the water quality standards are not met due to excessive sediment and temperature.

Sections 404 and 401 of the CWA require permitting and state certification for construction and/or other work conducted in "waters of the United States." Such work includes levee work, dredging, filling, grading, or any other temporary or permanent modification of wetlands, streams, or other water bodies. The Project will require both a RWQCB 401 Water Quality Certification and USACE Section 404 and may require Section 10 permits.

National Flood Insurance Program

FEMA administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA also issues Flood Insurance Rate Maps identifying which land areas are subject to flooding. The maps provide flood information and identify flood hazard zones in each community. The design standard for flood protection is established by FEMA, with the minimum level of flood protection for new development determined to be the 1-in-100 annual exceedance probability (i.e. the 100-year flood event).

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program was established in the CWA to regulate industrial and municipal discharges to surface waters of the United States. NPDES permit regulations have been established for broad categories of discharges including point source municipal waste discharges and nonpoint source stormwater runoff.

A NPDES permit is required when proposing to, or discharging of waste into any surface water of the state. NPDES storm water discharges in California are regulated through federal NPDES permits, administered by the RWQCB.

Federal Antidegradation Policy

The federal antidegradation policy is set forth in 40 CFR §131.12. State Water Resources Control Board (SWRCB) Order No. 68-16 incorporates the federal antidegradation policy into the state policy for water quality control and ensures consistency with federal CWA requirements. This federal regulation establishes a three-part test for determining when increases in pollutant loadings or other adverse changes in surface water quality may be permitted:

- Existing instream water use and level of water quality necessary to protect the existing uses shall be maintained and protected.
- Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the state finds after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the state shall assure water quality adequate to protect existing uses fully. Further, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control.
- Where high quality waters constitute an outstanding National resource, such as waters of National and State Parks and wildlife refuges and waters of exceptional recreational or ecological significance, water quality shall be maintained and protected.

The federal anti-degradation policy serves as a catch-all water quality standard to be applied where other water quality standards are not specific enough for a particular waterbody or where other water quality standards do not address a particular pollutant.

State

Porter Cologne Water Quality Control Act

The Porter Cologne Water Quality Control Act is the primary statute covering the quality of waters in California. Under the Act, the SWRCB has the ultimate authority over state water rights and water quality policy. The nine RWQCBs regulate water quality under this Act through the regulatory standards and objectives set forth in Water Quality Control Plans (also referred to as Basin Plans) prepared for each region.

The five-member SWRCB allocates water rights, adjudicates water right disputes, develops state-wide water protection plans, establishes water quality standards, and guides the nine RWQCBs located in the major watersheds of the state. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's waters. The SWRCB is responsible for implementing the CWA, issues NPDES permits to cities and counties through RWQCBs, and implements and enforces the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (Order No. 2009-0009, as amended by Order No. 2010-0014). The Order applies to construction sites that include one or more acre of soil disturbance. Construction activities include clearing, grading, grubbing, excavation, stockpiling, and reconstruction of existing facilities involving removal or replacement.

Regional Water Quality Control Board

Regional Water Boards adopt and implement Water Quality Control Plans (Basin Plans) which recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems. The current 2011 Basin Plan prepared by the NCRWQCB provides a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses of water in the North Coast Region.

The NCRWQCBs' planning process also includes water quality planning programs (adoption, review, and amendment of state-wide and basin water quality control plans and policies), including development and adoption of TMDLs and implementation plans; regulatory programs (permitting and control of discharges to water through "NPDES" and WDR permits, discharge to land – "Chapter 15," and stormwater and storage tanks programs); monitoring and quality assurance programs; nonpoint source management programs, including the "Watershed Management Initiative;" and funding assistance programs, including grants and loans.

NCRWQCB NPDES Permit

Projects that discharge stormwater runoff to Waters of the U.S. from land disturbances greater than one acre require a General Construction Stormwater Discharge Permit from the RWQCB, as required under NPDES Order No. 2009-0009, as amended by Order No. 2010-0014. To obtain a permit, a discharger files a Notice of Intent to be included under the State's NPDES permit. General conditions of the permit require that dischargers must eliminate non-stormwater discharges to stormwater systems, develop and implement a SWPPP, and perform inspections of stormwater pollution prevention measures. However, for some projects concurrently seeking coverage under CWA Section 401, such as restoration and enhancement projects, a water pollution control plan or similar may be accepted in lieu of a SWPPP.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate hydrology and water quality include the following:

WR-G1. Water Supply, Quality, and Beneficial Uses

High quality and abundant surface and groundwater water resources that satisfy the water quality objectives and beneficial uses identified in the Water Quality Control Basin Plan for the North Coast Region.

WR-G2. Water Resource Habitat

River and stream habitat supporting the recovery and continued viability of wild, native salmonid and other abundant coldwater fish populations supporting a thriving commercial, sport and tribal fishery.

WR-G9. Restored Water Quality and Watersheds

All water bodies de-listed and watersheds restored, providing high quality habitat and a full range of beneficial uses and ecosystem services.

WR-G10. Storm Drainage

Storm drainage utilizing onsite infiltration and natural drainage channels and watercourses, while minimizing erosion, peak runoff, and interference with surface and groundwater flows and storm water pollution.

WR-G11. Wastewater Management

Individual wastewater systems that do not contaminate surface and groundwater.

S-G1. Minimize Loss

Communities designed and built to minimize the potential for loss of life and property resulting from natural and manmade hazards.

S-G3. Natural Drainage and Watershed Protection

Natural drainage channels and watersheds that are managed to minimize peak flows in order to reduce the severity and frequency of flooding.

WR-P1. Sustainable Management

Ensure that land use decisions conserve, enhance, and manage water resources on a sustainable basis to assure sufficient clean water for beneficial uses and future generations.

WR-P2. Protection for Surface and Groundwater Uses

Impacts on Basin Plan beneficial water uses shall be considered and mitigated during discretionary review of land use permits that are not served by municipal water supplies.

WR-P9. Mitigate Controllable Sediment Discharge Sites

Proposed development applications involving a site identified as part of the TMDL Controllable Sediment Discharge Inventory shall be conditioned to reduce sediment discharge.

WR-P10. Erosion and Sediment Discharge

Ministerial and discretionary projects requiring a grading permit shall comply with performance standards adopted by ordinance and/or conditioned to minimize erosion and discharge of sediments into surface runoff, drainage systems, and water bodies consistent with BMPs, adopted Total Maximum Daily Loads (TMDLs), and non-point source regulatory standards.

WR-P12. Project Design

Development should be designed to complement and not detract from the function of rivers, streams, ponds, wetlands, and their setback areas.

WR-P14. Groundwater Quality Protection

Commercial and industrial discretionary uses shall be evaluated for their potential to contaminate groundwater resources, and mitigated as necessary.

WR-P16. Pathogen and Nutrient Discharge from Septic Systems

Support programs that reduce coliform bacteria and nitrate discharges from septic systems.

WR-P21. Enhance Groundwater Recharge Capacity

Encourage watershed management practices that enhance infiltration of rainfall into the groundwater.

WR-P35 Implementation of NPDES Permit

Implement and comply with the National Pollutant Discharge Elimination Systems (NPDES) Permit issued by the State Water Resources Control Board to the designated portions of the County.

WR-P36. Natural Stormwater Drainage Courses

Natural drainage courses, including ephemeral streams, shall be retained and protected from development impacts which would alter the natural drainage courses, increase erosion or sedimentation, or have a significant adverse effect on flow rates or water quality. Natural vegetation within riparian and wetland protection zones shall be maintained to preserve natural drainage characteristics consistent with the Biological Resource policies. Stormwater discharges from outfalls, culverts, gutters, and other drainage control facilities that discharge into natural drainage courses shall be dissipated so that they make no significant contribution to additional erosion and, where feasible, are filtered and cleaned of pollutants

WR-P37. Downstream Stormwater Peak Flows

Peak downstream stormwater discharge shall not exceed the capacity limits of off-site drainage systems or cause downstream erosion, flooding, habitat destruction, or impacts to wetlands and riparian areas. New development shall demonstrate that post development peak flow discharges will mimic natural flows to watercourses and avoid impacts to Beneficial Uses of Water.

WR-P38. New Drainage Facilities

Where it is necessary to develop additional drainage facilities, they shall be designed to be as natural in appearance and function as is feasible. All drainage facilities shall be designed to maintain maximum natural habitat of streams and their streamside management areas and buffers. Detention/retention facilities shall be managed in such a manner as to avoid reducing streamflow during critical low-flow periods.

WR-P39. Restoration Projects

The County shall encourage restoration projects aimed at reducing erosion and improving habitat values in Streamside Management Areas and wetlands.

WR-P40. Commercial and Industrial Activities

Commercial and industrial activities shall minimize, and eliminate to the extent feasible, facility-related discharges to the stormwater system. As required by state codes and local ordinances, commercial and industrial stormwater discharge must be routed to a wastewater collection system; for example, minimizing runoff from vehicle maintenance yards, car washes, restaurants cleaning grease, contaminated mats/carts into storm drains, and other wash practices that result in materials other than plain water entering the storm drain system.

WR-P41. Oil/Water Separation

Parking lot storm drainage shall include facilities to separate oils from stormwater in accordance with Public Works requirements and the recommendations of the Stormwater Quality Association's California Stormwater Best Management Practices Handbooks or their equivalent.

WR-P42. Erosion and Sediment Control Measures

Incorporate appropriate erosion and sediment control measures into development design and improvements.

WR-P43. Storm Drainage Design Standards

Drainage design standards for new development shall be adopted by ordinance. The design standards shall ensure that storms of specified intensity, frequency, and duration can be accommodated by engineered drainage systems and natural drainage courses.

WR-P44. Storm Drainage Impact Reduction.

Develop and require the use of Low Impact Development (LID) standards consistent with Regional Water Board requirements to reduce the quantity and increase the quality of stormwater runoff from new development and redevelopment projects in areas within the County's MS4 boundary or as triggered under other Regional Water Board permits. For all other watersheds, develop storm drainage development guidelines with incentives to encourage LID standards to reduce the quantity and increase the quality of stormwater runoff from new developments

WR-P45. Reduce Toxic Runoff

Minimize chemical pollutants in stormwater runoff such as pesticides, fertilizers, household hazardous wastes, and road oil by supporting education programs, household hazardous waste and used oil collection, street and parking lot cleaning and maintenance, use of bioswales and other stormwater BMPs described in the California Stormwater Best Management Practices Handbooks or their equivalent. WR-P46. Fish Passage Designs. Work with federal and state agencies and local watershed restoration groups to retrofit existing drainage and flood control structures and design new structures to facilitate fish and other wildlife passage in partnership with federal and state agencies.

S-P1. Reduce the Potential for Loss

Plan land uses and regulate new development to reduce the potential for loss of life, injury, property damage, and economic and social dislocations resulting from natural and manmade hazards, including but not limited to, steep slopes, unstable soils areas, active earthquake faults, wildland fire risk areas, airport influence areas, military operating areas, flood plains, and tsunami run-up areas.

S-P15. Construction within Special Flood Hazard Areas

Construction within a floodplain identified as the 100-Year Flood Boundary on FEMA's Flood Insurance Rate Map shall comply with the County's Flood Damage Prevention Regulations. Fill in the floodplain shall only be allowed if it can be demonstrated that the fill will not have cumulative adverse impacts on or off site and such fill shall not be detrimental to productive farm land, and is otherwise in conformance with the County's Flood Damage Prevention Regulations.

RL-P2. On-site Water and Septic Systems

Cumulative impacts of water withdrawal from surface and groundwater sources, and cumulative impacts from on-site sewage disposal systems, shall be assessed during the zoning and subdivision and, in critical watersheds, any other discretionary review of development in all areas designated for residential agriculture development.

AG-P11. Support Vegetative Management Programs

Support vegetation management programs (controlled burning, etc.) when it is found that they improve the availability and quality of rangeland for livestock and wildlife, reduce the hazard of disastrous wildfires, and increase water quality and quantity.

IS-P13. Drainage and Flood Control

Develop and maintain a countywide drainage and flood control plan to guide capital improvements and maintenance and serve as a basis for long-term sustainable funding mechanisms.

IS-P16. Water and Wastewater System Capital Improvement Programs

Support the efforts of service providers to develop and maintain capital improvement programs for construction of water and wastewater systems.

BR-P4. Development within Stream Channels

Development within stream channels shall be permitted when there is no lesser environmentally damaging feasible alternative, and where the best feasible mitigation measures have been provided to minimize adverse environmental effects. Development shall be limited to essential, non-disruptive projects as listed in Standard BR-S6 - Development within Stream Channels.

Impact Analysis

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality? (Less than Significant Impact with Mitigation)

Prairie Creek is not listed under the CWA as an impaired water body, rather it is considered the most pristine of the Redwood Creek tributaries (Wilzbach and Ozaki 2017). However, Redwood Creek is listed as an impaired water body under the CWA for sedimentation and temperature. A TMDL management plan for sediment has been prepared for the Redwood Creek watershed (EPA 1998). Therefore, Prairie Creek (as a major tributary to Redwood Creek) is subject to the same regulations as Redwood Creek under the CWA. However, there is no TMDL for temperature at this time, and no schedule has been set for the creation of a temperature TMDL for Redwood Creek (SWRCB 2019). The purpose of the Redwood Creek sediment TMDL is to identify total allowable loads and loading allocations that, when implemented, are expected to result in attainment of applicable water quality standards for sediment (EPA 1998). According to the TMDL, the sources of sediment in the Redwood Creek basin predominantly include timber harvesting and road construction.

The Prairie Creek sub watershed is different from the majority of the Redwood Creek watershed due to the lack of significant logging or other land management disturbance that has taken place, and because it is underlain by a less erosive rock type. According to the TMDL, Little Lost Man Creek, a tributary to Prairie Creek, is considered a reference site of loading rates for the Prairie Creek watershed which comprises approximately 14 percent of the Redwood Creek basin (EPA 1998). Little Lost Man Creek enters Prairie Creek upstream of the Project Area, slightly north of Berry Glen. The Project will not affect Little Lost Man Creek.

Project construction will occur over four years and therefore will require installation and monitoring of temporary erosion and sediment control BMPs during construction and throughout the entire construction duration to protect receiving waters from sediment or other construction debris. These BMPs include straw wattles, silt fences or other permeable barriers which allow water to filtrate through the barrier, but filter sediment and other debris. Construction BMPs will protect water quality up to the standards in the forthcoming 401 Water Quality Certification from the NCRWQCB, and in accordance with Environmental Protection Actions 2 and 3. As described in Section 4.4 – Biological Resources, Prairie Creek and other select waterways within the Project Area will be dewatered in accordance with Mitigation Measure BIO-7 (Dewatering), which will be in compliance with the Section 401 Water Quality Certification, and will not cause an adverse impact to water quality. Water that is intercepted during construction activities, such as groundwater in deeper excavations, is considered construction water and will need to be dewatered and handled separately from in-stream channel dewatering water. Construction water is typically highly turbid and will need to be treated before returning to water courses (if allowed) or diverted to areas where it can be spread and infiltrated into the ground. In some instances, it may be necessary to collect the construction water into tanks and be hauled from the site for proper disposal. Typically, construction water is collected from the excavation by pumps, and then pumped to a treatment or infiltration area. It is anticipated for this Project that construction water can be pumped to the low-lying wetland areas within the Project site for infiltration. It will be removed from the construction area in accordance with the forthcoming Section 401 Water Quality Certification permit, which may include pumping and discharging into a wetland to allow for infiltration. It is anticipated that one Section 401 Water Quality Certification will be obtained for the restoration components and one Section 401 Water Quality Certification for the development components.

Water quality observations of surface water within the study area are limited and only available for Prairie Creek and Skunk Cabbage Creek. No water quality observations exist for the other surface waters within the study area. It has been well documented (e.g. Cannata, 2006, Wilzbach and Ozaki 2017 in NHE 2019a) that the Prairie Creek basin maintains suitable water temperatures for salmonids due to channel shade, climate conditions and coastal fog, which moderates air and water temperatures.

As part of the surface water sampling efforts conducted by NHE to determine baseline conditions within the study area, continuous water temperature was collected at 15-minute intervals at three sampling sites within Prairie Creek in the study area (see Figure 22 in Appendix K, NHE 2019a) since February 2015. This temperature information provided three continuous water years (WYs) of water temperatures and four years of summer mean maximum weekly average temperature (MWAT) and maximum weekly maximum temperature (MWMT) values at each sampling site. The continuous water temperature data at all three sampling sites is summarized below in Table 4.10-1 – Summary of Prairie Creek Water Temperatures at Sampling Sites (NHE 2019a).

Table 4.10-1 Summary of Prairie Creek Water Temperatures at Three Sampling Sites (NHE 2019a)

Prairie Creek Sampling Site	Water Year	Temperature (°C)					
		MWAT	MWMT	Avg. 15-min Data	Min 15-min Data	Max 15-min Data	Max Diurnal Change
HWY101	2015	15.9	17.0	12.9	7.2	17.8	3.0
SKUNK		16.0	16.8	13.0	7.3	17.4	3.0
TURNOUT		16.2	16.9	13.1	7.3	17.4	2.8
HWY101	2016	15.0	16.2	11.6	5.3	16.5	3.0
SKUNK		15.1	16.0	11.8	5.4	16.3	2.5
TURNOUT		15.3	15.9	11.8	5.4	16.2	2.7
HWY101	2017	15.0	15.9	11.1	5.5	16.2	2.7
SKUNK		15.2	16.0	11.2	5.6	16.2	2.6
TURNOUT		15.4	16.0	11.3	5.5	16.1	2.5
HWY101	2018	14.5	15.7	10.7	4.7	16.0	3.1
SKUNK		14.7	15.8	10.8	4.9	16.0	3.0
TURNOUT		15.0	15.7	11.0	4.9	15.9	2.9

Notes:

MWAT (Mean Weekly Average Temperature): maximum seven day running average of daily temperatures

MWMT (Maximum Weekly Maximum Temperature: seven day average of the daily maximum temperatures

HWY101 monitoring location is within Prairie Creek immediately upstream of the northern border of the Project's disturbance extent

SKUNK monitoring location is within Prairie Creek, near the confluence of Skunk Cabbage Creek

TURNOUT monitoring location is within Prairie Creek, in the southern central portion of the Project Area

Source: NHE 2019a

Collected data indicate that Prairie Creek water temperatures within the study area are suitable for salmonid production and consistent with other Prairie Creek observations and suitability conclusions. MWMT for WY 2016, 2017 and 2018 are all at or below the 16 degrees Celsius (°C) threshold, with the WY 2015 MWMT slightly above at 17 °C. In general Prairie Creek MWMT changes little within the Project reach, although MWAT and average temperatures do increase slightly (approximately 0.3 and 0.5 °C) between the upstream HWY101 site and the downstream TURNOUT site. Additional water quality data was collected by Ozaki and Truesdell (2017) at multiple locations in Prairie Creek and tributaries such as Skunk Cabbage Creek in late spring and early fall 2016, including temperature, dissolved oxygen, pH and conductivity. The maximum observed temperature during the sampling periods was 15.6 C (60 F) in Prairie Creek below the Highway 101 bridge (upstream and outside the Project Area) (NHE 2019a).

Construction of the Project will modify the location of the main Prairie Creek channel, add overflow and backwater channels, and interconnect these channels with the floodplain to enhance habitat for salmonids. Implementation of the Project will result in a larger volume of water retained within the study area as compared to existing conditions. It is anticipated that water temperature may temporarily increase due to construction and operation of the Project due to the retention of water across a larger area coupled with a temporary increase in solar exposure than currently exists. However, this potential short-term increase in water temperature is anticipated to be minor, due to the cool, foggy coastal climate of the Project Area, and due to the consistent cool influx of water from upper Prairie Creek. The potential increase in water temperature, partially due to the loss of riparian vegetation, is anticipated to be temporary in nature. The Project includes robust revegetation efforts, and it is anticipated that the Prairie Creek Restoration area will contain ample vegetation, including extensive riparian vegetation, to appropriately shade Prairie Creek within ten years of initial construction. Groundwater quality will not be adversely affected by the Prairie Creek Restoration component of the Project because the Project will result in increased retention of surface water, improved hyporheic connectivity, creation of wetlands in the floodplain, both of which will aid in increased groundwater infiltration and improvements in water quality. The Project will significantly improve water quality, and potential impacts to water quality and temperature resulting construction will be **less than significant**.

Construction and operation of the Project, particularly within the Prairie Creek Restoration area, will include the treatment of invasive vegetation utilizing both mechanical and chemical methods. During construction, invasive vegetation will be excavated to the appropriate depth to ensure all rhizomatous root matter that could potentially re-sprout, is removed. It will be buried within the Project Area beneath locations where structures are not proposed to be located at an appropriate depth to ensure it cannot re-sprout. Herbicide may be applied during pre-construction, construction and operation. The removal and burying, and potential use of herbicide, has the potential to adversely impact water quality, which would be a significant impact. To avoid potentially adverse environmental impacts from removal and treatment of invasive vegetation before, during and after construction, Mitigation Measures BIO-13 (Pre-construction Mapping and Treatment of Invasive Species), BIO-14 (Treatment of Invasive Species during Construction), BIO-15 (Manage Herbicide Control and Minimize Spill Risk), BIO-16 (Accidents Associated with Release of Chemicals and Motor Fuel), and BIO-24 (Treatment of Invasive Species Post Construction) are proposed. With incorporation of Mitigation Measures BIO-13, BIO-14, BIO-15, BIO-16, and BIO-24 potential adverse impacts to water quality will be avoided through the mapping and marking of target invasive vegetation stands for removal via excavation and burying in accordance with the recommendations in the Invasive Species Management Plan, which will include measures to protect water quality if water features are in proximity. Use of herbicide will be in accordance with manufacturer’s recommendations and methods stated in the Invasive Species Management Plan, and accidents will be handled in accordance with the Spill Prevention and Response Plan included in the Invasive Species Management Plan. Collectively, with incorporation of the Mitigation Measures stated above, potentially adverse impacts to water quality during invasive vegetation management will be reduced to **less than significant with mitigation**.

Following construction of the Prairie Creek Restoration, loose sediment will be present in the excavated channels. When this area is rewatered turbidity impacts are expected to occur downstream of the Project Area. This effect will be brief and is consistent with existing background turbidity during high flow events within the watershed. The area of impact is expected to extend 500 feet downstream of the Project Area. A second turbidity pulse may also occur following the first significant rainfall. Due to the short term nature of this impact, and due to the significant water quality and aquatic habitat benefits the Project will create, the initial turbidity pulses following Project construction and the first significant rainfall is considered **less than significant**.

Operation of the Project may occasionally require the removal of accrued sediment from within the channels that may be hindering drainage within the restored area. Sediment would be removed with either hand tools or heavy machinery such as an excavator. During removal, if sediment were to flow within or downstream of the Project Area, water quality would be adversely affected through increased turbidity, which would be a significant impact. In order to avoid turbidity and other adverse water quality impacts, sediment removal and other instream maintenance activities will be conducted in accordance with Mitigation Measures BIO-5 (Seasonal Work Windows), BIO-6 (Native Aquatic

Species Relocation) and BIO-7 (Dewatering). Incorporation of BIO-5, BIO-6 and BIO-7 will isolate the area of potential water quality impacts by removing and relocating aquatic species and dewatering the area in a seasonally appropriate window. As mentioned above, a short-term sediment plume is likely to occur downstream of the Project Area following rewatering of the channels and following the first significant rainfall following Project work, which is considered less than significant. With incorporation of BIO-5, BIO-6 and BIO-7, this potential impact to water quality is reduced to **less than significant with mitigation**.

The Project has been designed to include stormwater retention basins to treat and manage stormwater that originates from impervious surfaces within the study area (i.e. parking lots, paved walkways, roads). The stormwater retention basins will be designed at a minimum to meet Section 438 of the Energy Independence and Security Act (EPA 841-B-09-001) ("Section 438"), which is the standard used by federal agencies for reducing stormwater runoff from federal development and redevelopment projects. Given that the Project is intended to be operated by RNSP, a federal/state agency partnership, this standard is appropriate. Final stormwater treatment standards and design will be determined during the permitting process for the Project.

The stormwater retention basin features are located along the southeastern corner and in the south central portion of the study area (See Figure 2-3 for the purple shaded LID features). To comply with Section 438, the Project is proposing to direct runoff from impervious surfaces to stormwater retention basins, which will help to remove pollutants and infiltrate stormwater into the ground. The stormwater retention basins will be designed and sized to retain the runoff sourced from the 95th percentile of a rainfall event over a 24-hour period. According to the Basis of Design Report for the Visitor Center (SHN 2018), the approximate 95th percentile rainfall is equal to 1.3 inches, and the resulting runoff depth is 1.1 inches. The required retention volume is 1.1 inches multiplied by the impervious surface area of the Project, which is anticipated to be 4.3 acres. The Visitor Center component of the Project was designed to minimize the amount of impervious surface onsite, and achieves a significant amount of reduction in the impervious surface from the existing condition (SHN 2018).

Compared to existing site conditions, which include approximately 20 acres of impervious surface (the asphalt and concrete foundation of the former Mill Site), construction and operation of the Visitor Center will decrease the extent of impervious surface and therefore the amount of runoff from the site. Impervious ground surface area across the entire study area is anticipated to be approximately 187,752 square feet (4.3 acres), and therefore approximately 17,212 cubic feet (0.4 acre feet) of retention volume will be required (SHN 2018). The final values may deviate from the values presented in this analysis as the Project design becomes finalized, however the volume and capacity of the retention basins will comply with Section 438 requirements prior to Project construction. See Appendix M – Civil Engineering Basis of Design Report, SHN 2018. Potential impacts in water quality as a result of runoff from the proposed project will be **less than significant**.

An onsite water well and wastewater treatment system and leach field are proposed for installation in the Visitor Center footprint. Detailed feasibility studies were conducted by LACO to determine the groundwater pumping rate and depth of a proposed well (LACO 2011a), and to determine the appropriate location for the wastewater system based upon soil suitability (LACO 2011b). Based upon the LACO 2011b report, subsurface disposal of pre-treated wastewater is feasible in the southwesterly portion of the Orick Mill foundation (LACO 2011b). The leach field will likely consist of eight lines with 10-foot spacing between lines. Based and the current design the lines will be approximately 69 feet in length and will be installed to accommodate wastewater needs for the site. There will be a 100 percent reserve leach field area adjacent to the primary leach field site. Wastewater will likely be pumped through a series of tanks for treatment, initially starting with an estimated 12,000 gallon septic tank and followed by an estimated 8,000 gallon equalization tank, an estimated 1,500 gallon recirculation tank, an Orenco Advanced Treatment Unit, and an estimated 1,000 gallon dosing tank that will pump wastewater to the leach field. All tank sizes are approximate. The onsite wastewater treatment system and leach fields will be designed to meet NCRWQCB and Humboldt County standards, as stated in the Humboldt County Onsite Wastewater Regulations and Technical Manual (Nov 2017). Impacts to surface and groundwater quality related to installation and operation of the leach field will be **less than significant**, because soils were tested and determined to be feasible for subsurface disposal and the leach field will be installed and operated in accordance with design standards and permit requirements for the NCRWQCB and Humboldt County.

Construction and operation of the Libby Creek Enhancement portion of the Project will not degrade surface or groundwater quality, rather it will enhance hydrologic function by replacing failing culverts and restoring a more natural flow pathway. This will result in a positive impact on surface water quality. **No adverse impact** will occur.

Construction and operation of the Canopy Walkway and Yurok Demonstration Site will have no effect on surface or groundwater quality due to the less than substantial amount of impervious surfaces associated with these components of the Project. **No adverse impact** on water quality will occur.

Construction and operation of the California Coastal Trail (CCT) will result in a reduction in impervious surfaces through the removal of a portion of the existing Upper Road pavement, and drainage improvements through the replacement of culverts and installation of new culverts. This will be considered beneficial to surface water quality. **No adverse impact** will occur.

Collectively, construction of the Project will incorporate BMPs including the use of silt fencing and/or straw wattles, or similar, to avoid the transfer of sediment directly into waterways during construction and therefore will not violate water quality standards. However, there is a reasonable potential for surface water temperatures within Prairie Creek to temporarily increase before replacement riparian vegetation is fully established because creek water will be flowing into a greater surface area and as most of the existing riparian vegetation along the creek in the Project Area will be removed and be replanted. The temporary increase in temperatures is not expected to reach lethal thresholds for salmonids which is approximately 23-35 degrees Celsius, or 73-77 degrees Fahrenheit (WSDEC 2000) due to the consistent flow from upstream Prairie Creek. As mentioned, Prairie Creek is considered a pristine tributary of Redwood Creek and supports populations of listed salmonids; the potential interim increase in temperatures due to the loss of vegetation is not expected to reach lethal levels to listed fish. The Project will also comply with requirements set forth in the Biological Assessment, pursuant to Section 7 of the ESA. Groundwater quality will improve due to the Project through the reduction in impervious surfaces and installation of stormwater retention basins. A **less than significant impact** will occur.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin? (Less than Significant Impact)

The study area and lower Prairie Creek basin to the confluence with Little Lost Man Creek are part of the Redwood Creek Area groundwater basin (Basin No. 1-26) which is 2,000 acres (3.1 square miles) in size (DWR 2003, DWR 2016 in NHE 2019a). Based on a 1996 survey, the California Department of Water Resources (DWR) estimates groundwater extraction in the Redwood Creek Area at 500 acre-feet for agricultural use and 80 acre-feet for municipal and industrial use (DWR 2003). The Redwood Creek Area groundwater basin is classified as very low priority as it relates to the California Statewide Groundwater Elevation Monitoring (CASGEM) program and the Sustainable

Groundwater Management Act (SGMA), and the basin does not currently have a sustainable groundwater management plan (NHE 2019a). A groundwater well currently exists at the Project Area that provided domestic/industrial water for the former Orick Mill, which was installed at a depth of 118 feet in 1985.

According to NHE (2019a) hydrogeologic information for the Redwood Creek basin is limited to site specific studies and information. Over the past few years, several studies have been conducted to better understand groundwater and subsurface conditions at the study area. In 2011 LACO installed 13 temporary piezometers within the asphalt area to gather groundwater monitoring data to determine site suitability for a subsurface disposal field (LACO 2011b). In 2015 McBain Associates installed eight piezometers in the pasture area west of the former Mill Site within the proposed Prairie Creek floodplain, to better understand shallow groundwater conditions to support restoration and revegetation activities in the study area (MA 2019; LACO 2015 in NHE 2019a). The piezometers have yielded groundwater data that was analyzed during design development.

Observed groundwater gradients are east-to-west towards Prairie Creek during the wet-weather periods (winter and spring) when groundwater levels are the highest. However, during the dry period (summer and fall) when groundwater levels are low, groundwater gradients shift and slope north-to-south towards Redwood Creek (MA 2019). Maximum groundwater levels occur in winter to spring period, drop through the summer, and reach minimum levels in the fall. These seasonal groundwater levels are consistent with Prairie Creek flow and stage levels and demonstrate the connection between Prairie Creek, the adjacent shallow unconfined aquifer and precipitation patterns in the study area. MA (2019) also noted that Prairie Creek gains water from shallow groundwater during winter and loses water to the shallow groundwater in summer and fall. However, evaluation of the groundwater data and Prairie Creek profile and stage data indicates that the summer and fall Prairie Creek to groundwater relation is complicated and Prairie Creek may gain and lose water to groundwater over the study area dependent on location to surface water sources. See Appendix I – Basis of Revegetation Design Report (McBain Associates 2019), for a detailed discussion of groundwater movement.

The existing groundwater well was installed to a depth of 118 feet in 1985. Based on the well driller logs, as reported by LACO (2011b), “yellow clay” exists from 0- to 35-feet and “blue clay” exists from 35- to 80-feet, underlain by “cemented gravels and water gravels.” During drilling the initial depth to groundwater was 95 feet, and the static level following well completion was 15 feet. Given this information regarding groundwater response in the drilled well and the presence of thick clay layers overlying deeper gravels, LACO (2010 and 2011b) concluded that the deeper aquifer was partially to fully confined.

Based on subsurface investigations and groundwater level monitoring below the paved area, a shallow zone of perched groundwater is also present (LACO (2011b). Subsequent groundwater level monitoring indicates the shallow perched groundwater zone extends over the entire low-lying area of the study area within the Prairie Creek Restoration Area and southwestern Visitor Center area (McBain Associates 2019). LACO (2011b) interpreted seasonal groundwater level response to indicate that the shallow perched groundwater layer is an open, unconfined water table aquifer that is separate from the deeper confined aquifer.

Monitoring indicates the maximum depths to groundwater ranged from six to greater than sixteen feet over the observed period and minimum depths ranged from zero to six feet in those same locations (see Figure 24 in Appendix K, NHE 2019a) (LACO 2011b, McBain Associates 2019 in NHE 2019a). Although groundwater observations occurred over different years, they demonstrate the distribution of minimum depth to groundwater below the study area. Depths to groundwater are related to the estimated native ground elevations below the paved area. Both minimum and maximum groundwater depths are a function of time of year, location to surface water sources and existing ground topography.

Groundwater monitoring indicates the site consists of at least two distinct aquifers. A deep, fully or partially confined aquifer is separated from a second perched unconfined aquifer by a thick layer of clay material. The lower confined aquifer supports domestic water well development. Water levels in the perched unconfined aquifer are seasonally responsive to infiltration of precipitation, surface water, and Prairie Creek and Redwood Creek stage height.

The proposed Project includes the installation of a domestic well and potential installation of three additional wells to increase filling of fire protection tanks. The additional wells will be drilled to the same approximate depth of the existing well (118 feet) in order to access groundwater from the confined aquifer. Water sourced from the primary well will be treated at the Water Treatment Building located onsite in the utility area southwest of the Visitor Center. The well will be utilized for drinking via water fountains and spigots within the Visitor Center and pedestrian plaza, cooking and other dining needs at the proposed café, and traditional cooking needs within the cookhouse located at the Yurok Demonstration Site. Per National Fire Protection Association (NFPA) standard 22, fire water storage tanks must be able to be refilled in eight hours. Water from the secondary wells will be available to be used to fill the two 30,000-gallon fire water storage tanks. In total, annual average daily water use is anticipated to be approximately 750 gpd, and peak daily water use up to 4,090 gpd (SHN 2018). Initially there will be a large draw of water to fill the fire water storage tanks; however, the tanks are not anticipated to be refilled often because structure fires are not anticipated to take place frequently, if at all due, to regular maintenance of the utilities onsite, sprinklers within the Visitor Center and proper staff training. Should a wildfire occur and fire protection water is needed, the tanks will be refilled following use.

Testing of the existing groundwater well, which sources water from the deep aquifer considered to be partially to fully confined, indicated that the well could produce 23 gallons per minute with a 0.35-foot drawdown over 24 hours (LACO 2011a). This rate was considered a minimum due to pump limitations. LACO (2011a) estimated that the existing well could produce about 35 gallons per minute with less than one foot of drawdown over 24 hours. The one-foot drawdown over 24 hours does not represent a critical or regulatory threshold, rather it is used to demonstrate the abundance or scarcity of water in an aquifer. Smaller draw down values over 24 hours, equate to greater storage capacity transmissivity within an aquifer. The Project includes the addition of a primary domestic well, and three additional wells within the Project footprint. The existing well will remain intact, however will not be utilized for domestic water. The proposed primary domestic well is located in the southern extent of the Project and will serve as the source of potable water for the Project Area. The proposed domestic well is located outside of the cone of influence of the existing well, and therefore it is expected that when the proposed primary domestic well and existing well are utilized at the same time, it will continue to result in less than one foot drawdown over 24 hours. The potential additional wells will be used intermittently to fill fire water storage tanks and are therefore not anticipated to collectively result in greater than one foot drawdown of the confined aquifer over 24 hours. Therefore, the proposed withdrawal of water from the deep, confined aquifer to support operations of the Project will not result in a substantial decrease in groundwater supplies nor will it interfere with groundwater recharge, and this is a less than significant impact.

There will be no decrease in groundwater supply nor interference with groundwater recharge in the shallow unconfined aquifer, as no water will be withdrawn from it. The Project will include stormwater retention basins intended to treat stormwater sourced from within the Project Area to federal EPA

Section 438 standards. The LID features will recharge the local unconfined aquifer through the infiltration of stormwater from the proposed stormwater retention basins. Although the Project proposes to typically pump approximately 750 gpd to support operations of the Project on an average day (SHN 2018), not including filling of the fire water storage tanks, there will not be a substantial decrease in groundwater supplies nor interference with groundwater recharge because the aquifer used to support operations of the Project is a confined aquifer and has been documented to draw down less than one foot and recover quickly. Additionally, groundwater recharge is expected to increase due to the significant reduction in impervious surfaces and installation of stormwater retention basins and extensive lowered floodplain surfaces within the Prairie Creek Restoration Area. Based on sustainable operation of the proposed drinking water well (utilizing the pumping limitations in LACO 2011a), reduction in impervious surfaces, installation of stormwater retention basins, and lowered floodplain surfaces, there will be a net benefit to groundwater resources. A **less than significant impact** will occur.

c, i) 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 result in substantial erosion or siltation on- or off-site? (Less than Significant Impact)

The Project will alter the course of Prairie Creek from a narrow and entrenched channel to a braided channel consisting of main channels, backwater channels, and high flow channels that are interconnected with the surrounding approximate 30-acre floodplain, resulting in a beneficial alteration of existing drainage patterns. The new channels will more closely resemble Prairie Creek's natural historic drainage pattern and improve floodplain function. However, the Prairie Creek Restoration component of the Project will increase the potential for onsite erosion due primarily to short-term impacts associated with construction. Following construction, the newly constructed channel banks, floodplains, and backwater features will be left in a raw, unvegetated state that will be vulnerable to short-term erosion. Overtime, as vegetation becomes established, the potential for erosion will diminish towards natural erosional conditions and will likely be less than existing conditions (J. Anderson pers.comm. 2019). This component of the Project will create a more dynamic channel and floodplain that creates conditions for erosion to occur in response to natural stream processes. However once vegetation is established it is not expected that the conditions within the Project Area will be any more erosional than upstream areas of Prairie Creek, outside the Project Area (J. Anderson pers. comm. 2019). During the design process, areas within the Prairie Creek Restoration and other applicable areas, such as within the Libby Creek Enhancement area, that will be most susceptible to erosion will be identified and appropriate erosion control measures will be incorporated into the design, which could include erosion fabric, straw wattles, biotechnical treatments or denser revegetation. It is not expected that there will be a significant increased short-term potential for erosion immediately following construction due to the erosion control measures to be implemented. Additionally, construction of the new channels will occur on non-wetted surfaces gradually diverting Prairie Creek flows into the new alignment. This will minimize erosion potential. The Project will adhere to the CWA, Section 401 Water Quality Certification, which will require erosion control protection measures during and after construction to limit erosion or siltation, and will likely require monitoring of water quality parameters, including turbidity, upstream and downstream of the Project during construction.

The culvert on Libby Creek will be removed and replaced with an open bottom culvert, and culverts will be replaced on Otter Creek and the unnamed tributary. Culvert replacements will not alter drainage patterns. Additional improvements include the removal of an impoundment on Libby Creek, and the berm and debris removal and widening of the Southern Drainage Ditch. These beneficial actions will reduce mass wasting erosion potential resulting from flood events, and will utilize the BMPs and design standards required in Environmental Protection Actions 2 and 3.

Modifications to the Prairie Creek channels and floodplain will reduce flood flow velocities, attenuate flood peaks, improve hyporheic connection, and create a more naturally functioning stream system to benefit Prairie Creek and special-status salmonids. Construction and operation of the Project will improve water quality due to increased groundwater infiltration, increased grain size diversity to reduce the percent of fine sediments within the active channel, restored geomorphic function (which will reduce turbidity and related fine sediment impacts), and increased hyporheic connectivity. The Project will not result in an increase in on- or off-site erosion or siltation. A **less than significant impact** will occur.

c, 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)

Surface runoff, also known as overland flow, is the flow of water that occurs when excess stormwater, melted water or other sources flow over the earth’s surface. Pervious surfaces such as soil, grass, wood chips or other porous surfaces are able to absorb surface runoff and allow for infiltration throughout the soil. Impervious surfaces such as pavement, rooftops and sidewalks are not porous and do not allow for infiltration to take place. Surface runoff flows over impervious surfaces and drains into the closest catchment basin in its path, which may be a waterbody, wetland, stormwater drainage system or other open space such as a parking lot or grassy field. Construction and operation of the Project has a nexus to surface runoff.

The expanded stream channels and restored floodplain will be graded downslope (NHE 2019b) and are anticipated to slow and retain surface flows within the study area for a longer duration than existing conditions to better attenuate flood peaks and improve hyporheic connections, reducing future flood related impacts. The extensive backwater channel network incorporated into the Prairie Creek Restoration Design will improve the channel’s capacity to handle flood flows and further reduce on-site flood related impacts. The Prairie Creek Restoration Area component of the Project is intentionally designed to inundate the Prairie Creek floodplain to provide habitat benefits interconnected floodplains, specifically to juvenile salmonids presently limited by winter rearing habitat (NMFS 2014). These modifications will not result in any off-site flood related impacts.

The development components of the Project, including the Visitor Center and CCT, will result in a net decrease in impervious surfaces which will affect surface runoff. In order to construct the Visitor Center, approximately 20 acres of asphalt and concrete at the former Mill Site will be removed and replaced with approximately four acres of impervious surfaces made up of parking lots, roads, and paved trails at and near the Visitor Center. This modification will result in a net decrease of approximately 16 acres (or 80 percent) of impervious surface. This modification will greatly reduce the amount of surface water runoff generated from within the study area as a result of the Project and reduce on-site flooding potential.

The footprint of the CCT (Upper Road) currently contains asphalt. The portion of the CCT that will be ADA accessible will likely be narrowed compared to existing conditions resulting in a decrease in the amount of pavement, and will therefore reduce the amount of surface water runoff. The Yurok Demonstration Site and the Canopy Walkway will have negligible effects on surface water runoff due to the small amount of impervious surfaces associated with each Project component (i.e. roofing of the Yurok Demonstration Site structures, walkway at the Canopy Walkway). As discussed in question (b), stormwater retention basins are planned components of the Project to manage stormwater generated from within the Project Area. They will be designed to meet EPA Section 438 standards, which includes designing the storage capacity assuming the 95th percentile of rainfall over 24 hours. Construction of the Project will result in a net reduction in the amount of impervious surfaces within the study area, which will reduce the amount of surface runoff present within the study area and thereby reduce risk of flooding on- or off-site due to increased surface runoff. Although some impervious surfaces will be installed as a component of the Project, implementation of the Project will result in a net gain to groundwater recharge, due to the increased stormwater infiltration, net loss of impervious surfaces and floodplain restoration. Therefore, a **less than significant impact** will occur.

c, 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? (No Impact)

The Project will result in an 80 percent decrease in impervious surfaces, which will significantly reduce the amount of surface runoff within the study area. Stormwater retention basins will treat and manage stormwater that originates within the study area in accordance with Section 438. The stormwater retention basins will be designed and sized to retain the runoff sourced from the 95th percentile of a 24-hour rainfall event. Polluted runoff due to oil and fuel leaks from vehicles could reach the stormwater retention basins from the parking lots. The runoff sourced from the parking lots, and all runoff within the Project footprint, will be directed towards stormwater retention basins to remove pollutants from and allow for stormwater to infiltrate into the ground (SHN 2018). The proposed stormwater retention basins will have the capacity to manage and treat approximately 17,212 cubic feet of stormwater at one time and is designed to comply with appropriate standards, therefore **no impact** will occur.

c, iv) Impede or redirect flood flows? (Less than Significant Impact with Mitigation)

The study area is located approximately 1,300 feet north of the confluence of Prairie Creek and Redwood Creek, and bounded by Highway 101 along the west, Bald Hills Road to the south, and steep forested terrain along the north and easterly edges bisected by two roads known as the Upper Road and Lower Road. Flood flow patterns within the study area are controlled by the Prairie Creek channel, floodplain conditions, and anthropogenic features, including the elevated roadways of Highway 101 and Bald Hills Road. Existing small bridges at roadway crossings obstruct flood flows. Larger peak-flows (e.g. 100-year flood) overtop these elevated roadways. The Mill Site was constructed on river run fill and elevated above the natural grade to prevent flooding. Flood flows within the Project Area are redirected towards Prairie Creek due to the elevated and impervious Mill Site.

According to Appendix L (NHE 2019b), the Project will increase existing 100-year water surface elevation within the study area and upstream by approximately 0.1 to 0.2 feet. This slight increase is within the range of changes to water surface elevations allowable by FEMA, which is limited to a one foot increase in streams and floodplains not designated by FEMA as a regulatory floodway. The predicted difference is attributed to the proposed floodplain filling and grading at the south end of the Project Area and west of the Visitor Center (see Figure 3 in Appendix L (NHE 2019b), which will increase elevation along a ridge-like trail and obstruct flood flows in this area, particularly the area just west of the Visitor Center entrance. This predicted change in water surface elevation could potentially increase flooding on Highway 101. The elevation in this area is proposed to be increased to provide a pedestrian trail to Prairie Creek along the southern end of the study area. However, according to modeling conducted by NHE (2019b), the fill for this trail feature would act as an impediment to flood flows and therefore would be a potentially significant impact. The trail design is not yet final and will inform the final elevation of the fill in this area. In order to mitigate for the potential impact of redirecting flood flows, Mitigation Measure HYD-1 is proposed.

Mitigation Measure HYD-1: Implementation of Design that will Not Increase Flood Levels

The pedestrian trail and associated fill located in the southwest portion of the Project shall not be constructed if the flooding predicted with the current designs can not be eliminated.

With incorporation of Mitigation Measure HYD-1, there are no Project features which would significantly impede or redirect flood flows beyond existing conditions, and the 100-year flood levels will be flood neutral. Furthermore, the grading and earthwork associated with the overall Prairie Creek Restoration component better redistributes flow in the study area and decreases Prairie Creek velocities in the downstream reaches of the Project at the two-year flood flow.

The model predicted that increased 100-year flood flow velocities in Prairie Creek at the Highway 101 bridge crossings within and downstream of the Project Area should not increase erosion potential. This is because the velocity of the 100-year flood flow is predicted to be well below existing two-year flood velocities, a more frequent flood at these locations (NHE 2019a). Furthermore, the grading associated with the proposed Prairie Creek Restoration will better redistribute flow in the study area and decrease Prairie Creek velocities in the downstream reaches of the Project at the two-year flood flow. The proposed Project grading will likely reduce overall erosion potential in Prairie Creek and at the Highway 101 bridge crossings (NHE 2019a). A **less than significant impact with mitigation** will occur.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation? (No Impact)

The Visitor Center buildings and Yurok Demonstration Site will be placed at a floor elevation of approximately 50 to 52.5 feet (NAVD 88), which is approximately five to 7.5 feet above the 100-year floodplain (45.0 feet) (SHN 2018, NHE 2019b). Site utilities including water treatment, drinking and fire water storage, wastewater treatment and wastewater disposal facilities, telecommunications, electricity and gas will be installed at an elevation of approximately 47.5 to 52.5, which is a minimum of two and a half feet above the 100-year floodplain (45.0 feet) (SHN 2018, NHE 2019b). The utilities will be located at the south eastern portion of the study area on fill. Existing elevations in this area are predominantly 42.5 to 45 feet, but range from 40 to 50 feet. Two PG&E power poles with active electrical wires currently exist within the study area, extending from across Highway 101 to the west and terminating at the former barn location. Two additional poles exist onsite that were once used for electrical infrastructure, however, do not contain wires and are not active. See Figure 5 in Appendix L (NHE 2019b), for modeling results of existing and designed Project components in relation to the 100 year flood level.

According to 100 year flood level modeling conducted by NHE (2019b), flood flows will inundate the majority of the study area. The areas that will not be within the 100-year floodplain include the Visitor Center including the parking lot and amenities within the Visitor Center footprint, utilities area, Yurok Demonstration Site, Canopy Walkway, and portions of the CCT (see Figure 5 in Appendix L).

The portions of the Project that are within the 100 year floodplain include the following Project components: Prairie Creek Restoration and the Libby Creek Enhancement (NHE 2019b). There will not be any hazardous pollutants such as fuels, gases or oils within the Prairie Creek Restoration, Libby Creek Enhancement areas. Infrastructure within the 100 year floodplain include the water quality monitoring structure proposed to be located adjacent to Prairie Creek, and miscellaneous signage throughout the study area. See Appendix N for a topographical and cross sectional view of Project components (NHE 2019c).

The portions of the study area which will contain pollutants are located above the 100 year floodplain and therefore there is no risk of release of pollutants if the Project site were inundated. **No impact** will occur.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan? (Less than Significant Impact)

As mentioned above in question (b), the study area and lower Prairie Creek basin to the confluence with Little Lost Man Creek are part of the Redwood Creek Area groundwater basin (Basin No. 1-26) which is 2,000 acres (3.1 square miles) in size (DWR 2003 and 2016 in NHE 2019a). Based on a 1996 survey, the California Department of Water Resources (DWR) estimates groundwater extraction in the Redwood Creek Area at 500 acre-feet for agricultural use and 80 acre-feet for municipal and industrial use (DWR 2003 in NHE 2019a). The Redwood Creek Area groundwater basin is classified as very low priority as it relates to the California Statewide Groundwater Elevation Monitoring (CASGEM) program and the Sustainable Groundwater Management Act (SGMA). The basin does not currently have a sustainable groundwater management plan (NHE 2019a).

With regard to water quality and as mentioned above in question (a), Prairie Creek is not listed under the Clean Water Act as an impaired water body, rather it is considered the most pristine of the Redwood Creek tributaries (Wilzbach and Ozaki 2017). However, Redwood Creek is listed as an impaired water body under the Clean Water Act for sedimentation and temperature (SWRCB 2019). Water quality monitoring conducted from July 1 through August 31 1997-2015 shows that water temperature in Prairie Creek is at present fully suitable throughout the year to support production of salmonid and other cold water fishes (Wilzbach and Ozaki 2017). There is no data measuring the amount of sediment entrained within the water column within the study area.

The Project will be constructed utilizing construction BMPs and in accordance with the forthcoming Section 401 Water Quality Certification, administered by the NCRWQCB. The Section 401 Water Quality Certification is anticipated to be in accordance with the instream numeric targets listed in the Redwood Creek sediment TMDL. Water quality monitoring is anticipated to be conducted during construction to ensure that water quality downstream of the Project is in compliance with the regulations put forth in the Section 401 certification. The Project may temporarily increase instream Prairie Creek water temperatures due to the increased stream channel surface area and due to the loss of riparian vegetation, however the potential increase in temperatures is not expected to reach lethal temperature limits for listed salmonids. Prairie Creek Restoration components will be consistent with regulatory permitting requirements. A **less than significant impact** will occur.

An analysis of potential cumulative impacts on hydrology and water quality from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.11 Land Use and Planning

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the Project:				
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?				✓

Evaluation Criteria	Significance Thresholds	Sources
Would the Project physically divide an established community?	A physical barrier to movement dividing an established community that results in a complete physical separation from the rest of the neighborhood	CEQA Guidelines Appendix G, Checklist Item XI (a)
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?	Any such applicable goal/policy in the Humboldt County General Plan	CEQA Guidelines Appendix G, Checklist Item XI (b) Land Use Element of the Humboldt County General Plan

This Section evaluates the potential impacts to land use and planning resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

The Project is located approximately 1.25 miles northeast of the unincorporated community of Orick, in Humboldt County, California. The Project's disturbance extent is 89.2 acres, and the parcels that comprise the Project are 101.5 acres. The Project Area includes the lower 4,275 feet (nearly one mile) of Prairie Creek, the former Mill Site, and various access roads. The Project area is bound to the west by Highway 101, to the north by the community of Berry Glen, to the east by the NPS and to the south by Bald Hills Road (Figure 2-1 – Project Vicinity). The Project Area is owned by Save the Redwoods League (the League) and includes the following assessor parcel numbers (APNs): 519-231-018, and 520-012-013. Approximately 2.5 acres of the Project encroaches onto NPS property (APNs: 520-012-009 and 519-231-020).

The historic Mill Site lies in the southeastern portion of the Project Area. The Mill Site shut down in 2009 and was demolished in 2010, while the asphalt and concrete foundation spanning approximately 20 acres remains within the Project Area. Two roads that parallel one another, known as the Lower and Upper Road exist in the eastern and northern portion of the Project Area. Flat, grassy meadow, Prairie Creek, and riparian habitat exists in the western portion of the Project Area.

At the time of preparation of this CEQA document, the Project Area was being utilized for open space and for data collection of aquatic habitat conditions within Prairie Creek by Project members. A barn previously located within the study area, a remnant of the past agricultural uses onsite, was demolished in 2019. The Project area has remained off limits to the public and has been in a fallow state since the Mill was demolished in 2010.

Regulatory Setting

Federal

There are no federal land use plans, policies or regulations pertaining to the Project.

State

State Lands Commission Policy

The State Lands Commission (Commission) is a trustee agency for projects that could directly or indirectly affect sovereign land and their accompanying Public Trust resources or uses. Additionally, because the Project involves work on sovereign land, the Commission will act as a responsible agency under CEQA.

The Commission has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways across California. The Commission also has certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions. All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the common law Public Trust Doctrine.

The State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. The state holds these lands for the benefit of all people of the state for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation and open space.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate land use and planning include the following:

> *RL-P1. Compatible with Resource Production*
>
> Planned development on residential agriculture lands adjacent to designated agricultural and timberlands shall be compatible with agriculture and timber production.
>
> *RL-P3 - Rural Commercial Uses:*
>
> New tourist, commercial, and retail outlets shall be located within the Rural Community Center land use designation or designated Community Planning Areas or other existing developed areas with development of a similar nature, unless the use meets rural cottage industry standards or is characteristic of, and compatible with, a rural setting.

PL-P6 - Planning Adjacent to Public Lands:

Land use planning and discretionary review of permit and subdivision applications adjacent to public lands shall consider impacts to public lands and consistency with applicable management plans.

PL-P7. Public Access

Encourage the provision of the maximum amount of access to public lands and waterways, consistent with:

- Public safety;
- Consideration of nearby access alternatives;
- Rights of private property owners;
- Natural resource protection;
- Subdivision Map Act requirements for access to navigable waterways;
- Special needs of handicap and elderly persons.

Orick Community Plan

The policies within the Orick Community Plan which address land use and planning include the following:

OCP-P1 Population

The County shall support Orick’s efforts to reverse declining population trends by:

- Encouraging tourist-oriented developments to locate in the Orick area.
- Including Orick in future Block Grant proposals.

OCP-P4 - Location of Commercial Uses:

Locate retail commercial uses in the existing community center, with population serving establishments concentrated north of Redwood Creek, and visitor serving uses south of the Creek.

OCP-P5 - Conversion of Resource Dependent Sites to Visitor Serving:

Permit the conversion of Resource Dependent Industrial sites to tourist oriented R-V parks. Campgrounds or resorts, if the sites are physically suitable for such uses.

OCP-P9 - Redwood National Park Master Plan:

In order to promote increased visitor usage of Redwood National Park, and to identify Orick as a major provider of services to park visitors, the County should support the following specific aspects of the Park Master Plan:

- Provide campsites at Orick Hill;
- Provide campsites at Skunk Cabbage Hill;
- Maintain no-charge camping at Freshwater Lagoon beach; and
- Require that visitor services that are available in Orick be identified in any County financed literature that discusses Redwood National Park.

Impact Analysis

a) Physically divide an established community? (No Impact)

The Project involves construction and operation of a Visitor Center, Canopy Walkway, Americans with Disabilities Act (ADA) accessible trail (CCT) primitive trails, Yurok Demonstration Site, and enhancements to stream channels and floodplains (Prairie Creek Restoration and Libby Creek Enhancement) over two contiguous parcels. The Project will encroach into approximately 2.5 acres of property to the east owned by the NPS. No development will occur on NPS property, however the following Project activities will take place: tree removal and replacement, earthwork and grading within the Eastside Restoration Area, and the removal of the impoundment on Libby Creek. The Project Area is currently closed to the public. A small neighborhood exists west of the Project Area, and the community of Orick is located south of the Project Area along Highway 101. Operation of the Project will remain within the boundaries of the study area, and will not physically divide the adjacent neighborhood or community of Orick, rather it will provide recreational and educational opportunities for the Community of Orick. Therefore, **no impact** will occur.

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? (No Impact)

The Humboldt County General Plan was certified in October 2017 and guides land use decisions and development in Humboldt County through the use of land use designations, goals, policies, standards and implementation measures. Based upon land use designations, the County assigns zoning designations to lands to further guide land use and development. The land use and zoning designations are shown on Figure 4.2-2 – Land Use and Zoning Overview and described below.

The land use designations for the Project Area are “Residential Agriculture 40-160” (RA 40-160) in the west, “Commercial Recreation” (CR) in the east, and ”Public Lands” (P) in the far eastern extent where the Project encroaches into RNSP lands. The zoning in the study area is: Rural Residential Agriculture (RA) with a minimum lot size of 40 acres, Commercial Highway (CH), Forest Recreation (FR), and Unclassified (U) where the Project encroaches into RNSP lands. There are five combining zones on the site: Design Control (D), Floodplain (F), Streamside Management Areas and Wetlands (WR), Recreation (X), and Special Building Site (B) with a minimum lot size of 20 acres.

The RA zoning occurs within the western portion of the study area, where the Prairie Creek Restoration, Canopy Walkway, and portions of the CCT, Libby Creek Enhancement and Yurok Demonstration Site components of the Project will take place. Recreational activities, and fish and wildlife management activities are conditionally allowable uses in the RA zone. Therefore, all construction and operation Project activities within the RA zone are expected to be principally or conditionally permitted through a Conditional Use Permit.

The CH zoning occurs within the eastern portion of the Project Area, where the Visitor Center, and portions of the CCT, Yurok Demonstration Site, and Libby Creek Enhancement components of the Project will take place. Recreational activities and ecosystem restoration activities are allowable land uses in this zoning area. Therefore, construction and operation Project activities within the CH zone will be principally permitted.

The FR zoning occurs within the northern extent of the Project Area, where the CCT will be located, however no construction activities or other Project work would occur in this area. Rather the proposed CCT would utilize the existing roadway. Public and private noncommercial recreational uses are allowable land uses in this zoning area. Therefore, construction and operation Project activities within the FR zone will be principally permitted.

Proposed Project components within the U zone include portions of the ERA, Libby Creek Enhancement and CCT. Portions of these Project components occur within the U zone on land owned by NPS. Because NPS is not under the jurisdiction of Humboldt County, they will not be subject to the County's permitting requirements. Portions of the ERA, Libby Creek Enhancement and CCT that are outside of NPS land will be subject to jurisdiction from Humboldt County.

Special conditions to address the combining zones: Design Control (D), Floodplain (F), Streamside Management Areas and Wetlands (WR), Recreation (X), Special Building Site (B) will be listed in a Special Permit which will be a subset of the Conditional Use Permit for the entire Project. Combining zone special conditions occur only in areas where the combining zone is added to the zoning designation (see Figure 4.2-2). The combining zones include design review by the Orick Design Review Committee (as signified by the D combining zone), limitations to development within the 100-year floodplain (signified by the F combining zone), conformance with the Streamside Management Area (SMA) ordinance to protect the ecological values of riparian and wet areas (as signified by the WR combining zone), the addition of recreational uses (as signified by the X combining zone), and the indication that lot area and yard requirements should be modified (as signified by the B combining zone). Construction and operation of the Project will be principally or conditionally permitted through a Conditional Use Permit and will comply with all other applicable local regulations, such as the Humboldt County Grading ordinance. Construction and operation of the Project adheres to the goals and policies regulating land use and planning of the Humboldt County General Plan, and all of the Orick Community Plan goals and policies except for OCP-P4 – Location of Commercial Uses and potentially RL-P3 – Rural Commercial Uses. Policy OCP-P4 states that visitor serving uses should be located south of Redwood Creek, The Project Area is located north of Redwood Creek and therefore conflicts with this policy. However, a main component of the Project is the Prairie Creek Restoration, which is location specific. The Project will allow visitors to view the restored Prairie Creek area which will benefit the visitor experience. Additionally, the Project upholds policy OCP-P5 – Conversion of Resource Dependent Sites to Visitor Serving, which states that sites that were once resource dependent should be converted to tourist oriented sites. Implementation of the Project will successfully redevelop a former resource dependent site to a tourist oriented site. Because of these reasons, the conflict with OCP-P4 is not considered significant. The Project potentially conflicts with policy RL-P3, which states that new tourist, commercial and retail outlets shall be located in the Rural Community Center or designated Community Planning Area or in other existing developed areas with development of similar nature, unless the use is characteristic or compatible with a rural setting. The Project is compatible with the rural setting it is currently sited in, and therefore there is no conflict with this policy. The Project conforms to all other policies within the Orick Community Plan. The Project will not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project that was adopted for the purpose of avoiding or mitigating an environmental effect. **No impact** will occur.

An analysis of potential cumulative impacts on land use and planning from implementation of the Project was not conducted because the Project will yield no impact to land use and planning.

4.12 Mineral Resources

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the Project:				
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?				✓

Evaluation Criteria	Significance Thresholds	Sources
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?	The loss of a mineral resource of value to the region and State	CEQA Guidelines Appendix G, Checklist Item XI (a)
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?	The loss of a locally-important mineral resource recovery site	CEQA Guidelines Appendix G, Checklist Item XI (b)

This Section evaluates the potential impacts to mineral resources resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area is the same as the Project Area**.** Humboldt County has a wealth of mineral resources. There are over 90 extraction sites around the county producing sand, gravel, hard rock, metals, stone and clay. Mining provides an input of vital importance to a number of key activities in the construction industry, primarily the raw materials for concrete used in foundations. Mining materials are also used for road construction, maintenance, repair, timber operations and other important uses (Humboldt County 2017). Sand and gravel extraction constitute the major portion of the county's mining activity, both in terms of quantity of material produced and value of extracted resource.

The closest permitted gravel mining operation appears to be located in the Mad River approximately 29 miles away. According to an independently managed database of mining claims (Diggings 2019), there is a USGS record of mineral resources labeled as "Unnamed Location" located approximately two miles southwest of the study area. It is unknown whether mineral resources have been sourced from the "Unnamed Location" mining claim (Diggins 2019). There are three USGS records of mineral resources sourced at locations clustered along the coast approximately four miles northwest of the study area, known as "Two State Mining Co.," "Upper Gold Bluffs," and "Lower Gold Bluffs." As of 2003, the three records contain small occurrences of gold and platinum deposits. An unpermitted small-scale gravel mining operation is known to exist along Redwood Creek south of the Project Area.

Regulatory Setting

Federal

There are no federal regulations that apply to the proposed Project related to mineral resources.

State

Surface Mining and Reclamation Act

The Surface Mining and Reclamation Act (SMARA) regulates surface mining operations within California. SMARA is administered by the California Department of Conservation through the California Department of Conservation State Mining and Geology Board (SMGB) and the Office of Mine Reclamation (OMR). SMARA requires local governments to obtain reclamation plans as a condition for granting the permits required before surface mining may proceed. SMARA encourages the production and conservation of minerals, while also considering "values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment."

Local

County of Humboldt Extraction Review Team (CHERT)

The Humboldt County Board of Supervisors created CHERT in 1992 to provide scientific oversight on Mad River gravel extraction, which had arrived at an impasse over environmental concerns. In 1996, the scope of CHERT services was expanded to include most riverine extraction sites throughout Humboldt County. CHERT develops recommendations based on two primary goals: 1) minimizing potential cumulative effects by ensuring that reach-scale mining volumes do not exceed sustainable levels, and 2) ensuring that site-specific methods of extraction (skimming, trenching, etc.) are appropriate for protecting local habitat.

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate mineral resources include the following:

> *MR-G1. Long-term Supply of Mineral Resources*
>
> A geographically distributed inventory of mining sites protected from incompatible land uses, permitted and operated to prevent or minimize to the extent feasible significant environmental impacts and to satisfy long-term demand for mineral resources and construction materials. Mining permits may be issued for any term consistent with the resource and subject to ongoing regulatory review.
>
> *MR-G2. In-stream Sand and Gravel Extraction*
>
> Continued supplies of in-stream sand and gravel using extraction methods and rates that are consistent with state and federal endangered species regulations and will not adversely impact public infrastructure. Where possible, extraction should take place in a manner beneficial to endangered or threatened species.

MR-P2. Production and Conservation

Encourage the production and conservation of minerals, while preserving to the maximum extent feasible the values relating to recreation, watershed, wildlife, timber management and agriculture, science, and aesthetic enjoyment.

MR-P3. Right to Mine

Discretionary projects within 1000 feet of vested and permitted surface mining extraction sites or a minimum of 300 feet along existing haul routes shall be required to record a notice of the right to mine against the property for which a discretionary permit is sought. The notice shall advise owners and subsequent interests in ownership that the existing mining operation has a permitted right to continued mining operations.

MR-P4. Identify Mineral Deposits

The County shall maintain an inventory of the county's mineral deposits and permitted and/or vested mining sites.

MR-P8. Future Development Planning

Plan future development such that it will not interfere with the utilization of identified mineral deposits.

Impact Analysis

a, b) 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, or a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan? (No impact)

According to the CHERT 2017 post-extraction report and independently operated mining claim database (Diggins 2019), there are no mining operations in the study area. There are no known mineral resources or USGS records within the Project footprint. Due to the absence of mining operations and identified mineral resources in the Project Area, construction and operation of the Project will have **no impact** on mineral resources.

An analysis of potential cumulative impacts on mineral resources from implementation of the Project was not conducted because the Project will yield no impact to mineral resources.

4.13 Noise

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the Project:				
a) 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?			✓	
b) Result in generation of excessive groundborne vibration or 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?				✓

Evaluation Criteria	Significance Thresholds	Sources
Would the Project result in the 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?	Land Use/Noise Compatibility Standards (Table 13-C)	CEQA Guidelines Appendix G, Checklist Item XIII (a) General Plan Land Use/Noise Compatibility Standards (Table 13-C)
Would the Project result in the generation of excessive groundborne vibration or noise levels?	Peak particle velocity of 0.3 in/sec	CEQA Guidelines Appendix G, Checklist Item XIII (b) California Department of Transportation – Construction Vibration Guidance Manual
Would the Project be 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, exposing people residing or working in the Project area to excessive noise levels?	Location of Project in area exposed to effects of airport noise	CEQA Guidelines Appendix G, Checklist Item XIII (c)

This Section evaluates the potential noise impacts resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

The study area for this Section includes the Project Area and adjacent lands to the west where a small residential neighborhood exists and may be impacted by construction or operational noise. The neighborhood is considered a sensitive receptor. The closest sensitive receptor is approximately 430 feet away from the western edge of the Prairie Creek Restoration Area, 1,250 feet away from the western edge of the Visitor Center footprint and 1,525 feet away from the western edge of the Yurok Demonstration Site. Existing noise sources in the Project vicinity are associated with Highway 101 and Bald Hills Road along the western and southern boundaries of the Project Area. Noise sources include passenger vehicles, commercial trucks, and other equipment. According to the Humboldt County General Plan, "(t)he principal sources of noise in Humboldt County are highways, airports, rail, on-site construction, and industrial activities" (Section 3240). The eastern boundary of the Project Area is bordered by forest owned and operated by the RNSP for wildlife habitat and public recreation, and therefore does not produce substantial noise.

A noise study was completed by LACO (2012) measuring ambient noise within the Project Area. The study found the ambient noise of Highway 101 to be approximately 70 decibels (dB) at 50 feet from the centerline of Highway 101, and 70 dB at 20 feet from the centerline of Bald Hills Road. Therefore the ambient noise at the approximate western and southern boundary of the Project Area is assumed to be 70 dB. Large trucks and heavy equipment utilizing Highway 101 and Bald Hills Road have the potential to cause vibrations which may be felt within the Project Area

Regulatory Setting

Federal

U.S. Department of Housing and Urban Development – Noise Assessment Guidelines

The Noise Assessment Guidelines assist in determining the exposure of a housing site to present and future noise conditions. The Guidelines do not constitute established policy of the Department of Housing and Urban Development (HUD) but do provide a methodology to assess noise which is consistent with HUD's objectives. The degree of acceptability of the noise environment at a site is determined by the outdoor day-night average sound level (DNL) in decibels (dB). The noise environment at a site will come under one of three categories: Acceptable (DNL not exceeding 65 dB), Normally Acceptable (DNL above 65 but not exceeding 75 dB), or Unacceptable (DNL above 75 dB).

State

California Department of Transportation – Construction Vibration

Caltrans recommends a vibration limit of 0.5 in/sec PPV (peak particle velocity) for buildings structurally sound and designed to modern engineering standards. A conservative vibration limit of 0.25 to 0.30 in/sec PPV has been used for older buildings that are found to be structurally sound but cosmetic damage to plaster ceilings or walls is a major concern. For historic buildings or buildings that are documented to be structurally weakened, a conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection. All of these limits have been used successfully and compliance to these limits has not been known to result in appreciable structural damage. All vibration limits referred to herein apply on the ground level and take into account the response of structural elements (i.e. walls and floors) to groundborne excitation (Caltrans 2013).

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate noise include the following:

N-G1. Excessive Noise

A quiet and healthful environment with limited disagreeable noise.

N-G2. Incompatible Land Uses

Land uses arranged to reduce annoyance and complaints and minimize the exposure of community residents to excessive noise.

N-P1. Minimize Noise from Stationary and Mobile Sources

Minimize stationary noise sources and noise emanating from temporary activities by applying appropriate standards for average and short-term noise levels during permit review and subsequent monitoring.

N-P3. Noise from U.S. Highway 101 and State Highway 299

The County shall support efforts to reduce noise levels on U.S. 101 and State Highway 299 along sections in proximity to concentrated residential development through prioritized roadway surface maintenance, use of noise-reducing surface treatments, traffic-safe tree or shrub plantings, or, in cases of significant noise exposure, use of lower speed limits and construction of sound walls.

N-P4. Protection from Excessive Noise

Protect persons from existing or future excessive levels of noise which interfere with sleep, communication, relaxation, health or legally permitted use of property.

Noise Compatibility

According to the Humboldt County General Plan, evaluation of new development projects for noise impacts should be based on a comparison of the noise compatibility standards in Table 13-C with noise contours and other available information. Table 13-C is provided below for reference.

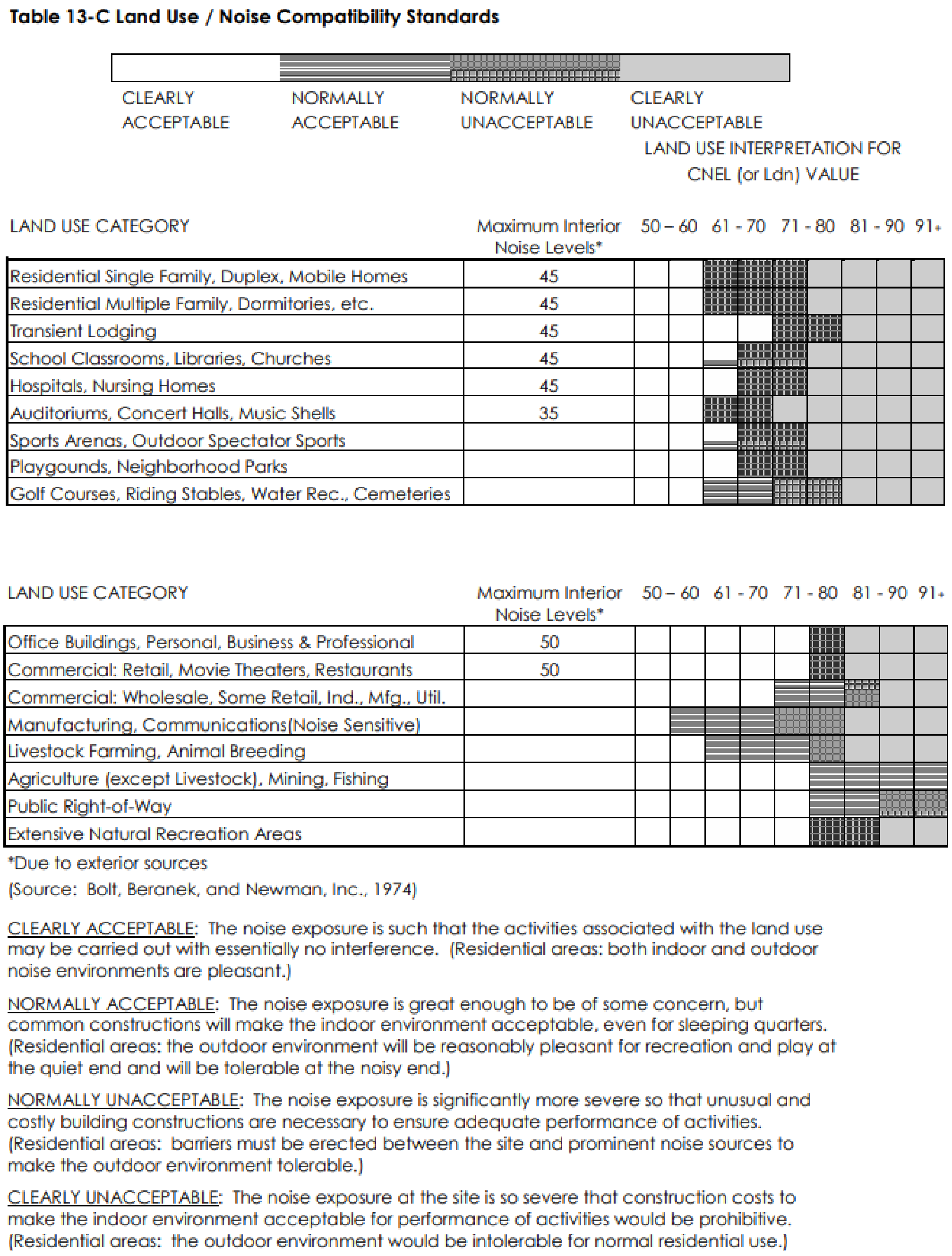

Table 13-C Land Use / Noise Compatibility Standards

	▤	▦	░
CLEARLY ACCEPTABLE	NORMALLY ACCEPTABLE	NORMALLY UNACCEPTABLE	CLEARLY UNACCEPTABLE

LAND USE INTERPRETATION FOR CNEL (or Ldn) VALUE

LAND USE CATEGORY	Maximum Interior Noise Levels*	50 – 60		61 - 70		71 - 80		81 - 90		91+
Residential Single Family, Duplex, Mobile Homes	45			▦	▦	▦	░	░	░	░
Residential Multiple Family, Dormitories, etc.	45			▦	▦	▦	░	░	░	░
Transient Lodging	45					▦	▦	░	░	░
School Classrooms, Libraries, Churches	45			▤	▦	▦	░	░	░	░
Hospitals, Nursing Homes	45				▦	▦	░	░	░	░
Auditoriums, Concert Halls, Music Shells	35			▦	▦	░	░	░	░	░
Sports Arenas, Outdoor Spectator Sports				▤	▦	▦	░	░	░	░
Playgounds, Neighborhood Parks					▦	▦	░	░	░	░
Golf Courses, Riding Stables, Water Rec., Cemeteries				▤	▤	▦	▦	░	░	░

LAND USE CATEGORY	Maximum Interior Noise Levels*	50 – 60		61 - 70		71 - 80		81 - 90		91+
Office Buildings, Personal, Business & Professional	50						▦	░	░	░
Commercial: Retail, Movie Theaters, Restaurants	50						▦	░	░	░
Commercial: Wholesale, Some Retail, Ind., Mfg., Util.						▤	▤	▦	░	░
Manufacturing, Communications(Noise Sensitive)			▤	▤	▤	▦	▦	░	░	░
Livestock Farming, Animal Breeding				▤	▤	▤	▦	░	░	░
Agriculture (except Livestock), Mining, Fishing							▤	▤	▤	▤
Public Right-of-Way							▤	▤	▦	▦
Extensive Natural Recreation Areas							▦	▦	░	░

*Due to exterior sources

(Source: Bolt, Beranek, and Newman, Inc., 1974)

CLEARLY ACCEPTABLE: The noise exposure is such that the activities associated with the land use may be carried out with essentially no interference. (Residential areas: both indoor and outdoor noise environments are pleasant.)

NORMALLY ACCEPTABLE: The noise exposure is great enough to be of some concern, but common constructions will make the indoor environment acceptable, even for sleeping quarters. (Residential areas: the outdoor environment will be reasonably pleasant for recreation and play at the quiet end and will be tolerable at the noisy end.)

NORMALLY UNACCEPTABLE: The noise exposure is significantly more severe so that unusual and costly building constructions are necessary to ensure adequate performance of activities. (Residential areas: barriers must be erected between the site and prominent noise sources to make the outdoor environment tolerable.)

CLEARLY UNACCEPTABLE: The noise exposure at the site is so severe that construction costs to make the indoor environment acceptable for performance of activities would be prohibitive. (Residential areas: the outdoor environment would be intolerable for normal residential use.)

Figure 4.13-1. Land Use/Noise Compatibility Standards (Table 13-C, Humboldt County General Plan 2017)

Impact Analysis

a) 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 Impact)

There will be a substantial temporary increase in ambient noise during construction due to the use of heavy equipment necessary to carry out the Project. The Project Area's land use and zoning designations are presented in Figure 4.2-2. These designations include Residential Agriculture (land use designation) and Rural Residential Agriculture (zoning) in the western portion of the Project Area, and Commercial Recreation (land use designation) and Commercial Highway (zoning) in the eastern portion of the Project Area. Therefore, according to Humboldt County's established land use and noise compatibility standards, the portions of the Project that are within the Rural Residential Agricultural land use designation, located in the western portion of the Project Area, and the sensitive receptors west of the Project Area are considered residential and correspond to noise levels that are normally acceptable up to 60 dB normally unacceptable from 61-79 dB, and unacceptable above 80 dB. The portion of the Project that is within the Commercial Recreation land use designation corresponds to noise levels that are normally acceptable up to 80 dB, normally unacceptable from 81-85 dB, and unacceptable above 86 db. See Section 4.4 – Biological Resources for analysis of construction related noise impacts on wildlife species.

The loudest pieces of equipment to be used adjacent to sensitive receptors are a vibratory driver, hydromulcher and excavator with a hammer which are considered to be in the Very High (91-100 dB) at 50 feet category (USFWS 2006). This equipment will be used at limited times during construction. The second loudest tier of equipment includes excavator (backhoe), dump trucks and other similar equipment classified within the High (81-90 dB) at 50 feet category. These pieces of equipment will be used adjacent to the sensitive receptors. The closest sensitive receptor will be approximately 430 feet away from the western edge of the Prairie Creek Restoration Area, and 1,250 feet away from the western edge of the Visitor Center footprint.

Sound intensity follows an inverse square law with distance: each doubling of sound source distance decreases sound intensity by 6 dB (Zahorik and Kelly 2007). In order to estimate the noise attenuation of equipment at these ranges of noise, the average of each noise level is assumed, i.e. the Very High sound range is assumed to be 95 dB, and the High sound range is assumed to be 85 dB. Using the inverse square law principle and a noise attenuation measurement tool produced by Humboldt County (2019), the use of the equipment, such as a vibratory driver and hydromulcher, in the Prairie Creek Restoration ranked Very High is expected to be approximately 76 dB at 430 feet away, and equipment ranked High is estimated to produce noise levels at 66 dB at 430 feet away. Use of equipment ranked Very High to construct the Visitor Center will produce noise levels at 67 dB at 1,250 feet away.

During work on the Prairie Creek Restoration, located approximately 430 feet away from the nearest sensitive receptor, the higher noise level (76 dB) experienced at the nearest sensitive receptor falls within the normally unacceptable range according to Humboldt County's established land use and noise compatibility standards (Humboldt County 2017). Noise from the equipment ranked Very High will be of limited duration. i.e., no longer than two weeks, as this equipment will only be used to insert large wood and either rock and/or a sheet pile wall into the Prairie Creek channel and to re-vegetate the Prairie Creek Restoration Area. The lower sound level (66 dB) will be experienced more commonly by sensitive receptors as this equipment, such as excavators and graders, will be utilized frequently throughout the construction seasons. Noise emissions of 66dB is considered to be normally unacceptable according to Humboldt County's established land use and noise compatibility standards, and will be a significant impact. Construction of the Prairie Creek Restoration in this location (approximately 430 feet away from the closest sensitive receptor) is expected to last one or two seasons, with each season spanning approximately two months.

The most noise intensive work to take place in the Visitor Center, expected to produce a sound level of 67 dB at the nearest sensitive receptor (located approximately 1,250 feet away), will occur for approximately one month during the removal of the concrete foundations of the Mill Site. Noise from these construction activities would exceed the County's noise standards. Although construction involving the removal of concrete foundation, placement or large wood and hydromulching (all which are ranked as Very High) will be of short duration it would be a significant impact. Mitigation Measure NOI-1 will be implemented to reduce this impact.

Mitigation Measure NOI-1: BMPs to Reduce Noise Impacts

All construction activities involving the use of the vibratory driver or hydromulcher, or any other equipment that ranks in the Very High (91-100 dB) category on Table 4.4-5 shall take place between 8:00 am and 6:00 pm in order to avoid sleep disturbance to the nearby sensitive receptors. This Mitigation Measure shall also comply with Mitigation Measure BIO-10 (Limitations to Use of Construction Equipment during Northern Spotted Owl and Marbled Murrelet Nesting Season).

With incorporation of Mitigation Measure NOI-1 and due to the short-term nature of construction activities which produce normally unacceptable sound levels, and because the remaining construction activities would produce sound levels that are anticipated to be within the acceptable range, this impact is considered **less than significant**.

Operation of the Project is not anticipated to produce noise levels that exceed Humboldt County's established land use and noise compatibility standards because there will be few sources of loud noises during operation of the Project. An excavator may be used occasionally to remove invasive species or sediment, however this will occur infrequently. The utilities area within the Visitor Center footprint will utilize pumps in order to operate the wastewater and drinking water infrastructure. The wastewater pumps are submersible and will be located within the housing infrastructure, and are therefore fairly quiet at 50 feet range, within acceptable noise limits. Drinking water pumps can emit up to 67 dB during use measured around the pump (Variani et al. 2018), however the drinking water wells pumps will be enclosed in structures which will muffle and reduce the noise. The Yurok Demonstration Site is expected to host four events per year, with each event lasting up to four days and hosting up to 100 people. Events may include singing, drumming and chanting, which is estimated to produce a volume of approximately 70 dB at 50 feet. The events will be sporadic, and will attenuate to acceptable levels given the distance between the Site and the nearest sensitive receptor (approximately 1,525 feet). A **less than significant impact** will occur.

A back-up fuel-driven generator, located in the Fire Pump House building in the utilities area, will provide electricity in order to re-fill the fire protection water storage tanks should there be an electricity outage following usage of the fire water. This generator will be used only in the event of an emergency. The generator will emit noise levels in either approximately the Moderate (71-80 dB) or High (81-90 dB) noise level category range, which will attenuate to acceptable levels given the distance between the generator and the nearest sensitive receptor (approximately 1,750 feet). Given the distance between the generator and the nearest sensitive receptor, noise from the use of the generation will not expose sensitive receptors to noise in excess of the County's standards. This is considered a **less than significant impact**.

b) Result in generation of excessive groundborne vibration or noise levels? (Less than Significant Impact)

The most sound-intensive Project activities were discussed in question (a), and are not anticipated to produce a significant level of noise for nearby sensitive receptors located approximately 430 feet away from the western edge of the Prairie Creek Restoration Area, 1,250 feet away from the western edge of the Visitor Center footprint and 1,525 feet away from the western edge of the Yurok Demonstration Site.

Groundborne vibrations are likely to be experienced locally during use of the vibratory driver, which will be utilized during installation of large woody debris, rock or sheet pile wall, which is necessary to disconnect the existing Prairie Creek flow pathway from the planned channel. Groundborne vibrations may also be experienced during the removal of the asphalt and concrete foundation. Both of these Project activities will be short-term and temporary. Pile driving will not occur. The removal of asphalt and concrete is expected to take place in 2020 or 2021 for up to one month, and the installation of the sheet pile wall and large woody debris is anticipated to occur for up to two weeks within one construction season (installation by vibratory methods not driving). Due to the short-term and temporary nature of these Project activities, a **less than significant impact** relating to groundborne vibrations will occur.

Operation of the Project will likely include drumming at the Yurok Demonstration Site during events. Given the closest sensitive receptor is approximately 1,525 feet away, the vibrations caused by drumming will not cause an adverse effect. No other Project operational component will cause excessive noise or vibrations; therefore, there will be **no impact** from drumming at the Yurok Demonstration Site.

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 is not located within the vicinity of a private airstrip or an airport land use plan, or within two miles of a public airport. Therefore, **no impact** will occur.

An analysis of potential cumulative impacts on noise is considered in Section 4.21 – Mandatory Findings of Significance.

4.14 Population and Housing

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
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?				✓

Evaluation Criteria	Significance Thresholds	Sources
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)?	Creation growth that does not comply with the Humboldt County General Plan or Orick Community Plan	CEQA Guidelines Appendix G, Checklist Item XIV (a)
Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	Displacement of 25 or more households	CEQA Guidelines Appendix G, Checklist Item XIV (b)

This Section evaluates the potential impacts to population and housing resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area is the same as the Project Area. The closest population area to the Project Area is Orick, a census-designated community that includes commercial and residential uses. The town was once a prominent industrial area for timber production, and the former local mill is located within the Project Area (as the Mill Site). The community of Orick had a population of 357 in the 2010 census and an estimated population of 295 people in 2017 (U.S. Census Bureau 2019). A small neighborhood comprised of approximately ten houses exists west of the Project Area. Highway 101 bisects the community of Orick and bounds the western Project boundary.

Regulatory Setting

There are no federal or state regulations that apply to the proposed Project related to population and housing resources.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate population and housing include the following:

> *IS-P19. Private Recreation Facilities*
>
> The development of private or joint public-private sector recreation facilities shall be encouraged.

Orick Community Plan

> *OCP-P1. Population*
>
> The county shall support Orick's efforts to reverse declining population trends by:
>
> - Encouraging tourist-oriented developments to locate in the Orick area; and
> - Including Orick in future Block Grant proposal

Impact Analysis

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)? (Less than Significant Impact)

The Project includes the installation of a Visitor Center and other amenities to serve the public. The Project does not propose the addition of new housing nor will it result in the need for new housing. It is reasonable to expect that the community of Orick will experience an increase in demand for lodging, dining, and general stores and supplies to accommodate users of the Visitor Center and other Project components. The Project is expected to be utilized predominantly in the summer, during the tourist season. It is therefore reasonable to expect that there may be an increase in seasonal job opportunities in the area in order to support visitor services, and therefore additional people may move to the area seasonally. The population of Orick decreased considerably in the 1980s and 1990s due to a halt in timber production, reducing from approximately 3,000 to the current estimate of 295 (Curtius 1996, US Census Bureau 2019). Population growth and tourist-oriented development is a supported policy in the Orick Community Plan, and will likely improve the community's local depressed economy. Support for private or joint private-public sector recreation facilities is encouraged in the Humboldt County General Plan. In accordance with Humboldt County rules and regulations, any incidental growth in Orick due to the Project will occur in accordance with the Orick Community Plan and Humboldt County zoning code and will be subject to CEQA and other regulations on a case by case basis. The seasonal influx of people into the area is expected to be a benefit to the lodging and restaurant businesses in Orick. The Project is not expected to result in the need for new housing or new businesses because existing infrastructure (that once supported a community of 3,000 people) is still in place. See Section 4.17 – Transportation for a discussion of potential traffic impacts.

Due to the seasonality of utilization of the Project Area, support of an increase in population according to the Orick Community Plan, and Humboldt County requirement that any additional housing will be created in accordance with applicable zoning codes and the General Plan, the proposed Project will result in a **less than significant impact** to substantial unplanned population growth.

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere? (No Impact)

No homes or people will be displaced as a result of Project construction or operation. Therefore, **no impact** will occur.

An analysis of potential cumulative impacts on population and housing from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.15 Public Services

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
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?				✓

Evaluation Criteria	Significance Thresholds	Sources
Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the 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 following public services: • fire protection • police protection • schools • parks	Increase in population that leads to unacceptable service ratios or response times or would result in the need for expanded/new services	CEQA Guidelines Appendix G, Checklist Item XIV (a)

This Section evaluates the potential impacts to public services resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area is the same as the Project Area. The Project is located north of Orick, a census-designated place in rural northern Humboldt County. Public services in the vicinity of the Project are provided by Humboldt County and volunteers. Specifically, in the vicinity of the Project, police protection is served by Humboldt County Sheriff’s Department, and fire protection is served by the Orick Volunteer Fire Department and Cal Fire. Emergency vehicle response time to the Project Area is 4.5 minutes (Humboldt County 2006). Response time is based on spatial modeling. Actual response times may vary due to local road characteristics, traffic lights, congestion, road networks, weather conditions, visibility, etc. The model used to predict response time also does not account for the fact that the engine company may be assigned to a prior call and another unit would have to be called to cover the incident, thus extending the response time (Humboldt County 2006). The Orick Elementary School provides curriculum for kindergarten through eighth grade, and contains a park for school aged children. RNSP owns lands adjacent to Orick which provide recreational opportunities to residents. Public services such as waste management is discussed in Section 4.19 – Utilities and Service Systems.

Regulatory Setting

There are no federal or state regulations governing public services that apply to the Project.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate public services include the following:

> *S-G4. Fire Risk and Loss*
>
> Development designed to reduce the risk of structural and wildland fires supported by fire protection services that minimize the potential for loss of life, property, and natural resources.
>
> *S-G7. Response Preparedness*
>
> Interagency readiness and capacity to respond to emergencies to reduce loss of life and property, support the population, and facilitate recovery.
>
> *S-P1. Reduce the Potential for Loss*
>
> Plan land uses and regulate new development to reduce the potential for loss of life, injury, property damage, and economic and social dislocations resulting from natural and manmade hazards, including but not limited to, steep slopes, unstable soils areas, active earthquake faults, wildland fire risk areas, airport influence areas, military operating areas, flood plains, and tsunami run-up areas.
>
> *S-P4. Disaster Response Plans*
>
> The County shall prepare and maintain current disaster response plans. The County shall support and participate in the preparation of disaster response plans by community organizations, companies, cities, and state and federal agencies.
>
> *S-P20. Level-of-Service Standards*
>
> Support the development of a level of service standard by the Humboldt County Fire Chief's Association for all emergency response services (fire, EMS, HazMat, and rescue) and make such information public so that landowners and residents understand the distribution and quality of service.

S-P25. Fire Service Provider Support

Make information available to fire service providers about creating districts, increasing organizational capacity, developing funding streams, and improving Insurance Services Office (ISO) ratings for reduced insurance costs.

S-P36. Emergency Operations Capability

The County shall maintain the ability to implement the nationwide National Incident Management System (NIMS), statewide Standardized Emergency Management System (SEMS), activate the Operational Area Emergency Operations Center (EOC), coordinate responders, and implement other tactical response measures as required. Emergency operations shall conform to the Humboldt County Operational Area Emergency Operations Plan.

IS-P25. Fire Service Impacts from New Development

During review of discretionary permits within fire related district boundaries or identified response areas, utilize recommendations from the appropriate local fire chief as feasible mitigation measures to reduce impacts to emergency response and fire suppression services from new development.

Orick Community Plan

OCP-P18. Extension of Community Water

The Orick Community Services District shall retain discretion to extend or not extend community water service to the rural portion of the Planning Area. The District may approve extension of such service subject to any requirements that it may adopt and to the following guidelines:

- to areas designated as Timberlands, no extension of community water systems shall be permitted;
- to areas designated as Agriculture Exclusive and Residential Agriculture: the extension must be an emergency response to the failure on an existing system; and, the capacity of the extension shall be limited to a size adequate to meet the existing residential requirements;
- no extension shall be permitted to serve uses that are clearly inconsistent with the Land Use Designation; and
- to areas designated as Residential Estates: community water systems may be provided to meet existing and planned residential development.

Impact Analysis

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 public services? (Less than Significant Impact)

The Project includes the construction and operation of various recreational enhancement Project components and habitat improvements located on private land (and slightly encroaches onto public land). The property which the Project lies upon will eventually be transferred to RNSP upon completion of the Project and implementation of permit requirements. Therefore, there is no new or physically altered government facilities associated with the Project at this time. Construction of the

Project will not require additional public services.

Currently RNSP provides public services, including public safety and fire protection, for park visitors throughout its locations (M. Whelan pers. comm. 2019), including the existing Redwood Information Center located along the coastline on Highway 101 south of the Project Area. According to the RNSP General Plan, the Redwood Information Center is located in the tsunami run-up zone and geologically vulnerable area, and will be relocated to a new primary visitor center between Orick and Prairie Creek adjacent to Highway 101 where services would be expanded (RNSP 2000). The existing Redwood Information Center is to be removed following installation of the new primary visitor center (RNSP 2000). The proposed Project will be the new primary visitor center, and therefore the public services provided by RNSP will transfer to the proposed Project location.

There is moderate potential that additional police and fire protection services may be required in the community of Orick during Project operation. However, it is not anticipated that the potential additional services will be substantial or will result in increased response times, because of the services that RNSP will continue to provide to the proposed Project which will serve as the new primary visitor center. Fire protection is served via partnership between the local Orick Volunteer Fire Department, Cal Fire and RNSP and is discussed in Section 4.20 – Wildfire. There is moderate potential that the local Orick Elementary School will increase enrollment due to operation of the Project. There is adequate availability at the Orick Elementary School as enrollment has dropped from 90 students in 1989 to 14 students in 2019 (PSR 2019). Therefore, a **less than significant impact** will occur.

An analysis of potential cumulative impacts on public services from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.16 Recreation

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			✓	
b) Include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?			✓	

Evaluation Criteria	Significance Thresholds	Sources
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?	Cause additional use of recreation facilities that would cause significant deterioration of those facilities	CEQA Guidelines Appendix G, Checklist Item XVI (a)
Would the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	Required New or expanded recreational facilities that would result in a significant impact on the environment	CEQA Guidelines Appendix G, Checklist Item XIV (b) General Plan Policy CO-P11

This Section evaluates the potential impacts to recreation resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

The Project Area is located immediately adjacent to and encroaches slightly into approximately 13,000 acres of forested park property under the ownership of RNSP. The Redwood Creek trailhead occurs east of the Project Area, which connects to numerous loop trails, campgrounds and picnic areas, the Lady Bird Johnson Grove trail occurs east of the Project Area, and numerous picnicking locations are in the vicinity of the Project. For the purposes of this Section, the study area includes the Project Area and popular places to recreate in the vicinity of the Project, such as the Redwood Creek trailhead, and Lady Bird Johnson Grove.

The Project Area does not have a history of land uses involving recreation; rather it was utilized for ranching and used as a lumber mill site with onsite accommodations for workers. In present day, much of the vicinity of Orick is owned and managed in partnership by the NPS and California State Parks, as “Redwood National and State Parks” or RNSP. One of the management goals for RNSP is to restore the lands they manage for the inspiration, enjoyment and education of all (NPS 2019b).

RNSP lands and facilities provide substantial recreational opportunities for uses. Thousands of people travel from around the world annually to visit RNSP and enjoy the spectacular redwood trees.

Recreational resources within the community of Orick include the Orick Rodeo Grounds, which hosts an annual rodeo the second weekend in July with family activities in addition to rodeo events, and the children's playground at the Orick School.

Regulatory Setting

Federal

There are no federal regulations that apply to the proposed Project related to recreational resources.

State

There are no State regulations that apply to the proposed Project related to recreational resources.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate recreational resources include the following:

> *IS-G3. Interagency Coordination*
>
> Coordinated planning, prioritization, funding and implementation of infrastructure and public service projects across jurisdictional boundaries.
>
> *CO-G4. Parks and Recreation*
>
> Well maintained and accessible parks offering a range of popular recreation opportunities and a regional trail system that meets future recreational and non-motorized transportation demands.
>
> *IS-P18. Parks and Recreation Service in Urban Development Areas*
>
> Encourage and support special districts to provide neighborhood parks and recreation services within Urban Development Areas.
>
> *IS-P19. Private Recreation Facilities*
>
> The development of private or joint public-private sector recreation facilities shall be encouraged.
>
> *IS-P27. Parks Master Plan*
>
> In cooperation with other park service providers, the County shall establish and maintain a Parks Master Plan that would assess current facilities within each inland and coastal planning area, determine appropriate locations for new facilities, and identify funding options.
>
> *CO-P8. Planning for Recreational Needs within Communities*
>
> Policies addressing community recreational needs shall be prepared as part of planning efforts within each community. Implement park in-lieu fee programs in major communities.
>
> *CO-P10. Encourage Private Outdoor Recreation*
>
> Encourage private acquisition, development, and management of compatible outdoor recreational services and facilities as a means to generate economic returns for the landowner from conservation and open space lands where such recreational uses do not significantly detract

from the agricultural capability or timber productivity of lands planned and zoned for agriculture or timber.

CO-P11. Public Recreation

Support acquisition, development and management of parklands and trails primarily in locations that are highly accessible to the public in order to serve the outdoor recreation and ADA needs of current and future residents, and where such uses do not reduce the agricultural capability, timber productivity and ecological services on open space lands.

C-P42. Public Infrastructure Supporting Private Investment

Support investments in public infrastructure that increase readiness and facilitate private initiatives and investment into port enterprises such as marine-dependent industrial use, boat building and repair facilities, fleet service facilities, tourism, recreation, and fish processing facilities.

Impact Analysis

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? (Less than Significant Impact)

The Project Area is not currently open to the public, nor has it supported recreational activities. Construction of the Project will not block access to surrounding recreational amenities in the Project vicinity including the Orick Rodeo Ground, Orick School, or RNSP amenities. Therefore, construction of the Project will have no impact on existing recreational facilities in the study area.

Operation of the Project is anticipated to draw many visitors annually, which is likely to increase the use of surrounding RNSP hiking trails, picnic areas, and other amenities in the study area, but also divert uses from the current facility located at the mouth of Redwood Creek. Visitation of the Project Area and surrounding RNSP amenities is expected to be concentrated between Memorial Day weekend (late May) and Labor Day weekend (first weekend in September). A study was conducted (Voigt 2016) to assess the relationship between visitation and health of old-growth redwood trees at three groves in RNSP, one of the groves being Tall Trees Grove which is accessible by the Redwood Creek Trail located just east of the Project Area. It is reasonable to expect that use of the Tall Trees Grove would increase due to operation of the Project, however due to the long hike from the Redwood Creek Trailhead (approximately eight miles one way), it is uncertain how much additional use is reasonably expected at Tall Trees Grove. Driving to Tall Trees Grove is an option and reduces the hiking distance to approximately 1.3 miles, however a permit is required to drive to the grove. The use of permits by RNSP improves management of the park tremendously by limiting the amount of foot traffic within an area. Due to the long distance and use of permits, substantial deterioration of Tall Trees Grove is not expected. However, other popular RNSP locations such as Lady Bird Johnson Grove is highly accessible and is located just 2.5 miles east of the Project (utilizing Bald Hills Road). It is very likely that use of this site will increase as a result of the Project. As mentioned above, RNSP manages their lands for the inspiration, enjoyment and education of all (NPS 2019b), and is in support of visitation of their facilities to carry out this goal. Additionally, RNSP is in support of the proposed Project. The RNSP General Plan (RNSP 2000) has considered the adverse impacts to natural and cultural resources from overuse of park amenities, and in order to protect resources, have stated:

> *Visitor use will be limited to that which will result in no significant impacts on resources and their values. To determine level of visitor use that will be allowed without adverse impacts*

> *on resource or visitor experience, a visitor carrying capacity analysis will be conducted and carrying capacities will be established for several sites. These site-specific capacities will be based on standards and indicators of resource condition and visitor experiences (RNSP 2000).*

RNSP currently receives thousands of visitors annually, and while the proposed Project will likely increase the number of visitors in the area, the RNSP has committed to limit visitor usage to ensure its recreational facilities are not significantly impacted. Therefore, the Project will cause a **less than significant impact**.

Operation of the Project is not expected to increase use to the level that would cause deterioration to the Orick Rodeo Grounds, or the playground at the Orick School.

b) Include or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment? (Less than Significant Impact)

Construction of the Project will not include or require the construction or expansion of recreational facilities in the study area, therefore no impact will occur.

Operation of the Project is anticipated to attract additional visitors to the Project Area, which may utilize nearby RNSP amenities. Expansion of recreational facilities within the study area due to operation of the Project is not expected to occur from operation of the Project. The mission of the NPS is to preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education and inspiration of this and future generations. Therefore any new construction or expansion would be done in accordance with that mission, in addition to NEPA environmental impact analysis. This potential impact would be **less than significant**.

An analysis of potential cumulative impacts on recreation from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.17 Transportation

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?			✓	
b) Conflict or be inconsistent with CEQA Guidelines section 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?			✓	

Evaluation Criteria	Significance Thresholds	Sources
Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	LOS deteriorates from LOS C or better countywide, and LOS D or better for Highway 101, to LOS E or F	CEQA Guidelines Appendix G, Checklist Item XVII (a) General Plan Policy C-P1 9 (d), C-P5, C-P9, and C-P17
Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	Increased vehicle miles traveled	CEQA Guidelines Appendix G, Checklist Item XVII (b)
Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Non-conformance with defined safety regulations or roadway design standards, or otherwise create unsafe conditions	CEQA Guidelines Appendix G, Checklist Item XVII (c)
Would the project result in inadequate emergency access?	Increases in traffic, road closures, or insufficient emergency access during construction or inadequate design features to accommodate emergency vehicle access and circulation during operation. Greater than zero incidences of delayed emergency access	CEQA Guidelines Appendix G, Checklist Item XVII (d)

This Section evaluates potential impacts related to transportation resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines. A Traffic Impact Study was conducted for the Project (GHD 2019h, see Appendix O) and was used as a basis for describing the existing transportation setting and evaluating potential Project-related traffic impacts. The Bald Hills Road and Highway 101 unsignalized intersection was evaluated because of the potential impact to this intersection from the proposed Project, which is under the jurisdiction of the California Department of Transportation (Caltrans).

Environmental Setting

For the purpose of this Section, the study area includes the Project Area, Bald Hills Road from the Highway 101 intersection to the eastern extent of the proposed Project Area, and northbound and southbound Highway 101 near the Bald Hills Road intersection.

The roadways analyzed are located in a rural area, with the closest community (Orick) located approximately 1.25 miles south of the Project Area. The Humboldt County General Plan recognizes that roadway capacity is generally less of an issue for rural areas due to the lower population densities, but capacity and functionality must be maintained (Humboldt County 2017).

Highway 101 is a two-lane highway within the Project vicinity. It generally runs in a north/south direction. There is a minimum 12-foot lane with 1-foot minimum paved shoulder in each direction and the speed limit is 55 miles per hour. Existing terrain is characterized as rolling, with changes in grade and horizontal curvature in the roadway alignment north and south of Bald Hills Road (GHD 2019h). Bicycle facilities on Highway 101 consist of Class III bike routes, referred to as the Pacific Coast Bike Route.

Within the Project Area, Bald Hills Road is a two-lane collector, with one 12-foot lane in each direction and varies from no shoulder to a few feet of soft shoulder. The Bald Hills Road bridge, located near the intersection with Highway 101, provides a narrow two-lane crossing over Prairie Creek and provides access to the Project site. The posted speed limit on Bald Hills Road within the Project vicinity is 35 miles per hour. There are no pedestrian or bicycle facilities on Bald Hills Road near the Project Area.

Redwood Coast Transit operates bus Route 20 – Smith River/Crescent City/Arcata – providing daily fixed route transit service between Smith River in Del Norte County and Arcata in Humboldt County along Highway 101, with stops at all major communities along the route, including the Prairie Creek Redwoods State Park and Redwood National Park's Orick Southern Service Center. There are no existing pedestrian facilities, such as sidewalks or trails, in the study area.

Regulatory Setting

Federal

The Federal Highway Administration (FHWA) supports state and local governments in design, construction, and maintenance of the nation's highway system, including Highway 101. Applicable federal policies include the Department of Transportation Act of 1966, Section 4(f), which is required whenever a United States Department of Transportation (USDOT) project involves the use of significant publicly-owned public (open to the public) parklands, recreational areas, or wildlife sites.

State

Transportation analysis in California is guided by policies and standards set at the state level by Caltrans for highway facilities under state jurisdiction, as well as by local jurisdictions. Any work or traffic control within the state right-of-way requires an encroachment permit issued by Caltrans. In addition, work that requires movement of oversized or excessive load vehicles on highway facilities requires a transportation permit by Caltrans.

Level of Service

In the context of traffic, level of service (LOS) based standards are typically used to establish thresholds of significance. Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities. If a State highway facility is operating at less than the appropriate target LOS, the existing Measures of Effectiveness (MOE) should be maintained (Caltrans 2002). Due to the passage of Senate Bill (SB) 743 (described below), LOS is phasing out as the acceptable method of determining transportation impacts for CEQA.

Vehicle Miles Traveled

SB 743 creates a process to change the way that transportation impacts are analyzed under CEQA. Specifically, SB 743 required the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative (MOE) to control delay and associated LOS for evaluating transportation impacts, which was done in early 2019. The Governor's Office of Planning and Research (OPR) recommends that vehicle miles traveled (VMT) become the primary metric or MOE of transportation impact across the California. By July 1, 2020, all CEQA lead agencies must analyze a project's transportation impacts using VMT (Caltrans 2019). Utilizing LOS as the primary method of determining transportation impacts is acceptable until July 1, 2020. There are currently no set thresholds for VMT regionally or locally.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate transportation include the following:

C-P1 (d). Circulation System

Planning retail, service, and industrial facilities, community centers, major recreational facilities, employment centers, and other intensive land uses that consider the location of collectors or arterial roads consistent with the Land Use Element.

C-P5. Level of Service Criteria

The County shall strive to maintain Level of Service C operation on all roadway segments and intersections, except for US 101, where Level of Service D shall be acceptable. Level of Service improvements for automobiles should not adversely affect Level of Service and/or Quality of Service for other modes of transportation, if possible. Level of Service C is defined as stable traffic flow, with less freedom to select speed, change lanes, or pass. Some delay may be experienced. Level of Service D is defined as a traffic stream approach unstable flow, with reduced speed and maneuverability.

C-P9. Circulation Planning for Bicycles, Pedestrians and Transit

Circulation planning and project review shall include an assessment for bicycle, pedestrian and public transit access.

C-P17. Highway Improvements

Encourage state and federal highway improvements that promote safety and connectivity for all users, especially for communities with highway arterials.

C-P42. Public Infrastructure Supporting Private Investment

Support investments in public infrastructure that increase readiness and facilitate private initiatives and investment into port enterprises such as marine-dependent industrial use, boat building and repair facilities, fleet service facilities, tourism, recreation, and fish processing facilities.

Orick Community Plan

OCP-P16. Pavement Marking on U.S. 101

Caltrans should stripe the edge of the traveled way in Orick to make roadside parking areas more obvious and add a center turning lane in the wider portion of the highway.

Impact Analysis

a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities? (Less than Significant Impact)

Construction-related traffic will be short-term and limited to weekday construction hours only. Construction traffic will include materials hauling and delivery and construction-related personnel. Construction will span four calendar years and will be limited to approximately 90 working days each year. Most construction activities will occur during summer and early fall each year. All earthen spoils will remain on-site due to the balance of cut and fill quantities (except for some possible off hauling of invasive-species impacted soil), which will limit construction-related traffic otherwise associated with off-site hauling and disposal. Construction-related traffic will not limit or preclude bicycle, pedestrian, or transit access along Highway 101 within the study area, and consistency with state and local transportation policies will be maintained. Construction of the Project will result in a **less than significant impact**.

According to established policies from both Caltrans and Humboldt County, the LOS within the study area must be maintained at Level D or better. Under existing conditions, the LOS at the study intersection (Highway 101/Bald Hills Road) is Level A or Level B, depending on the direction of approach. The Project will generate 391 daily trips, including 67 trips during the peak hour during the average day which will approximately double the amount of vehicles utilizing the Highway 101/Bald Hills Road intersection (see Figure 5 in Appendix O, GHD 2019h). Despite this increase in traffic, this intersection will operate at acceptable LOS B or better during weekday peak hours which is well under the Level D criteria (GHD 2019h). See the Traffic Impact Study, attached as Appendix O, for the LOS calculations on the four scenarios analyzed: existing conditions, existing conditions plus Project conditions, cumulative conditions based upon existing conditions, and cumulative conditions based upon existing conditions and Project conditions.

In addition, the transportation-related planning associated with the Project supports expanded bicycle and pedestrian facilities in the Traffic Impact Study evaluation (GHD 2019h). The Project will include numerous bicycle and pedestrian facilities, consistent with bicycle and pedestrian-related policies in the Humboldt County General Plan Circulation Element (2017). Because the study intersection will operate at an acceptable LOS within the Project Area and because the Project is consistent with applicable State and local transportation policies, operation of the Project will result in a **less than significant impact**.

b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)? (Less than Significant Impact)

For land use Projects, CEQA Guidelines 15064.3 (b) establishes that VMT exceeding an applicable threshold of significance may indicate a significant impact. Generally, Projects within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease VMT in the Project area compared to existing conditions should be presumed to have a less than significant transportation impact. As mentioned above, and per Section 15064.3 (c), VMT as the basis for analyzing transportation impacts shall apply statewide on and after July 1, 2020.

A VMT analysis was conducted for the Project using CalEEMod which is referred to as a “sketch model” which uses statistical characterizations of land use projects and transportation networks to estimate project VMT. The total annual VMT from Project operation is estimated at 13,145,649 miles (GHD 2019h). However, VMT thresholds have not yet been established by Humboldt County or Caltrans. Thus modeled VMT results cannot be analyzed against a threshold and the data provided above is for informational purposes only. There will be a **less than significant impact**.

c) 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)

Although the intersection of Bald Hills Road and Highway 101 will operate at an acceptable LOS with Project-related traffic, the increase in traffic may pose a risk to public safety. The Project would more than double the peak hour Highway 101 southbound left turns and significantly increase the approach volumes to the intersection overall. The intersection currently has an above average collision rate for similar intersections state-wide (rural, tee intersections), with collisions that may be attributed to slowing and/or stopped traffic on southbound Highway 101 waiting to make the left-turn onto Bald Hills Road (GHD 2019h). A collision analysis for the three-year time period at the intersection between January 1, 2015 and December 31, 2017 identified six reported collisions at this intersection during the assessed period (GHD 2019h). The increase in traffic generated by the Project would contribute to the existing safety hazard at the Highway 101/Bald Hills Road intersection constituting a potentially significant impact.

Based on the traffic modeling included in the Traffic Impact Study, existing conditions warrant a south bound left-hand turn lane (GHD 2019h). Since September 2019, Caltrans, the League and the NPS have been discussing the design of this left-turn lane as well as associated shoulder widening, a retaining wall, and signage at the at the Bald Hills Road and Highway 101 intersection. Caltrans will need to issue an encroachment permit for construction of these improvements. NPS is completing a schematic design and estimate of construction costs for the improvements and is coordinating with Caltrans to ensure that the improvements satisfy Caltrans’ design standards.

Caltrans and NPS have identified a number of potential funding sources for the proposed intersection improvements, including the Federal Lands Access Program (FLAP), the State Highway Operation and Protection Program (SHOPP), Humboldt County System Improvement Plan (SIP), and Caltrans Local Funds. The League will continue to work with NPS, Caltrans and Humboldt County to identify all potential funding sources for these improvements and the appropriate applicant (public agency, the League or other nonprofits), and to ensure that the applications satisfy all funding requirements.

Measure TR-1, which includes a southbound left-turn lane on Highway 101, shoulder widening, and signage will reduce the public safety impacts at the intersection of Bald Hills Road and Highway 101 to a less than significant level.

> **Mitigation Measure TR-1: Safety Measures for the Highway 101/Bald Hills Road Intersection**
>
> A new southbound left-turn lane shall be constructed on Highway 101 to provide safe ingress/egress onto Bald Hills Road. In addition, the shoulder of Highway 101 at the Bald Hills Road intersection shall be widened for pedestrian and bicycle travel and to improve overall safety. Directional and safety signage shall be installed at the intersection, from both the southbound and northbound approach. The Visitor Center shall not be opened until these improvements are in place.

With the implementation of Mitigation Measure TR-1, impacts relating to increased hazards at the Highway 101/Bald Hill intersection will be reduced to a level of **less than significant with mitigation.**

d) Result in inadequate emergency access? (Less than Significant Impact)

During Project construction, emergency access will be maintained at all times to allow traffic flow in both directions, utilizing the existing Upper and Lower Roads in addition to the main entrance gate.

Construction of the southbound left-turn lane may result in a temporary lane closure on Highway 101. Emergency access will be maintained at all times during construction for emergency response vehicles. Existing emergency operations planning and associated requirements adopted by Humboldt County and RNSP will remain in effect. The construction-related impact will be **less than significant**.

Operation of the Project will not affect emergency access routes. Following transfer of the property to RNSP, the Project Area will be incorporated into the RNSP's existing evacuation plan for visitor facilities and will comply with its standards for safety and evacuation. The improved entrance to the Visitor Center will provide improved first responder access to the new facilities, and the existing access utilizing the Lower and Upper Road will be retained. Therefore, emergency access and access uses will be improved and the operational impact will be **less than significant**.

An analysis of potential cumulative impacts on transportation from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.18 Tribal Cultural Resources

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: (i) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historic resources as defined in Public Resources Code Section 5020.1(k)?				✓
(ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of the Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of the Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American Tribe.				✓

Evaluation Criteria	Significance Thresholds	Sources
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k) or	Adverse alteration of those physical characteristics of a tribal cultural resource that justify its eligibility for the CRHR or in a local register of historical resources	CEQA Guidelines Appendix G, Checklist Item XVIII (a) (i) and (ii) General Plan Policy CU-P2

Evaluation Criteria	Significance Thresholds	Sources
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 Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.		

This Section evaluates the potential impacts to tribal cultural resources resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

Tribal cultural resources include resources that are of specific concern to California Native American tribes, with knowledge of such resources limited to tribal people. Refer to Section 4.5 – Cultural Resources, for a discussion of prehistoric or historic archaeological sites, structures, or objects, and refer to Section 4.7 – Geology and Soils for a discussion of paleontological resources. The study area is termed Area of Potential Effect (APE) when considering impacts to cultural or historical resources under Section 106 of the National Historic Preservation Act. For this Section, the study area (or APE) includes the entirety of parcels APN: 519-231-018, and 520-012-013 which includes areas outside of the Project Area, as well as the entirety of the Project Area.

The study area is located in Yurok ancestral lands. The Yurok, like other northwestern tribes, used a variety of coastal and terrestrial resources to subsist and thrive in their territorial range. Particularly important resources to the Yurok people include: salmon, deer, acorns and berries.

On May 8, 2019, the State Coastal Conservancy notified California Native American tribes culturally affiliated with the study area in writing pursuant to CEQA and Public Resources Code (PRC) Section 21080.3.1 as provided by the Native American Heritage Commission (NAHC). Letters were sent to representatives of the Bear River Band of Rohnerville Rancheria, the Big Lagoon Rancheria, the Cher-Ae Heights Indian Community of the Trinidad Rancheria, the Hoopa Valley Tribe, the Resighini Rancheria/Coast Indian Community, the Tolowa Dee-ni' Nation, and the Yurok Tribe of the Yurok Reservation. No responses have been received to date, and no Tribes requested formal consultation for the Project.

On June 6, 2018, PAR Environmental Services, Inc. conducted a records search of the study area and a 0.25 miles buffer at the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS). The records search included reviewing previous cultural resources studies, recorded resources and the California Office of Historic Preservation (OHP) historic properties files. Additionally, PAR conducted research at Humboldt State University (HSU; Humboldt Room and general collections), Humboldt County Recorder's Office, and the Humboldt County Historical Society. Online sources were used, including historical U.S. Geological Survey (USGS) and General Land Office (GLO) maps, historical newspapers, historical aerial photographs, census, and immigration records accessed through sites such as Ancestry.com, Newspapers.com, and HistoricAerials.com.

Due to the absence of responses from notified tribes, and absence of archaeological resources considered eligible for registration under the California Register of Historic Places as reported in the cultural resources inventory and evaluation (PAR 2019), no tribal cultural resources are considered to be present in the study area.

Regulatory Setting

Federal

There are no federal regulations which apply to tribal cultural resources.

State

California Public Resources Code Section 21074

California PRC Section 21074 details what can be considered a tribal cultural resource.

A. Tribal cultural resources are either of the following:

   1) Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Native American tribe that are either of the following:

      a. Included or determined to be eligible for inclusion in the California Register of Historical Resources (CRHR).

      b. Included in a local register of historical resources as defined in subdivision (k) of PRC Section 5020.1.

   2) 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 PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

B. A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.

C. A historical resource described in PRC Section 21084.1, a unique archaeological resource as defined in subdivision (g) of PRC Section 21083.2, or a “nonunique archeological resource” as defined in subdivision (h) of PRC Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

Assembly Bill 52

Assembly Bill 52 (AB 52), the Native American Historic Resource Protection Act, sets forth a proactive approach intended to reduce the potential for delay and conflicts between Native American and development interests. Projects subject to AB 52 are those that file a notice of preparation for an Environmental Impact Report or notice of intent to adopt a negative or mitigated negative declaration on or after July 1, 2016. AB 52 adds tribal cultural resources to the specific cultural resources protected under CEQA. Under AB 52, a tribal cultural resource is defined as a site, feature, place, cultural landscape (must be geographically defined in terms of size and scope), sacred place, or object with cultural value to a California Native American tribe that is either included or eligible for inclusion in the CRHR, or included in a local register of historical resources. A Native American Tribe or the lead agency, supported by substantial evidence, may choose at its discretion to treat a resource as a tribal cultural resource. AB 52 also mandates lead agencies to consult with tribes, if requested by the tribe, and sets the principles for conducting and concluding consultation.

California Environmental Quality Act

CEQA requires lead agencies to determine if a project would have a significant effect on tribal cultural resources. The CEQA Guidelines define a tribal cultural resource according to California PRC Section 21074.

While some tribal cultural resources include physical archaeological resources, described above, cultural resources are not limited to physical resources that have scientific significance. Tribal cultural resources also include cultural landscapes and non-unique archaeological resources. Non-unique resources are resources that are deemed culturally significant to a tribe, but do not contain information needed for scientific purposes, and may not be the best specimen in terms of quality, uniqueness, or age.

Local

Humboldt County General Plan

There are no goals or policies within the Humboldt County General Plan that regulate tribal cultural resources, see Section 4.5 – Cultural Resources, for a list of goals and policies within the Humboldt County General Plan that regulate cultural resources.

Impact Analysis

a, b) Cause a substantial adverse change in the significance of a tribal cultural resource? (No Impact)

As noted above the cultural resources evaluation did not identify resources that meet the criteria of a tribal cultural resource, nor did any of the notified tribes respond to the letter sent to them regarding the Project. Therefore, due to the absence of known tribal cultural resources, **no impact** will occur.

An analysis of potential cumulative impacts to tribal cultural resources from implementation of the Project was not conducted because the Project will yield no impact to tribal cultural resources.

4.19 Utilities and Service Systems

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electrical power, natural gas, or telecommunications facilities, the construction or relocation 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?				✓

Evaluation Criteria	Significance Thresholds	Sources
Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunication facilities, the construction or relocation of which could cause significant environmental effects?	Project would require relocation or construction of public infrastructure which would have significant environmental effect	CEQA Guidelines Appendix G, Checklist Item XIX (a)
Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	Inadequate water supply capacity to serve the needs of the project	CEQA Guidelines Appendix G, Checklist Item XIX (b)

Evaluation Criteria	Significance Thresholds	Sources
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?	Inadequate sewer capacity to serve the project	CEQA Guidelines Appendix G, Checklist Item XIX (c)
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?	Inadequate regional landfill capacity or waste management to serve the project	CEQA Guidelines Appendix G, Checklist Item XIX (d)
Would the project comply with federal, state and local management and reduction statutes and regulations related to solid waste?	Non-compliance with applicable solid waste diversion regulations	CEQA Guidelines Appendix G, Checklist Item XIX (e)

This Section evaluates the potential impacts to utilities and service systems resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

Existing utilities and service systems within the Project Area include two PG&E power poles with electrical wires and other infrastructure, and two private power poles with no electrical wires or other infrastructure. Electricity is not currently in use within the Project Area. Water within the Project Area is sourced from a well, and no municipal drinking water or wastewater infrastructure exists within the Project Area. The Project Area does not have telephone or internet connectivity.

Regulatory Setting

Federal

There are no federal regulations governing utilities that apply to the Project.

State

California Integrated Waste Management Act

The California Integrated Waste Management Act (CIWMA), also known as Assembly Bill 939, required each jurisdiction in the state to divert 50 percent of its solid waste from landfill or transformation facilities by 2000, and established a statewide diversion of 75% by 2020 for all municipal solid waste. The CIWMA also required each County to prepare a Countywide Integrated Waste Management Plan (CoIWMP), which is the main planning document for solid waste management in each County. Humboldt County's CoIWMP is the principal planning document for solid waste management in the county, addressing source reduction, household hazardous waste, and countywide landfill capacity needs.

Local

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate utilities include the following:

IS-P16. Water and Wastewater System Capital Improvement Programs

Support the efforts of service providers to develop and maintain capital improvement programs for construction of water and wastewater systems.

IS-P17. On-site Sewage Disposal Requirements

Maintain regulations governing construction and maintenance of on-site sewage disposal systems to protect health and safety and to reflect changes in state law and advances in treatment technologies. Recognize and allow the use of alternative onsite sewage disposal systems that meet state standards.

WM-G1. Comprehensive System.

A flexible system for the management of solid wastes and waste resources on a countywide basis, which encompasses storage, collection, separation, processing, reduction, reuse and repair, recycling, recovery, marketing, and, when necessary, landfill disposal.

WM-G3. Reduce Waste Toxicity.

A low toxicity waste stream that reduces risk of exposure to residents, solid waste and recycling industry workers, and the environment.

WR-P28. Conservation and Re-use Strategy.

Promote the use of water conservation and re-use as a strategy to lower the cost, minimize energy consumption, and maximize the overall efficiency and capacity of public and private water systems. Encourage the installation of water storage, rain catchment and graywater systems to support domestic and outdoor water needs. Encourage and support conservation for agricultural activities that increase the efficiency of water use for crop irrigation and livestock. Support the use of treated water for irrigation, landscaping, parks, public facilities, and other appropriate uses and coordinate with cities and other wastewater treatment entities in planning uses and minimizing impacts for treated water in unincorporated areas. Avoid water reuse that could adversely affect the quality of groundwater or surface water.

Orick Community Plan

OCP-P18. Extension of Community Water

The Orick Community Services District shall retain discretion to extend or not extend community water service to the rural portion of the Planning Area. The District may approve extension of such service subject to any requirements that it may adopt and to the following guidelines:

- To areas designated as Timberlands, no extension of community water systems shall be permitted;
- To areas designated as Agriculture Exclusive and Residential Agriculture: the extension must be an emergency response to the failure on an existing system; and, the capacity of the extension shall be limited to a size adequate to meet the existing residential requirements;

- No extension shall be permitted to serve uses that are clearly inconsistent with the Land Use Designation; and
- To areas designated as Residential Estates: community water systems may be provided to meet existing and planned residential development.

Impact Analysis

a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electrical power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects? (No Impact)

The Project includes the installation of a new domestic well, and potential additional wells, wastewater treatment system, stormwater retention basins and electrical power. Two complementary ways to provide electrical service to the site are currently envisioned, consisting of PG&E service and, if feasible, a grid-tied photovoltaic system (discussed in Section 2.6.1). PG&E service will be delivered by removing existing overhead lines to the site and installing new overhead service lines south along Highway 101 and east along Bald Hills Road, to the south side of the site. Power lines within the Project Area will be buried. The telecommunication provider is unknown at this point, however it will likely be served by a local internet provider and will include minor equipment.

The proposed domestic well will source water from a deep, confined aquifer and is anticipated to meet average daily water use of approximately 750 gpd (SHN 2018), which is a sustainable amount based upon the 23 gallons per minute pumping rate analyzed in the LACO (2011a) investigation. The onsite wastewater treatment system and leach fields will be designed to meet NCRWQCB and Humboldt County standards, as stated in the Humboldt County Onsite Wastewater Regulations and Technical Manual (Nov 2017), and as described in Section 4.10 – Hydrology and Water Quality. Electrical power may involve trenching within the Project Area and will not disturb sensitive habitats. If photovoltaic panels are utilized, they will be located on the roof of the Visitor Center and installation of the panels will not cause a significant environmental effect as described in Section 4.1 – Aesthetics. The propane tanks will be located in the utilities area and will be stored and maintained in accordance with the manufacturer’s recommendations. All of the Project utilities will be installed in the utilities area which is located outside of the 100-year floodplain. Proposed utilities will be maintained in accordance with all rules and regulations, therefore installation of utilities will not cause significant environmental effects. **No impact** will occur.

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years? (Less than Significant Impact)

As described in question (b) of Section 4.10 – Hydrology and Water Quality, the Project will source potable water from a well to be treated onsite. The well will be drilled to the approximate same depth (118 feet) of the existing well onsite. This depth accesses water from a partially to fully confined aquifer (LACO 2010 and 2011b). The proposed domestic well is located outside of the cone of influence of the existing well, and therefore it is expected that when the proposed primary domestic well and existing well are utilized at the same time, it will continue to result in less than one foot drawdown over 24 hours. Based on the investigations of the aquifers beneath the Project Area and pumping rate testing, water supply will be sufficient to serve the Project. Therefore, a **less than significant impact** will occur.

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? (Less than Significant Impact)

An onsite wastewater treatment system and leach field are proposed for installation in the Visitor Center development footprint. Detailed feasibility studies were conducted by LACO to determine the appropriate location for the wastewater system based upon soil suitability and depth to groundwater, which was determined by soil borings and monitoring wells (LACO 2010, LACO 2011b). Based upon the LACO 2010 and 2011b reports, subsurface disposal of pre-treated wastewater is feasible in the southwesterly portion of the Orick Mill foundation (LACO 2011b). The onsite wastewater treatment system and leach fields will be designed to meet NCRWQCB and Humboldt County standards, as stated in the Humboldt County Onsite Wastewater Regulations and Technical Manual (Nov 2017). The wastewater treatment system and leach fields will also adhere to permit conditions required by the RWQCB and will include permanent monitoring wells, periodic groundwater monitoring to verify adequate treatment of effluent, and a waste discharge permit (LACO 2010). The wastewater treatment system and leach fields are designed to serve the Project's expected demand, and will have adequate capacity. Therefore, a **less than significant impact** will occur.

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? (No Impact)

The Project will not generate solid waste in excess of state or local standards, will offer recycling bins and will utilize recycling services. All solid waste generated during operation of the Project will be sorted in order to recycle materials appropriately. **No impact** will occur.

e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste? (No Impact)

The Project will contain trash bins onsite that are separated into landfill-bound items and recyclable items. No toxic waste will be generated from construction or operation of the Project. The Project will not conflict with state or local management statutes and regulations due to the incorporation of recycling, and absence of toxic waste. **No impact** will occur.

An analysis of potential cumulative impacts on utilities and service systems from implementation of the Project is considered in Section 4.21 – Mandatory Findings of Significance.

4.20 Wildfire

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?				✓
b) Due to slope, prevailing winds, and other factors, 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?				✓

Evaluation Criteria	Significance Thresholds	Sources
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones:		
Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?	Result in the inability to carry out the Humboldt County Emergency Operations Plan, Humboldt County Community Wildfire Protection Plan or the Redwood National Park Fire Management Plan	CEQA Guidelines Appendix G, Checklist Item XX (a) Humboldt County Emergency Operations Plan Humboldt County Community Wildfire Protection Plan Redwood National Park Fire Management Plan

Evaluation Criteria	Significance Thresholds	Sources
Would the project due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	Placement of pollutant materials within an area vulnerable to prevailing winds, or upslope of project occupants	CEQA Guidelines Appendix G, Checklist Item XX (b)
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?	Installation or maintenance of infrastructure that could exacerbate fire risk	CEQA Guidelines Appendix G, Checklist Item XX (c)
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?	Substantial modifications to the drainage and downslope pathway existing the Project Area.	CEQA Guidelines Appendix G, Checklist Item XX (d)

This Section evaluates the potential wildfire impacts resulting from construction and operation of the Project against significance thresholds derived from applicable local, state or federal policies, or from Appendix G of the CEQA Guidelines.

Environmental Setting

For the purpose of this Section, the study area includes the Project Area and adjoining properties that could feasibly be impacted should a wildfire occur within the Project Area. The Project Area is located within a State Responsibility Area (SRA) and is therefore within the service area of the California Department of Forestry and Fire Protection (Cal Fire). Community fire protection services in Orick, located south of the Project Area, are provided through the Orick Community Services District by the Orick Volunteer Fire Department (OVFD). Wildland fire protection services are provided by Cal Fire within the SRA, and the NPS within the Federal Responsibility Area (FRA). The study area is mostly located within the SRA, however the portion of the Project Area which encroaches into RNSP property is considered within the FRA. The study area contains both “moderate” and “high” SRA-ranked fire hazard severity classes (Cal Fire 2007). See Figure 4.20-1- Wildfire Responsibility Areas for a map of the Project Area in relation to wildfire responsibility areas, and SRA-ranked fire hazard areas. There have been no know significant wildfires in the Project vicinity in recent history.

A wildfire is a non-structural fire that occurs in vegetative fuels, excluding prescribed fire. Wildfires can occur in undeveloped areas and spread to urban areas where the landscape and structures are not designed and maintained to avoid sparking fire. A wildland-urban interface is an area where development is located in proximity to areas prone to wildland fire. More specifically, the wildland-urban interface exists when a certain set of conditions are present. The National Fire Protection Agency states that these conditions include, but are not limited to, the amount, type, and distribution of vegetation; the flammability of structures in the area, and their proximity to fire-prone vegetation and to other combustible structures, weather patterns and general climate conditions, topography, hydrology, and average lot size (NFPA 2009).

Vegetation acts as the main source of fuel for a potential wildfire. Areas with limited vegetation have a lower risk for wildfires to occur, therefore areas near open spaces may be more likely to experience a wildfire. Climate conditions such as wind, temperature, and humidity are all factors generally used to predict fire behavior. Wind increases flammability of fuels by removing moisture through evaporation. During a wildfire, wind can carry embers, increasing the fire’s range. Higher temperatures and low humidity are also indicative of higher fire risk, increasing flammability of vegetation. Topographic features such as slope, as well as overall form of the land effects fire behavior, specifically its intensity, direction, and rate of spread. Fires in flat or gently sloping areas tend to burn slower. Existing hydrology can also have an impact, as streams and rivers tend to channel winds, which can accelerate the fire’s speed and direction. The presence of large hydrological features tends to increase humidity and can make it more resistant to the effects of fire (Humboldt County 2019a).

Regulatory Setting

Federal

The federal government is responsible for responding to wildfires that are on federal lands. The Department of the Interior (DOI) manages wildfire response for more than 400 million acres of national parks, wildlife refuges and preserves, other public lands and Indian reservations. The U.S. Forest Service (USFS) carries out wildfire management and response across the 193 million acres of the National Forest System.

Redwood National and State Parks Fire Management Plan

The RNSP Fire Management Plan (FMP) provides the NPS with operational guidance used to safely manage wildfire in RNSP while protecting park resources and human life and property. Fire management includes all activities undertaken to prevent, control, suppress, and utilize fire for protection of human safety, personal property, and irreplaceable natural and cultural resources. One of the primary purposes of the FMP is to develop an overall approach to fire management that focuses on the safety of firefighters and the public. To reduce threats from wildfire to property and resources, hazardous fuel buildups should be reduced around park buildings and in areas where fire could either enter the parks or move beyond park boundaries, suppression tools such as water sources should be identified and developed, and tactics need to be planned for safe and efficient actions in case of wildfire (NPS 2010).

RNSP is a “service first” organization and by agreement, works with the Six Rivers National Forest (SRNF) to protect both federal and state lands, also called direct protection areas (Humboldt County 2019a). RNP and SRNF operate as one fire management organization, supporting each unit’s fire and land management objectives.

Fire management activities in RNSP include suppression of wildfires, prescribed fire, mechanical fuel reduction, fire ecology and fire effects monitoring, and fire operations planning. A major purpose of fire management in national parks is to preserve and restore natural and cultural resources that evolved in the presence of fire. The FMP describes the major actions that will be taken to prepare for wildfires, to reduce the threat of wildfires to park resources, and to prepare for the use of fire to restore ecological conditions and cultural practices that have created the modern landscape of the parks. Despite these goals and any imminent threat to resources from wildfire, protecting human life and safety are the highest priority of all fire management actions. Protecting park resources and park and private property are secondary priorities to protecting human life and safety.

State

California Department of Forestry and Fire Protection (Cal Fire)

Cal Fire protects the people of California from fires, responds to emergencies, and protects and enhances forest, range, and watershed values providing social, economic, and environmental benefits to rural and urban citizens. Cal Fire responded to 310 wildfire incidents in 2018, which burned a total of 1,618,033 acres, and 436 wildfire incidents in 2017, which burned a total of 1,566,344 acres (Cal Fire 2019).

Pursuant to Public Resources Code (PRC) Sections 4201-4204 and Government Code Sections 51175-89, Cal Fire has created Fire Hazard Severity Zone (FHSZ) maps for the state that identify areas that are within state or local responsibility areas for preventing or suppressing fires. These maps identify areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. The FHSZ zones then define the application of various mitigation strategies to reduce risks associated with wildland fires. SRAs were originally mapped by Cal Fire in 1985 and LRAs in 1996. Within SRAs, the Director of Cal Fire has designated areas as moderate, high and very high fire hazard severity zones. (PRC Section 4202.) Outside of SRAs, but within LRAs the Director of Cal Fire was charged with recommending the locations of very high fire hazard severity zones (VHFHSZ). (Government Code Section 51178.) See Figure 4.20-1 for a map of responsibility areas in the Project vicinity.

State of California Emergency Response Plan

California has developed the State of California Emergency Response Plan to coordinate emergency services provided by federal, state, and local government agencies. The plan is administered by the State Office of Emergency Services (OES), which coordinates the responses of other agencies such as local fire and police agencies, emergency medical providers, California Highway Patrol (CHP), the CDFW and Caltrans (CGOES 2017).

California Public Resources Code

The California Public Resources Code (PRC) sets forth fire safety regulations that include the following:

- Earthmoving and portable equipment with internal combustion engines must be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (PRC Section 4442).
- On days when a burning permit is required, flammable materials must be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor must maintain the appropriate fire suppression equipment (PRC Section 4427).
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines must not be used within 25 feet of any flammable materials (PRC Section 4431).

Local

Humboldt County Emergency Operation Plan

The Humboldt County Emergency Operation Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies in or affecting Humboldt County (Humboldt County 2015). The Federal Emergency Management Agency (FEMA) approved the Humboldt Operational Area Hazard

Mitigation Plan on March 20, 2014. The EOP addresses integration and coordination with other governmental levels when required. The EOP accomplishes the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting Humboldt County.
- Identifies the policies, responsibilities, and procedures required to protect the health and safety of Humboldt County communities, public and private property, and the environmental effects of natural and technological emergencies and disasters.
- Establishes the operational concepts and procedures associated with field response to emergencies, County Emergency Operations Center (EOC) activities, and the recovery process.

Humboldt County Community Wildfire Protection Plan

The Humboldt County Community Wildfire Protection Plan (CWPP) serves as the guiding document for the work of the Humboldt County Fire Safe Council. It is a planning tool to help secure funding for numerous projects that have helped residents and community groups prepare for the impacts of wildfire. The CWPP contains six goal areas:

1. Wildfire Ignition Prevention: Reduce human-caused wildfire ignitions;
2. Wildfire Preparedness: Increase community resilience and adaptation to wildfire;
3. Disaster Preparedness: Increase resident's ability to effectively prepare for and survive wildfire;
4. Fire Protection: Support fire protection for people, property, communities, and natural resources;
5. Restoration of Beneficial Fire: Restore beneficial fire at the landscape level;
6. Integrated Planning: Maximize integration of planning efforts to improve community; and ecosystem resilience to wildfire.

The CWPP breaks the county down into 14 planning units in order to gain community feedback and to create individual plans relevant to the particular community, of which the Orick-Redwood Park is a planning unit. This unit is dominated by publicly owned park land and industrial timberland. The Orick-Redwood Park Planning Unit Action Plan (Plan) identifies: community assets and values at risk, the wildfire environment, fire protection capabilities, evacuation, community preparedness, wildfire prevention plans, community identified potential projects, and an action plan. The Plan states that evacuation routes within the Orick-Redwood Park Planning Unit will depend on the location of the community at risk and law enforcement recommendations based on fire behavior, wind patterns, traffic, and ingress of emergency vehicles (Humboldt County 2019a). Generally, evacuation from within this unit will take place traveling either north or south along Highway 101. Bald Hills Road, an east-west roadway, located near the study area, is another access route to be utilized for evacuation if necessary.

A Fire Safe Council (FSC) is a public and private organization that comprise a council intended to minimize the potential for wildfire damage to communities and homeowners, while also protecting the health of natural resources. The Firewise Communities/USA Recognition Program teaches people living in the Wildland Urban Interface (WUI) how to adapt to living with wildfire by preparing for a fire before it occurs. This program empowers communities with tools and resources for reducing their wildfire risk and encourages neighbors to work together to take action to minimize losses from wildfire. In 2002, the Humboldt County Board of Supervisors formed the Humboldt County FSC, which produced the CWPP discussed above (Humboldt County 2019b). No local fire safe councils (FSC) or recognized Firewise communities exist within the Orick-Redwood Park Planning Unit.

Humboldt County General Plan

The goals and policies within the Humboldt County General Plan that regulate wildfire include the following:

S-G4. Fire Risk and Loss

Development designed to reduce the risk of structural and wildland fires supported by fire protection services that minimize the potential for loss of life, property, and natural resources.

S-P1. Reduce the Potential for Loss

Plan land uses and regulate new development to reduce the potential for loss of life, injury, property damage, and economic and social dislocations resulting from natural and manmade hazards, including but not limited to, steep slopes, unstable soils areas, active earthquake faults, wildland fire risk areas, airport influence areas, military operating areas, flood plains, and tsunami run-up areas.

S-P17. Joint Planning and Implementation

The County shall plan collaboratively with local fire agencies and companies, Cal Fire, and federal fire organizations on countywide fire prevention and response strategies. Implementation shall be coordinated to maximize efficiency and ensure efforts are complimentary.

S-P19. Conformance with State Responsibility Areas (SRA) Fire Safe Regulations

Development shall conform to Humboldt County SRA Fire Safe Regulations.

S-P22. Prescribed Burning

Encourage the use of prescribed burning as a management tool for hazardous fuels reduction, timber management purposes, livestock production, and enhancement of wildlife habitat.

S-P23. Hazardous Fuel Reduction

Encourage land management activities that result in the reduction of hazardous fuels and also support timber management, livestock production, and the enhancement of wildlife habitat, through the use of prescribed burning, hand or mechanical methods, firewise plants, biomass utilization, and animal grazing.

S-P24. Fire Safe Education

Expand fire prevention and mitigation education capacity in the county.

RL-P4. Fire Safety Hazards

Support implementation of State Responsibility Area Fire Safe Standards and Wildland-Urban Interface Building Codes for new development and voluntary programs for fuels reduction, dwelling fire protection and creation of defensible space for existing development.

Impact Analysis

a) Substantially impair an adopted emergency response plan or emergency evacuation plan? (No Impact)

The Project will be subject to the 2015 Humboldt County Emergency Operation Plan (EOP), the 2019 Humboldt County Community Wildfire Protection Plan (CWPP), and the 2010 Redwood National Fire Management Plan (FMP).

The study area is undeveloped, with the exception of pavement on the former Mill Site and along the Lower Road and Upper Road. The study area is uninhabited and the Project does not propose to construct habitable structures. The northwestern segment of the Lower Road, which intersects with Highway 101, will intentionally remain a useable road in order to provide emergency access into and out of the Project Area. The additional proposed roads, parking areas, and trail improvements associated with the Project, particularly the Lower Road, can potentially aid in emergency response access to and evacuation from the Project Area if the primary entrance/exit is compromised or unable to be used. The Lower Road, from approximately 375 feet north of the Canopy Walkway to the Visitor Center, will be converted to an ADA accessible trail. The Lower Road trail will be accessible for emergency vehicles.

According to the CWPP, Highway 101 is a general evacuation route. The Project is anticipated to increase the amount of people in the Orick vicinity which has the potential to cause congestion on Highway 101 during an evacuation. If the increase in public usage within the study area were to cause congestion during a wildfire, a car accident or other accident may block access into and out of the study area. However, road improvements are proposed at the intersection of Bald Hills Road and Highway 101 to offset congestion and accommodate the projected increase in users of the site, which is discussed in Section 4.17 – Transportation. Therefore, ingress and egress out of the study area would be accommodated during an evacuation.

Construction and operation of the Project will not impair implementation of or physically interfere with the adopted EOP, CWPP, FMP, or the ability of the local Orick community to create an FSC or become a Firewise community because the Project will provide emergency access routes and will not restrict or remove the use of current evacuation routes, will conduct routine vegetation management in order to reduce hazardous fuels in accordance with the RNSP Vegetation Management Plan (following transfer of the property to RNSP), and will contain fire water storage tanks and infrastructure to provide water to combat a fire should the situation arise (as described in Section 2.6.1 – Visitor Center). Therefore, the proposed Project will not impair an adopted emergency response or evacuation plan, and **no impact** will occur.

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire? (No Impact)

The Project will not substantially alter the site's topography. Rather Project earthwork will modify elevations in order to mimic and/or restore what once existed in the Project Area before the Mill Site and extensive logging took place decades ago and to ensure significant infrastructure will not be flooded. Areas of earthwork are predominantly located in non-forested areas, except for the proposed ERA which is discussed below, and Libby Creek Enhancement. Areas of earthwork that border forested areas include the CCT. Vegetation removal associated with the Prairie Creek Restoration Area, Lower Road trail building, and the Southern Ditch Widening areas are not adjacent to contiguous forest. Earthwork will predominantly take place in the asphalt and concrete footprint of the former Mill Site, within the open grassland surrounding Prairie Creek, along the paved Upper Road, within the previously disturbed Yurok Demonstration Site and minimally at the Canopy Walkway (located along the Upper Road and Lower Road). The earthwork associated with these activities will not significantly modify slope, therefore topographical conditions are not anticipated to exacerbate wildfire risks beyond current conditions.

The ERA will serve as a stormwater management area and native vegetation enhancement area. Project activities include the removal of approximately 100 trees, the addition of and re-contouring of earthen fill material, and revegetation efforts. Earthwork will temporarily fill a drainage ditch, which will subsequently be excavated and reestablished in approximately the same location as a drainage swale flowing towards the southeastern corner of the Project Area, to adjoin the Southern Drainage Ditch as it currently does. Construction and operation of the ERA will not cause a significant alteration in topography, will not modify prevailing winds or other factors, which could exacerbate wildfire. The vegetation removal associated with the ERA will actually benefit wildfire risk as the removal of trees and the understory ladder fuels, will be replanted with similar native vegetation which will initially lack the development of understory vegetation which can act as “ladder fuels” to spread fire up to the crowns of trees. Construction and operation of Libby Creek will involve grading around Libby Creek in order to restore streamflow in this area. This Project component will have no effect on wildfire.

The construction of the Visitor Center, proposed to be located within the northern portion of the former Mill Site at approximately ten to fifteen feet higher than the current elevation, may improve wind conditions during a wildfire as compared to current conditions. Currently, there is no infrastructure besides pavement and concrete within the study area. The former Mill Site is a flat, empty, paved 20 acre area, with no infrastructure in place to block or deflect winds. The construction of the Visitor Center has the potential to act as a wind break in this area which would deflect winds, and reduce the momentum of wind movement which could discourage the spread of wildfire within the study area.

Earthwork and grading will occur on a portion of the CCT trail. The final grade will be at or less than five percent for the ADA-compliant section (which is expected to span between the Visitor Center and the Canopy Walkway). During Project operation, the CCT will retain access for emergency vehicles, thereby improving safety to Project users of wildfire risks. Construction and operation of the CCT will not affect wildfire risk.

The Project will result in an increase in visitors utilizing the Project Area, located adjacent to a forested area which has the intrinsic potential for wildfire. However, construction and operation of the Project will not cause substantial topographical modifications to forest land, will improve drainage within the edge of forest land, will remove hazardous ladder fuel and may reduce wind speeds within the study area, and therefore will not exacerbate wildfire risks. Project occupants will not be exposed to pollutant concentrations from a wildfire or uncontrolled spread of a wildfire beyond the conditions that currently exist. Therefore **no impact** will occur.

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? (No Impact)

The Project will install an access road, three parking lots and a series of trails to support automobile and pedestrian circulation within the study area. Minimal maintenance is anticipated to be required for the proposed access road and parking lots, and will consist of clearing downed vegetation, leaves and other debris from stormwater drainage pathways and across roadways and trails. The largest and most extensive proposed trail is the CCT, portions of which will be built in accordance with ADA requirements and up to State Coastal Conservancy trail standards. The CCT is proposed to be approximately 12 feet wide and located along the existing Upper Road, which is currently paved. The CCT will be accessible by emergency vehicles if necessary. Routine maintenance and vegetation clearing is anticipated to be necessary along the remaining Lower Road and CCT in order to retain emergency access should it be necessary. This maintenance is a component of the Project, and additional maintenance is not anticipated to be necessary.

Other infrastructure proposed in the Project includes the Visitor Center, Canopy Walkway, and Yurok Demonstration Site, and the utilities necessary to support the Project. Electricity will be delivered to the Project Area. Any electrical transmission lines within the Project Area will be buried and therefore will not come into contact with above ground vegetation, which will avoid a wildlife ignition risk.

The Project is anticipated to attract thousands of visitors to the site annually. The proposed access road, parking lots and CCT, and existing Lower Road, will be maintained regularly and therefore will not adversely affect emergency access or exacerbate fire risk. **No impact** will occur.

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? (No Impact)

The Project is anticipated to draw visitors from around the world to experience RNSP. If a wildfire affected the slopes near the Project site, the safety of the Visitor Center, trails and other public areas would be monitored prior to allowing re-entry onto the Project site. As stated above in questions (b) (c) and (d), the Project will not exacerbate fire risk above and beyond the current risk. Implementation of the Project will actually reduce fire risk due to the vegetation modifications in the ERA and Southern Drainage Ditch areas, and due to the net increase in wetlands. Therefore because the Project will have no impact on wildfire risk above and beyond current conditions, implementation of the Project will not expose people or structures to significant risks including downslope flooding or landslides, slope instability or drainage changes above and beyond the current conditions. **No impact** will occur.

An analysis of potential cumulative impacts on wildfire from implementation of the Project was not conducted because the Project will yield no impact to wildfire.

4.21 Mandatory Findings of Significance

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	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 projects, the effects of other current projects, and the effects of probable future projects)?		✓		
c) Does the project have environmental effects which would cause substantial adverse effects on human beings, either directly or indirectly?		✓		

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 Impact)

Construction and operation of the Project will improve the quality of the environment as compared to existing conditions. The Project will improve instream aquatic habitat quality, quantity, and duration in Prairie Creek and Libby Creek for ESA-listed Coho Salmon and other anadromous salmonids. Removal of 16 acres of impervious material, which will be partially replaced with stormwater retention basins, will improve groundwater connectivity and recharge and surface water quality. A world-class Visitor Center will educate visitors about the significance of the local environment. Although potential impacts to Sensitive Natural Communities will occur, these communities will be replanted at a minimum one to one ratio in accordance with Mitigation Measure BIO-28 (Offset Impacts to Sensitive Natural Communities). The Prairie Creek riparian corridor will expand significantly and be fully integrated into the hydrodynamic channel restoration design for Prairie Creek. Riparian restoration will provide a substantial increase in stream shading, long-term large wood recruitment, improved geofluvial function, enhanced groundwater connectivity, and high quality wildlife habitat. In total, the

Project will result in a net gain of vegetation compared to existing conditions. The Project Area will become a destination for visitors to experience redwood ecology via the CCT, a restored stream channel, and a world-class Visitor Center. Although the Project will have temporary construction impacts to wetlands, wildlife, vegetation, air quality, energy resources, hazardous materials, hydrology, noise, and transportation, and potential impacts to cultural and paleontological resources, these impacts will be reduced to a less than significant level with implementation of the following Mitigation Measures:

- AQ-1: BMPs to Reduce Air Pollution;
- BIO-1: Worker Environmental Awareness Program (WEAP);
- BIO-2: Avoidance of Northern Red-legged Frogs;
- BIO-3: Avoidance of Stream-dwelling Amphibians;
- BIO-4: Avoidance of Western Pond Turtles;
- BIO-5: Seasonal Work Windows;
- BIO-6: Native Aquatic Species Relocation;
- BIO-7: Dewatering;
- BIO-8: Nesting Birds;
- BIO-9: Special-status Bats;
- BIO-10: Limitations to Use of Construction Equipment During Northern Spotted Owl and Marbled Murrelet Nesting Season;
- BIO-11: Limitations to Overnight Excavation Areas;
- BIO-12: Removal of Trash;
- BIO-13: Pre-construction Mapping and Treatment of Invasive Species;
- BIO-14: Treatment of Invasive Species During Construction;
- BIO-15: Manage Herbicide Control and Minimize Spill Risk;
- BIO-16: Accidents Associated with Release of Chemicals and Motor Fuel;
- BIO-17: Interpretive Signage at Key Visitor Access Points;
- BIO-18: Interpretive Brochures;
- BIO-19: Social Media;
- BIO-20: Interpretive Staff;
- BIO-21: Law Enforcement;
- BIO-22: Facility Management;
- BIO-23: Noise Control Within Two Hours of Sunrise and Sunset at the Yurok Demonstration Site;
- BIO-24: Treatment of Invasive Species Post Construction;
- BIO-25: Pre-construction Botanical Surveys;
- BIO-26: Mitigate Temporary and Short-term Impacts to Wetlands and other Waters of the U.S. Through Construction Minimization and Avoidance Measures;

- BIO-27: Protection to Designated Sitka Spruce Forest Area;
- BIO-28: Offset Impacts to Sensitive Natural Communities;
- CR-1: Worker Cultural Awareness Training;
- CR-2: Protect Archaeological Resources During Construction Activities;
- CR-3: Protect Human Remains if Encountered During Construction;
- GEO-1: Protect Paleontological Resources During Construction;
- HYD-1: Implementation of Design that will Not Increase Flood Levels;
- NOI-1: BMPs to Reduce Noise Impacts; and
- TR-1: Safety Measures for the Highway 101/Bald Hills Road Intersection

Environmental Protection Measures include:

- Environmental Protection Action 1: Implement Geotechnical Design Recommendations;
- Environmental Protection Action 2: Stormwater Pollution Prevention Plan (SWPPP); and
- Environmental Protection Action 3: Construction BMPs

With incorporation of the mitigation measures and environmental protection actions listed above, impacts will be reduced to a less than significant level. Operation of the Project will not substantially degrade the quality of the environment. The Project will benefit special status and endangered animal species and will not result in a barrier to migration or other impact that will be beneficial to the ecology of the Project Area. The Project will significantly enhance the quality of the environment. The impacts will be **less than significant with mitigation**.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)? (Less than Significant Impact with Mitigation)

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The cumulative impact analysis in this ISMND uses the list approach. As stated in Section 2.9 – Cumulative Impact Projects, Humboldt County, Del Norte County, Caltrans and the NPS were contacted to discuss nearby projects that may, in addition to the proposed Project, cause a cumulative environmental impact. See Table 2-1 – Projects Considered for Cumulative Impacts for the list of projects considered in the cumulative impact analysis.

As summarized in Chapter 4 of this ISMND, the Project will not result in impacts on land use and planning, mineral resources, and utilities and service systems. Therefore, implementation of the Project will not contribute to related cumulative impacts in these three categories.

An analysis of potential cumulative impacts on aesthetics, agriculture and forest resources, air quality, biological resources, cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, recreation, transportation, tribal cultural resources and wildfire is provided below.

Aesthetics

As discussed in Section 4.1 – Aesthetics , the Project will have less than significant short-term impacts on the existing visual character of Project Area visible from Highway 101 during construction due to the occurrence of construction activities and the presence of staging areas.

The proposed Centennial Grove Trail & Berry Glen Connector Trail will intersect the proposed CCT and therefore will necessitate the use of heavy machinery at least partially within the Project Area. The CCT is not visible from Highway 101, and therefore use of heavy equipment in this area will not be visible by motorists on Highway 101. Machinery to complete the Centennial Trail & Berry Glen Connector Trail may potentially be temporarily staged in areas visible from Highway 101. Because of the lack of visual accessibility from Highway 101 to the Centennial Grove Trail & Berry Glen Connector Trail, the Project will not result in a considerable contribution to a significant cumulative impact relative to visual character within the Project Area. No other project included in Table 2.1 will result in a potential cumulative visual impact to Project Area.

The proposed Project is located adjacent to existing RNSP properties, which include unique old growth redwood forest and other public trust resources. For decades, RNSP and their partners have engaged in a landscape scale, programmatic effort to manage and restore watersheds within and near the parks that were formerly managed as industrial timber properties, resulting in significant legacy impacts to forest ecology and stream habitats, ESA-listed fish and wildlife species, and water quality, among others. Projects included in Table 2.1 also relate to restoring and enhancing the public trust resources within and near RNSP. Cumulatively, and in concert with the proposed Project, these efforts constitute the next phase of landscape-scale restoration along California’s northern redwood coast to address remaining legacy impacts of prior timber harvest, antiquated road networks, former mill sites, and related development. Combined, these efforts will further benefit the public and the environment by promoting environmental education and stewardship and protecting the ecology of RNSP for future generations, consistent with the mission and goals of these public resource management agencies. Cumulative construction-related and operational aesthetics impacts will be less than significant.

Agriculture and Forest Resources

As discussed in Section 4.2 – Agriculture and Forest Resources, the Project will have a less than significant impact to forest land during construction due to the removal (and replacement) of trees and shrubs, and a less than significant impact to agricultural resources during Project construction and operation due to the location of earthwork in an area that contains a small (21.9 acres) area of prime agricultural land (per PRC Section 21060.1(b) definition). No projects exist in the Project vicinity that are currently occurring or are proposed that would affect or impact agriculture resources; therefore the Project will not contribute to a cumulative impact to agriculture resources.

Two projects in the vicinity include improvements to forest health: the Greater Prairie Creek Ecosystem Restoration Project and the Mill Creek Ecosystem Restoration Project. Both Projects are in the planning phase and managed by Redwoods Rising. Both projects include forest thinning, fuels reduction, multi-story canopy development, removing or maintaining roads, and conducting instream habitat enhancements such as the installation of large wood into waterways to benefit fish. An additional project in the vicinity, the Lower B500 Road Removal Project, located approximately five miles north of the Project Area, includes the decommissioning of an abandoned road and improvements to drainage features.

The three projects in the vicinity of the Project will improve forest health and help to promote late-seral habitat forest features through forest thinning and road removal. Because of the benefits to forest resources from implementation of the three projects, the Project will not have a considerable contribution to a significant cumulative impact relative to forest resources within the Project Area. The cumulative impact resulting from the Project will be less than significant.

Air Quality, Greenhouse Gas Emissions and Energy

By their nature, air pollution, greenhouse gas emissions and energy usage are largely cumulative impacts. As discussed in Section 4.3 – Air Quality, with incorporation of Mitigation Measure AQ-1, the Project will not conflict with or obstruct applicable air quality plans or exceed BAAQMD thresholds of significance for criteria air pollutants. A project that will not exceed the BAAQMD thresholds of significance on a project level also will not be considered to result in a cumulatively considerable contribution to these regional air quality impacts. This impact will be cumulatively less than significant.

As described in Section 4.8 – Greenhouse Gas Emissions and specifically in Table 4.8-2, any increases in Project-related greenhouse gas emissions will not impede the state in meeting Assembly Bill 32 (AB 32) greenhouse gas reduction goals. Therefore, the Project's contribution to cumulative greenhouse gas impacts will not be cumulatively considerable, and therefore will be less than significant.

As discussed in Section 4.6 – Energy, construction will not encourage activities that will result in the use of large amounts of fuel and energy in a wasteful manner. Operation of the Project will utilize fuels for routine site maintenance, however, it will not utilize a substantial amount of fuel regularly. The Visitor Center is designed to capture passive energy including light and heat. The Project will include a transit bus to shuttle visitors from the Visitor Center to other RNSP locations, and will be an available stopping point on the local Redwood Transit Service line. Therefore, the Project's contribution to cumulative energy impacts will not be cumulatively considerable, and therefore will be less than significant.

Biological Resources

As discussed in Section 4.4 – Biological Resources, the Project has the potential to impact fish, amphibians, reptiles, nesting birds, bats, mammals, riparian vegetation, wetlands, Sensitive Natural Communities and trees. These potential impacts include temporary harassment, temporary disturbance of habitat, and incidental take caused by earthwork near waterways, removal of vegetation, movement of construction equipment, and filling of wetlands. These potential impacts will be reduced to a less-than-significant level with implementation of Mitigation Measures BIO-1 through BIO-28 listed above. The following projects listed in Table 2-1, are expected to cause potential impacts to biological resources: Redwoods Rising: Greater Prairie Creek Ecosystem Restoration Project; Redwoods Rising Mill Creek Ecosystem Restoration Project; Lower B500 Road Removal Project; Little Lost Man Creek Bridge – Fish Passage Improvement Project; Proposed Centennial Grove Trail and Berry Glen Connector Trail; and the RP-5 Road Improvement Project. Each project and the biological resources they may potentially effect is further discussed below.

The Redwoods Rising Prairie Creek Ecosystem Restoration Project includes watershed restoration activities within the Prairie Creek watershed such as forest thinning, road removal and augmenting riparian corridors. The project is located north and upstream of the Project discussed in this ISMND. These project activities have the potential to adversely impact fish through temporary increases in turbidity and sediment from the road removal earth work; amphibians, reptiles, nesting birds, bats and mammals through inadvertent crushing or other take resulting from use and movement of equipment and temporary habitat loss; and impacts to riparian vegetation, wetlands, Sensitive Natural Communities and trees due to forest thinning, movement of equipment, and habitat modification. Although this project will likely have potential adverse impacts to biological resources, mitigation measures will be required to address these impacts. In addition, this project will result in long-term habitat and ecological benefits. Incorporation of Mitigation Measures BIO 1 through 28 into the Project discussed in this ISMND will reduce adverse impacts to the biological resources stated above to a less than significant level. However, the Prairie Creek Restoration component of the Project will increase the potential for onsite erosion in the short term during and following construction before riparian vegetation becomes established. In conjunction with the Redwoods Rising Prairie Creek Ecosystem Restoration Project this increase in erosion potential may have a cumulative impact to water quality and fish. Both projects will be required to implement mitigation measures pursuant to CEQA and will be required to comply with Section 401 permits as appropriate. Therefore no additional mitigation is proposed.

The Redwoods Rising Mill Creek Ecosystem Restoration Project, which is not located in the Prairie Creek watershed, includes watershed restoration activities within the Mill Creek watershed located in Del Norte County, approximately 33 miles north of the Project Area. Activities include forest thinning, road removal and instream habitat improvements which have the potential to adversely impact fish through temporary increases in turbidity and sediment from the road removal earth work and instream habitat enhancement work; amphibians, reptiles, nesting birds, bats and mammals through inadvertent crushing or other take resulting from use and movement of equipment and temporary habitat loss; and impacts to riparian vegetation, wetlands, Sensitive Natural Communities and trees due to forest thinning, movement of equipment, and habitat modification. However, similar to the proposed Project, the Redwoods Rising Mill Creek Ecosystem Restoration Project will result in long-term habitat and ecological benefits. Impacts to fish, amphibians, reptiles, nesting birds, bats, mammals, riparian vegetation, wetlands, Sensitive Natural Communities and trees from the Project discussed in this ISMND and the Redwoods Rising Mill Creek project are not considered cumulatively significant because both projects will be required to implement mitigation measures pursuant to CEQA and will be required to comply with Section 401 permits as appropriate. Therefore no additional mitigation is proposed.

The Lower B500 Road Removal Project will abandon an approximately 0.8 mile segment of a former logging road to reduce sediment inputs into the nearby Larry Damm Creek. This project is within the Prairie Creek watershed, and is therefore hydrologically connected to the proposed Project. The Lower B500 Road Removal Project has the potential to result in temporary adverse impacts to water quality and fish due to the potential increase in sedimentation and turbidity from the earthwork necessary to remove the road, located adjacent to the creek. As mentioned above, the Prairie Creek Restoration component of the Project will increase the potential for onsite erosion in the short term during and following construction before riparian vegetation becomes established. However, long-term erosion potential will decrease as vegetation becomes established. Both projects will be required to implement BMPs to control construction-related erosion which will reduce the potential for sedimentation and turbidity impacts. In addition both projects will comply with Section 401 permits as appropriate which will also reduce any potential for water quality impacts. Therefore no additional mitigation is proposed.

The Little Lost Man Creek Bridge – Fish Passage Improvement Project will remove a culvert over Little Lost Man Creek and replace it with a bridge. This project is a direct tributary to Prairie Creek, and flows into Prairie Creek approximately two miles upstream of where Prairie Creek enters the Project Area. Similarly the Little Lost Man Creek Project has the potential to result in temporary adverse impacts to water quality and fish due to the potential increase in sedimentation and turbidity from the earthwork necessary to remove the culvert and construct the bridge, located adjacent to the creek. The Little Lost Man Creek Project will result in long term improvements for fish due to the improvement in passage conditions. Although the Little Lost Man Creek Project and the Project discussed in this ISMND have the potential to increase erosion and sedimentation during construction, BMPs will be required to address this potential impact. In addition, both projects will improve biological conditions for fish and water quality in the long term. Both projects will comply with Section 401 permits as appropriate which will also reduce the potential for water quality impacts. Therefore no additional mitigation is proposed.

The Proposed Centennial Grove Trail and Berry Glen Connector Trail is located adjacent to the Project Area on property managed by RNSP. This project will build two trails, one that is accessible from the CCT called the Centennial Grove Trail (CGT) and one that interconnects with the CGT and traverses north to the existing Berry Glen Trail known as the Berry Glen Connector Trail (BGCT). The CGT and BGCT project will not contain ADA trails and therefore significant earthwork, grading and paving will not occur. This project is expected to result in the removal of 20 trees (up to 16 inches dbh), which has the potential to effect nesting birds, bats and mammals. Construction has the potential to emit noise loud enough to adversely affect Marbled Murrelet or Northern Spotted Owl in the vicinity, however the project will be constructed after the nesting season in September and therefore will avoid noise impacts on these two species. Impacts to nesting birds, bats and mammals from implementation of the Project discussed in this ISMND have been reduced to less than significant level with incorporation of Mitigation Measures BIO-8, BIO-9 and BIO-11. Impacts from the construction of the CGT and BGCT project are expected to be fully mitigated. Therefore, no cumulative impact to biological resources would occur.

The RP-5 Road Improvement Project involves the removal of eroding earthen material from the west side of the Upper Road and drainage improvements. The project is located on the Upper Road partially within and mostly outside (west) of the disturbance extent associated with the Project that this ISMND analyzes. The Road Improvement Project would remove second growth vegetation growing within the eroding material which has the potential to adversely affect nesting birds, and bats located adjacent to Highway 101. The Project analyzed in this ISMND will avoid or reduce impacts to nesting birds and bats via Mitigation Measures BIO-8 and BIO-9, and will reduce noise impacts to nesting birds and bats incidentally via Mitigation Measure BIO-10. Adverse impacts to amphibians or reptiles from construction of the Road Improvement Project are not anticipated because the proposed improvements address stormwater runoff rather than established waterways. Both projects will be required to implement mitigation measures pursuant to CEQA, therefore no additional mitigation is proposed.

Cultural Resources

If Project impacts were to overlap with those from the projects listed in Table 2-1, the cumulative effect of the Project plus cumulative projects could be significant. As discussed in Section 4.5 – Cultural Resources, record searches and field review visits were undertaken to ensure that cultural resources, human remains, and paleontological resources that could be impacted by Project implementation were identified and mitigation measures are included that will reduce impacts to a less-than-significant level. With implementation of Mitigation Measures CR-1 (Worker Cultural Awareness Training); CR-2 (Protect Archaeological Resources during Construction Activities); CR-3 (Protect Human Remains if Encountered During Construction); and GEO-1 (Protect Paleontological Resources during Construction), the Project’s contribution to this cumulative impact will not be cumulatively considerable, and therefore less than significant.

Geology and Soils

The nature of most geologic impacts is site-specific, with the exception of erosion of sediment. As discussed in Section 2.11.1, with incorporation of Environmental Protection Action 2 – Stormwater

Pollution Prevention Plan (SWPPP), and Environmental Protection Action 3 – Construction BMPs, erosion and sedimentation will be managed and will not result in a significant adverse impact to the environment. Therefore, most geologic hazards do not accumulate. As discussed in Section 2.11.1, Environmental Protection Action 1- Implement Geotechnical Design Recommendations, the Project will be designed and constructed in compliance with the site-specific recommendations made in the Project’s geotechnical reports. With compliance with the recommendations of the Project-specific geotechnical report and applicable state and local regulation and policies, the Project’s geologic-related impacts will be less than significant. Because of the localized nature of geologic and soil impacts, no significant cumulative impacts will occur.

Hazards and Hazardous Materials

If Project impacts were to overlap with those from the projects listed in Table 2-1, the cumulative effect of the Project plus cumulative projects could be significant. As discussed in Section 4.9 – Hazards and Hazardous Materials, the Project will be subject to existing federal, state and local regulations, and will incorporate Mitigation Measures AQ-1 (BMPs to Reduce Air Pollution); BIO-15 (Manage Herbicide Control and Minimize Spill Risk); BIO-16 (Accidents Associated with Release of Chemicals and Motor Fuel); and Environmental Protection Actions 2 and 3, which require the use of a SWPPP and Construction BMPs. The mitigation measures and environmental protection actions will reduce potential impacts to be less than significant. With implementation of the mitigation measures and environmental protection actions, the Project’s contribution to this cumulative impact will not be cumulatively considerable and therefore less than significant.

Hydrology and Water Quality

The restoration of Prairie Creek and Libby Creek will benefit the hydrology and water quality within the Project Area by improving floodplain connectivity and function, groundwater infiltration, and water quality without resulting in a significant impact related to flood events, on-site or off-site erosion, or drainage. As described in Section 4.10 – Hydrology and Water Quality, the Project will be subject to existing permits and waste discharge requirements applicable to construction activities and groundwater dewatering, which will minimize Project-related water quality impacts to a less-than-significant level. The projects listed in Table 2-1, particularly the Culvert Removal and Bridge Replacement Project that is hydrologically connected to the Project Area, will also be required to comply with applicable regulations, similar to the proposed Project. For this reason and with the incorporation of Mitigation Measure HYD-1 (Implementation of Design that will Not Increase Flood Levels), the potential cumulative impact on hydrology and water quality will be less than significant.

Noise

As discussed in Section 4.13 – Noise, the Project will have impacts related to construction noise. The closest projects listed in Table 2-1 to the Project Area are the Culvert Removal and Bridge Replacement Project, and the Centennial Grove Trail & Berry Glen Connector. These projects are immediately adjacent to the Project. The Culvert Removal and Bridge Replacement Project is a relatively small project and will be short-term in nature. Both projects will require limited use of heavy machinery and noise produced from Project work will be temporary. The proposed Project is avoiding noise impacts to ESA listed species in adjacent habitat through the use of construction noise zones, listed as BIO-10 (Limitations to Use of Construction Equipment During Northern Spotted Owl and Marbled Murrelet Nesting Season), and therefore the Centennial Grove Trail & Berry Glen Connector will also be subject to the same ESA regulations and potential noise impacts to species. With implementation of Mitigation Measures BIO-10 and NOI-1, the Project’s contribution to cumulative construction noise impacts will not be cumulatively considerable, and therefore will be less than significant.

Population and Housing

As discussed in Section 4.14 – Population and Housing, the Project will have less than significant impacts to unplanned population growth in the area due to the projected increase in visitors in the Project vicinity and potential need for additional businesses and services such as restaurants and hotels. Tourism and population growth are stated in the Orick Community Plan as desired goals and policies. The Project is subject to the rules and regulations of Humboldt County Planning and Building Department, and any subsequent development will also be subject to those rules and regulations. None of the projects listed on Table 2-1 include infrastructure improvements. Due to the existing regulations that all proposed development must comply with, the Project's contribution to cumulative population and housing impacts will not be cumulatively considerable, and therefore will be less than significant.

Public Services

As discussed in Section 4.15 – Public Services, the Project will have less than significant short-term impacts on public services in the Project Area due to the projected seasonal increase of people in the Project vicinity. If Project impacts were to overlap with those from the projects listed in Table 2-1, the cumulative effect of the Project plus cumulative projects could be significant. Of the projects listed in Table 2-1, the proposed Centennial Grove Trail & Berry Glen Connector Trail may impact public services through use of the proposed project. However, the Centennial Grove Trail will be accessible from the CCT within the Project Area and it can be reasonably assumed that visitors utilizing the Project may also utilize the Centennial Grove Trail project. Therefore, additional visitors are not expected to utilize the Centennial Grove Trail without also utilizing the proposed Project. Utilization of the Project Area and subsequent impacts to public services is considered in the ISMND, and the Project will not contribute to cumulative public service impacts due to the existing local, county, state and RNSP public services. Because use of the Centennial Grove Trail & Berry Glen Connector will be on RNSP property and will be utilized in conjunction with the Project, the Project's contribution to cumulative public service impacts will not be cumulatively considerable, and therefore will be less than significant.

Recreation

As described in Section 4.16 – Recreation, the Project could impact other RNSP locations due to the expected increase in visitors to the Project vicinity, however the potential increase in use is not considered significant. Of the projects listed in Table 2-1, the Centennial Grove Trail & Berry Glen Connector Trail is the only project listed with a recreational component. As mentioned, this project is interconnected to the proposed Project and is expected to be utilized at the same rate as the proposed Project. With the incorporation of interpretive signage, which is a planned component of the Project, impacts from recreation such as hiking off trail, littering, improper food disposal, are not anticipated to occur. Existing RNSP trails may be utilized more frequently however operation of the Project is not expected to increase visitation so significantly that it will cause deterioration of RNSP sites above and beyond current use. Therefore the Project will cause a less than significant impact.

Transportation

As described in the Section 4.17 – Transportation, the increase in traffic from the Project will not cause a deterioration in intersection LOS. However, existing conditions warrant a south bound left-hand turn lane at the Highway 101/Bald Hills Road intersection. The increase in Project-related traffic will exacerbate this existing safety risk. Mitigation Measure TR-1 is proposed to reduce this safety risk.

Of the projects considered for cumulative impact analysis listed on Table 2-1, the Little Lost Man Creek Bridge – Fish Passage Improvement Project will require the temporary closure of one lane and traffic control on Highway 101. Traffic will be controlled via traffic lights spaced approximately 200 feet apart (L. Osborn pers. comm. 2019). This project will likely be completed between June and October 2020. This project is located approximately 2.15 miles north of the Highway 101/Bald Hills Road intersection. Although traffic may back up around the traffic control lights the potential traffic will be temporary (approximately five months) and will not include traffic generated from operation of the Project because it will be under construction at that time. Construction of the proposed Project will predominantly utilize access from the south via Bald Hills Road or the Lower Road, both of which are south of the Little Lost Man Creek Bridge – Fish Passage Improvement Project. Implementation of the work described in TR-1, involving the installation of a southbound left-hand turn lane at the Highway 101/Bald Hills Road intersection, will not take place during the Little Lost Man Creek Bridge – Fish Passage Improvement Project, and therefore road work will not take place concurrently. No other projects listed in Table 2-1 are expected to affect traffic in the Project vicinity. Due to the temporary nature and location of the Little Lost Man Creek Bridge – Fish Passage Improvement Project and with the incorporation of Mitigation Measure TR-1, the Project's contribution to cumulative transportation impacts will not be cumulatively considerable, and therefore will be less than significant.

Utilities and Service Systems

As summarized in Section 4.19 – Utilities and Service Systems, the Project will result in either a less than significant impact or no impact to utilities and service systems. Less than significant impacts are related to sufficient water supplies and wastewater treatment capacity. If Project impacts were to overlap with those from the projects listed in Table 2-1, the cumulative effect of the Project plus cumulative projects could be significant. None of the projects listed on Table 2-1 include utilities, and one project includes removal of a culvert and replacement of a bridge which will not impact utilities or service systems. Due to the existing regulations that the proposed development must comply with and absence of local projects relating to utilities and service systems, the Project's contribution to cumulative utilities and service systems impacts will not be cumulatively considerable, and therefore will be less than significant.

c) Does the project have environmental effects which would cause substantial adverse effects on human beings, either directly or indirectly? (Less than Significant Impact with Mitigation)

As described in Section 2 – Project Description, the Project is a restoration and public improvement project designed to improve ecological processes, wildlife habitat, and recreational and educational opportunities. All potential impacts have been reduced to a level that will be less than significant with the implementation of appropriate mitigation measures. The Project will be implemented in accordance with federal, state and local environmental regulations and therefore will not cause a direct or indirect substantial adverse effect on humans. There will be **less than significant impacts with mitigation**.

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AECOM

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Appendices

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Appendix A – Figures

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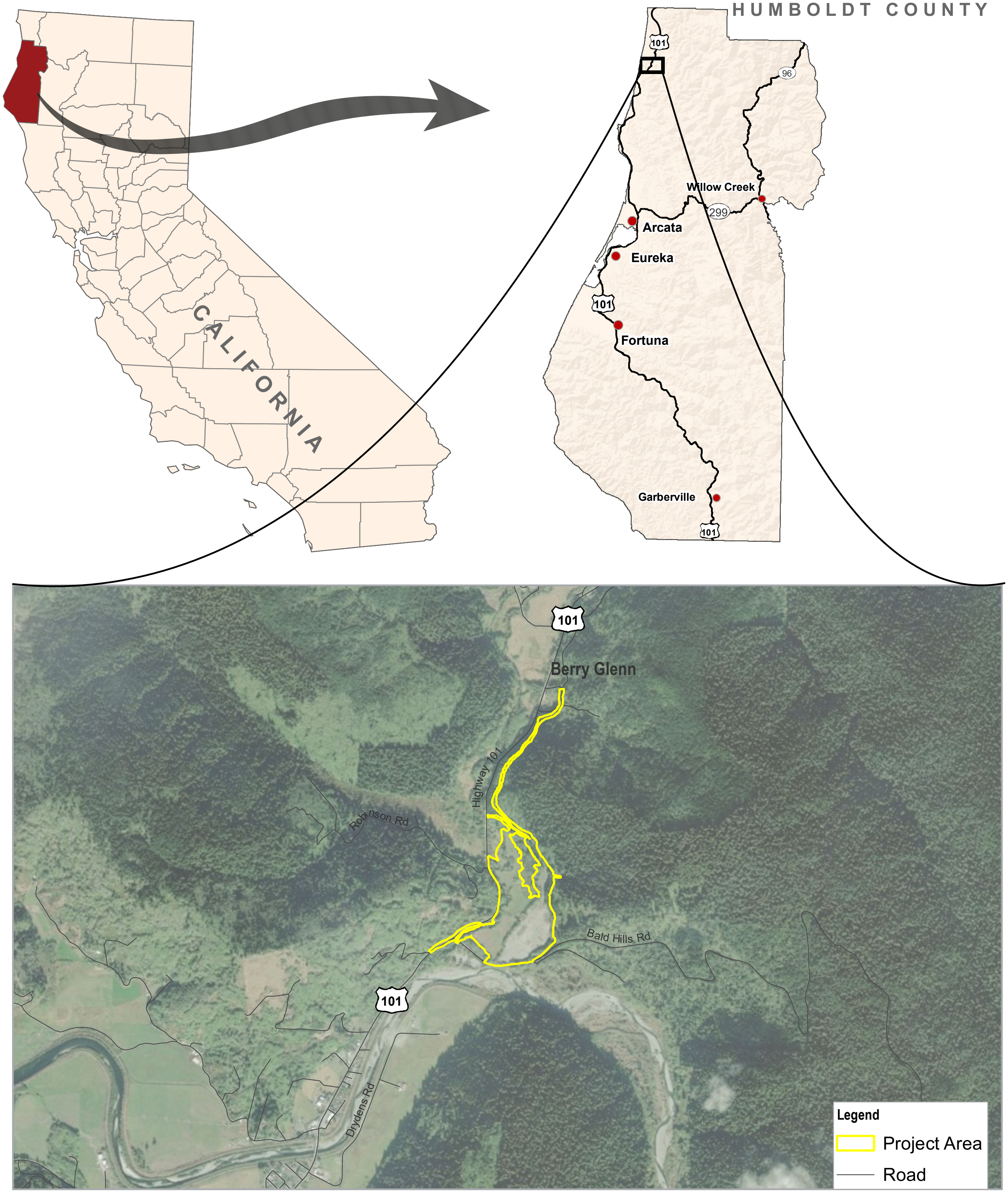

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State Coastal Conservancy
RNSP Visitor Center and Restoration Project

Project No. **11187543**
Revision No. **-**
Date **02 Dec 2019**

Project Vicinity

FIGURE 2-1

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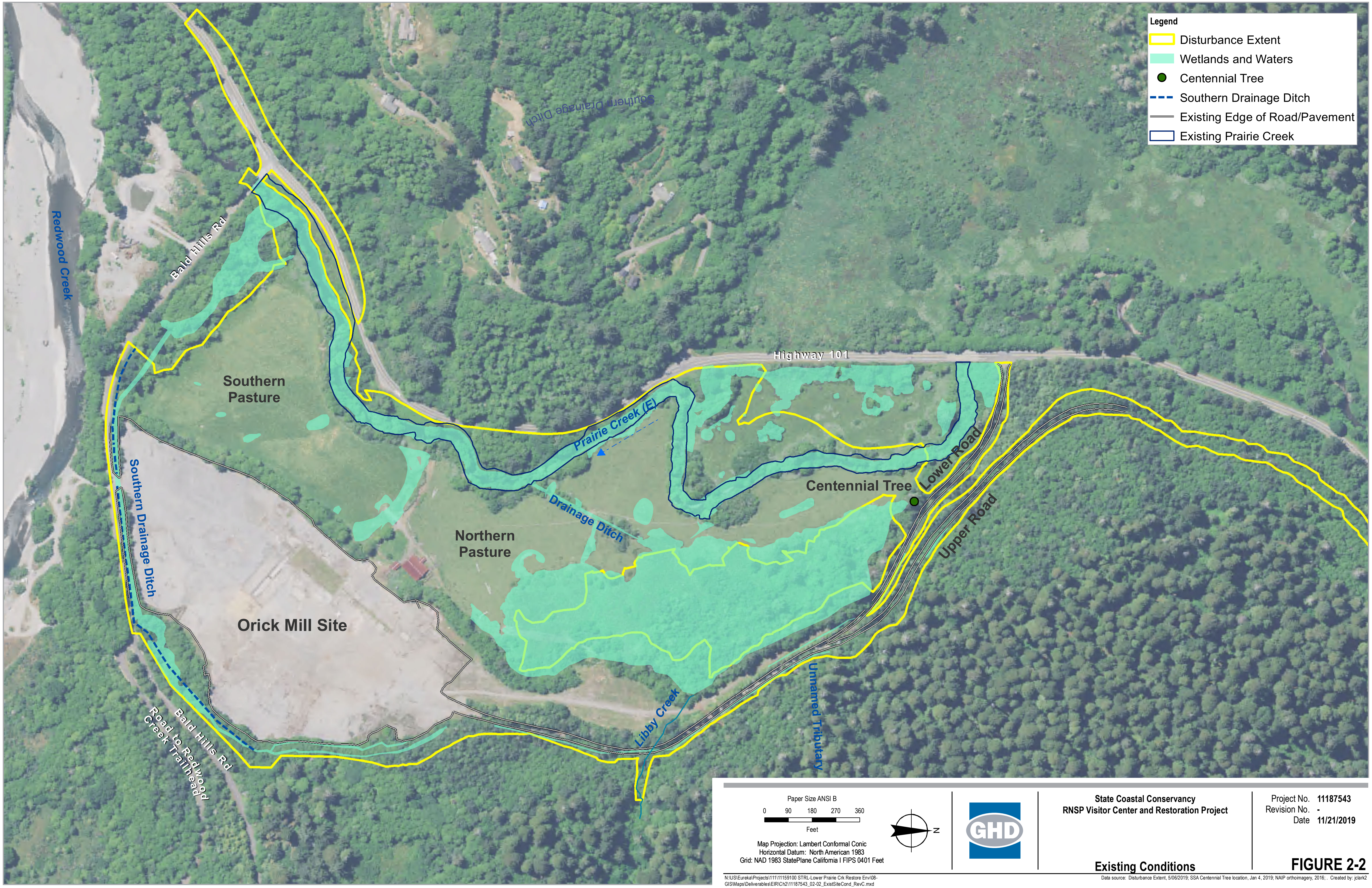
Print date: 02 Dec 2019 - 12:42

Data source: Project Area, Disturbance Extent, 5/06/2019; Tiger roads; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Sources: Esri, USGS, NOAA. Created by: jclark2



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State Coastal Conservancy
RNSP Visitor Center and Restoration Project

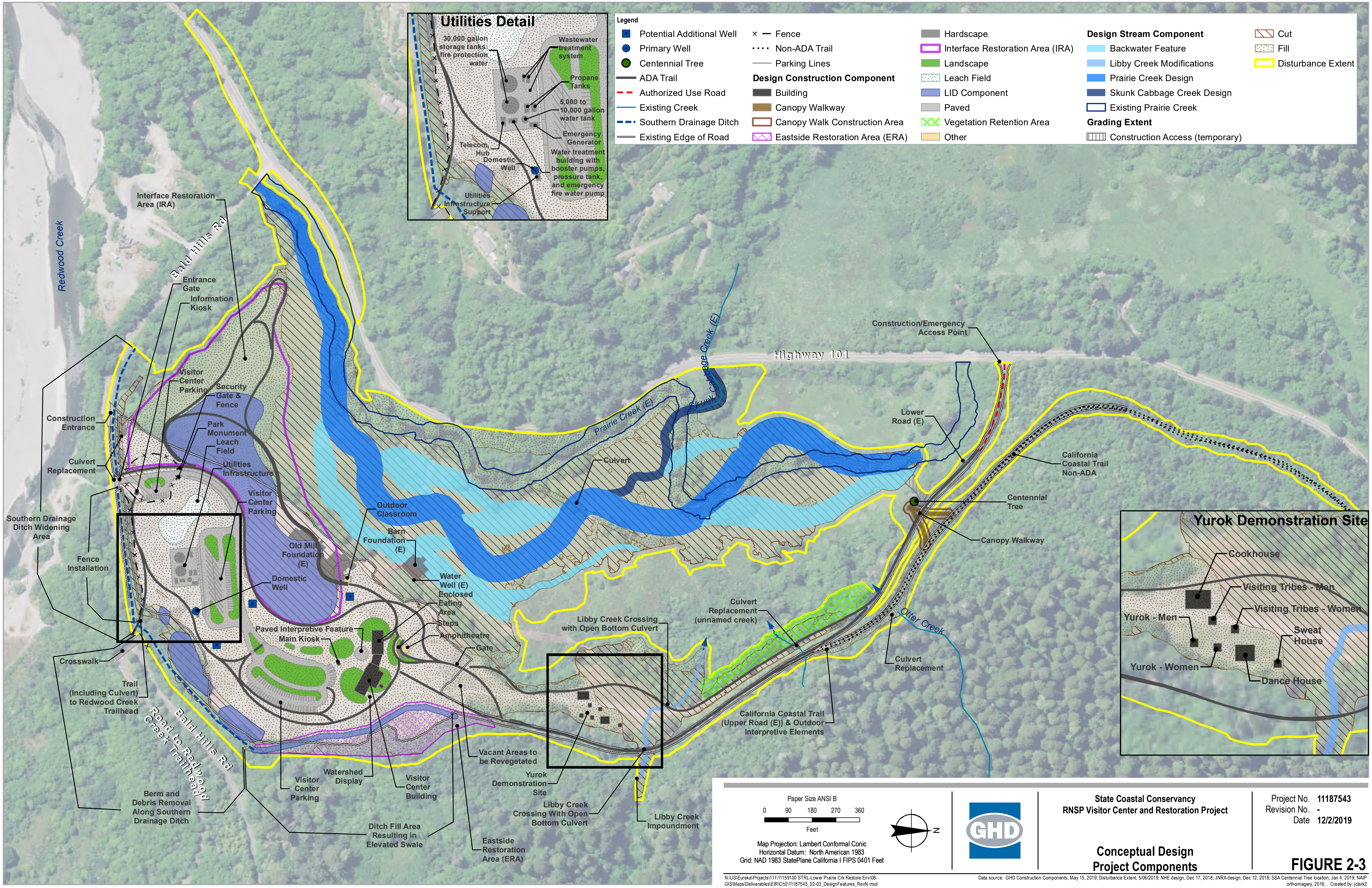
Project No. **11187543**
Revision No. **-**
Date **11/21/2019**

Existing Conditions

FIGURE 2-2

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch2\11187543_02-02_ExistSiteCond_RevC.mxd
Print date: 21 Nov 2019 - 11:11

Data source: Disturbance Extent, 5/06/2019; SSA Centennial Tree location, Jan 4, 2019; NAIP orthoimagery, 2016;. Created by: jclark2



Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

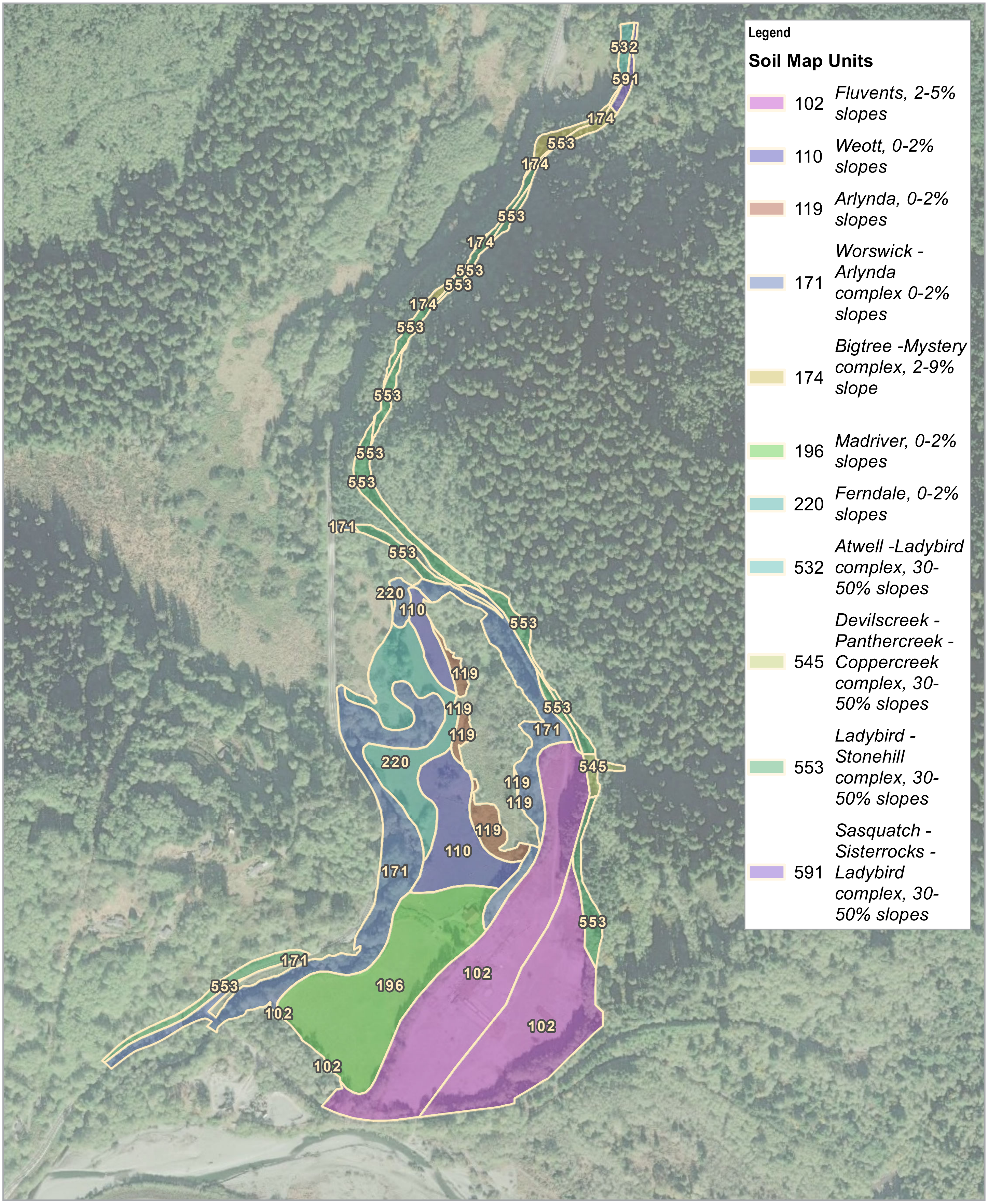
Project No. 11187543
Revision No. -
Date 12/2/2019

Conceptual Design
Project Components

FIGURE 2-3

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch2\11187543_02-03_DesignFeatures_RevN.mxd
Print date: 02 Dec 2019 - 12:40

Data source: GHD Construction Components, May 15, 2019; Disturbance Extent, 5/06/2019; NHE design, Dec 17, 2018; JNRA design, Dec 12, 2018; SSA Centennial Tree location, Jan 4, 2019; NAIP orthoimagery, 2016; . Created by: jclark2



Paper Size ANSI A

0 210 420 630 840

Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

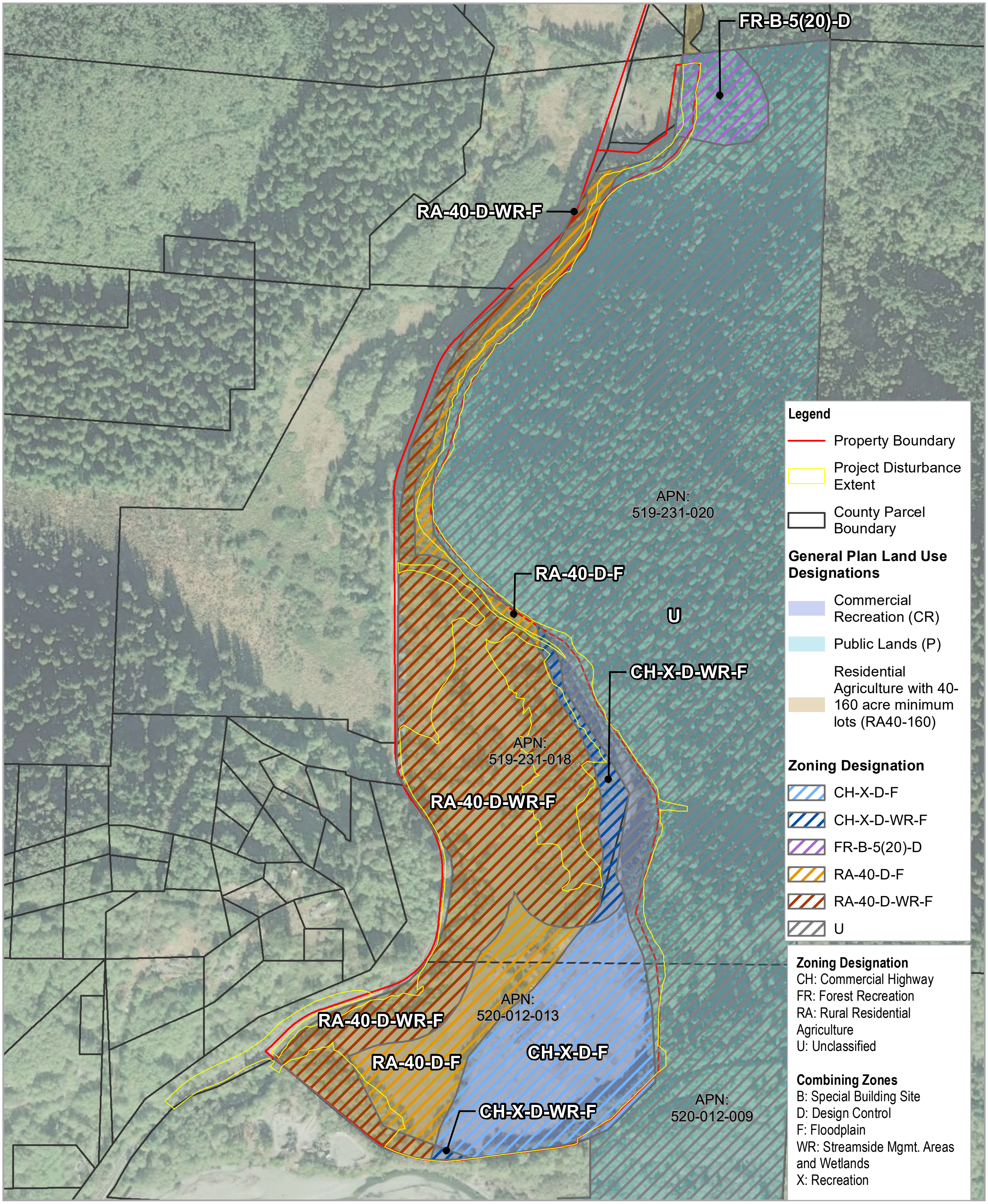
Soil Map Units

Project No. **11187543**
Revision No. **-**
Date **07/15/2019**

FIGURE 4.2-1

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-2\11187543_04-02-01_Soils_RevA.mxd
Print date: 22 Jul 2019 - 09:12

Data source: NRCS Web Soil Survey, 2019; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2



Paper Size ANSI A

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Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

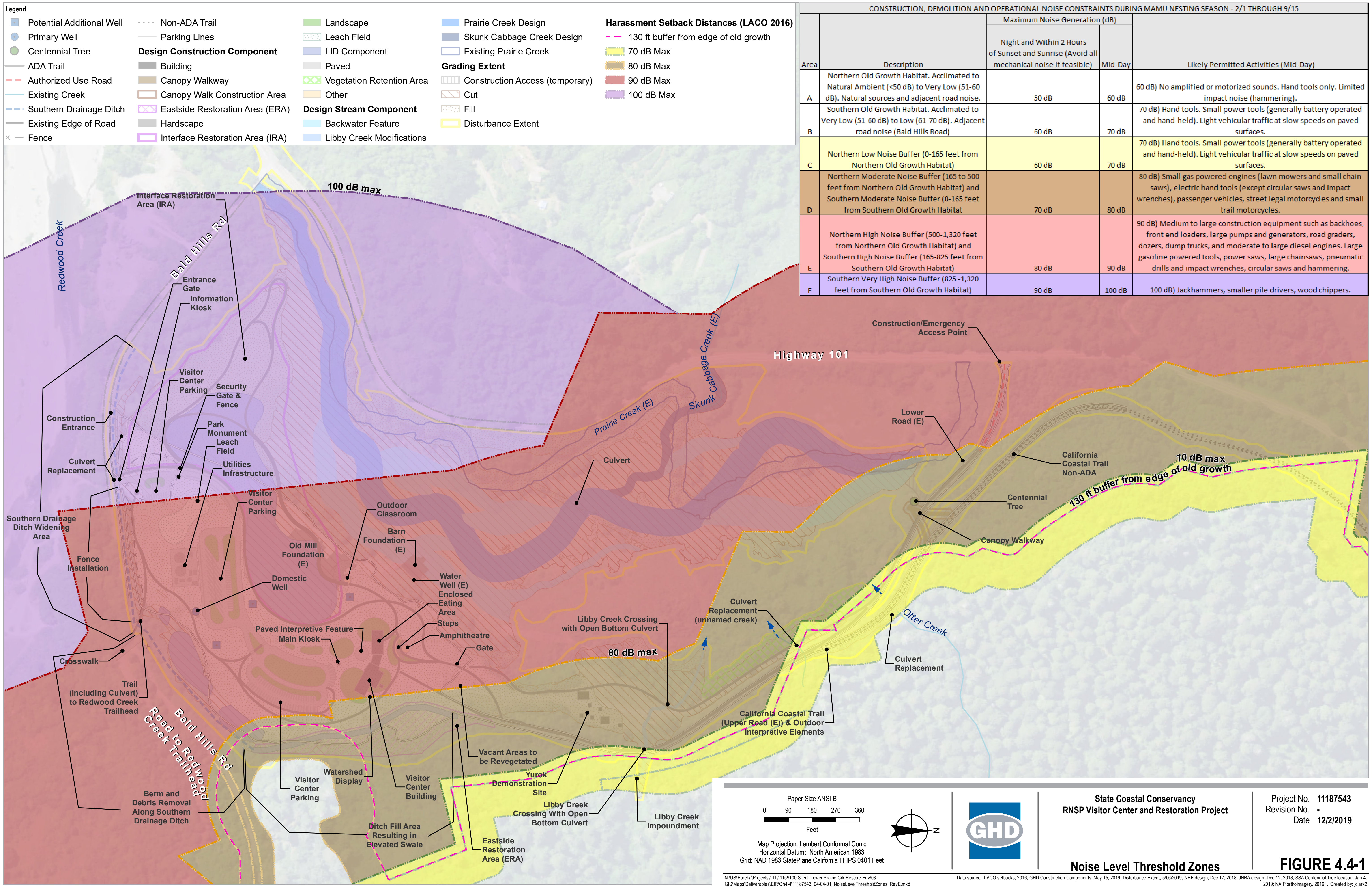
Land Use Designations and Zoning Site Overview

Project No. **11187543**
Revision No. **-**
Date **Nov 2019**

FIGURE 4.2-2

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-2\11187543_04-02-02_LandUse_RevE.mxd
Print date: 06 Dec 2019 - 10:33

Data source: Humboldt county land use, zoning, and parcel boundaries, March 2018; Disturbance Extent, 5/06/2019; ALTA property survey; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2



CONSTRUCTION, DEMOLITION AND OPERATIONAL NOISE CONSTRAINTS DURING MAMU NESTING SEASON - 2/1 THROUGH 9/15

Area	Description	Maximum Noise Generation (dB)		Likely Permitted Activities (Mid-Day)
		Night and Within 2 Hours of Sunset and Sunrise (Avoid all mechanical noise if feasible)	Mid-Day	
A	Northern Old Growth Habitat. Acclimated to Natural Ambient (<50 dB) to Very Low (51-60 dB). Natural sources and adjacent road noise.	50 dB	60 dB	60 dB) No amplified or motorized sounds. Hand tools only. Limited impact noise (hammering).
B	Southern Old Growth Habitat. Acclimated to Very Low (51-60 dB) to Low (61-70 dB). Adjacent road noise (Bald Hills Road)	60 dB	70 dB	70 dB) Hand tools. Small power tools (generally battery operated and hand-held). Light vehicular traffic at slow speeds on paved surfaces.
C	Northern Low Noise Buffer (0-165 feet from Northern Old Growth Habitat)	60 dB	70 dB	70 dB) Hand tools. Small power tools (generally battery operated and hand-held). Light vehicular traffic at slow speeds on paved surfaces.
D	Northern Moderate Noise Buffer (165 to 500 feet from Northern Old Growth Habitat) and Southern Moderate Noise Buffer (0-165 feet from Southern Old Growth Habitat	70 dB	80 dB	80 dB) Small gas powered engines (lawn mowers and small chain saws), electric hand tools (except circular saws and impact wrenches), passenger vehicles, street legal motorcycles and small trail motorcycles.
E	Northern High Noise Buffer (500-1,320 feet from Northern Old Growth Habitat) and Southern High Noise Buffer (165-825 feet from Southern Old Growth Habitat)	80 dB	90 dB	90 dB) Medium to large construction equipment such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, and moderate to large diesel engines. Large gasoline powered tools, power saws, large chainsaws, pneumatic drills and impact wrenches, circular saws and hammering.
F	Southern Very High Noise Buffer (825 -1,320 feet from Southern Old Growth Habitat)	90 dB	100 dB	100 dB) Jackhammers, smaller pile drivers, wood chippers.

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

GHD

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

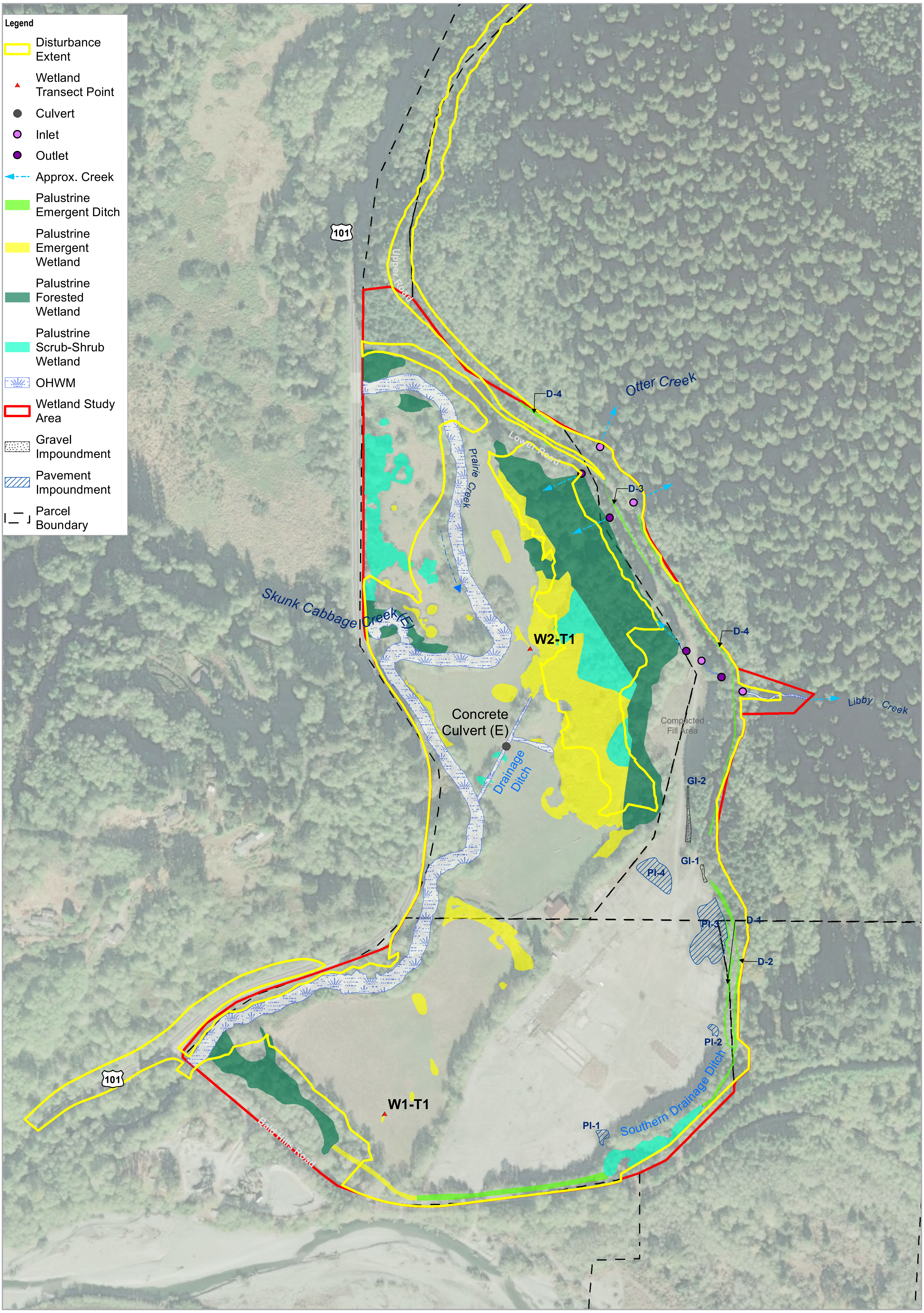
Noise Level Threshold Zones

Project No. **11187543**
Revision No. **-**
Date **12/2/2019**

FIGURE 4.4-1

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-4\11187543_04-04-01_NoiseLevelThresholdZones_RevE.mxd
Print date: 02 Dec 2019 - 12:36

Data source: LACO setbacks, 2016; GHD Construction Components, May 15, 2019; Disturbance Extent, 5/06/2019; NHE design, Dec 17, 2018; JNRA design, Dec 12, 2018; SSA Centennial Tree location, Jan 4, 2019; NAIP orthoimagery, 2016; . Created by: jclark2



Paper Size ANSI B

0 100 200 300 400

Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

N

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

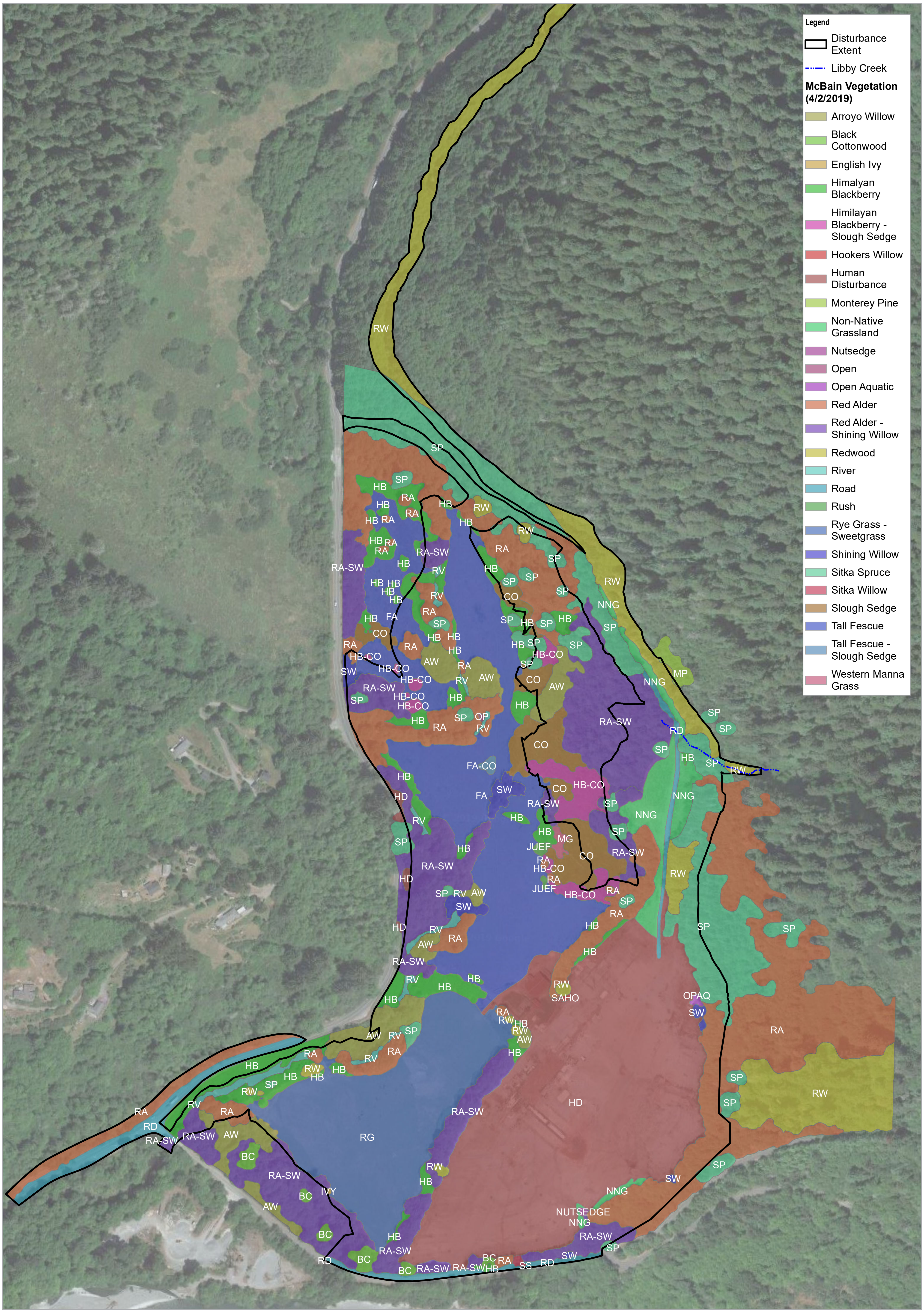
Wetland Delineation Overview

Project No.	**11187543**
Revision No.	**-**
Date	**10/07/2019**

FIGURE 4.4-2

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-4\11187543_04-04-02_WetDelOverview_RevB.mxd
Print date: 07 Oct 2019 - 15:03

Data source: McBain Vegetation, 4/02/2019; Libby Creek from NHE; Disturbance extent, 5/06/2019; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2



Paper Size ANSI B

0 90 180 270 360

Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

N

GHD

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

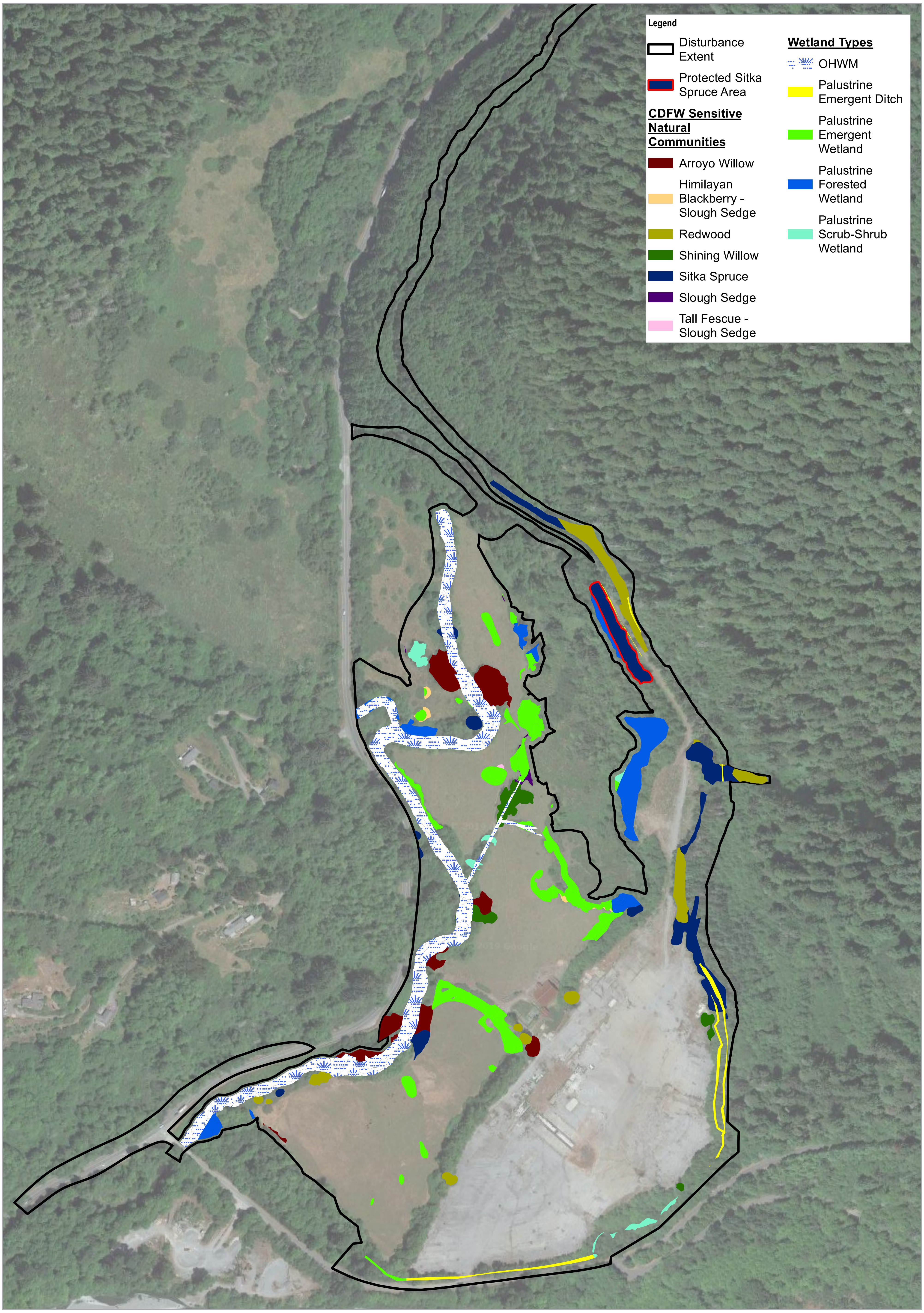
Vegetation Cover Type

Project No. **11187543**
Revision No. **-**
Date **07/24/2019**

FIGURE 4.4-3

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-4\11187543_04-04-03_VegetativeCoverTypes_RevA.mxd
Print date: 07 Oct 2019 - 13:42

Data source: McBain Vegetation, 4/02/2019; Libby Creek from NHE; Disturbance extent, 5/06/2019; . Created by: jclark2



Paper Size ANSI B

0 100 200 300 400

Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

Impacts to Wetlands and CDFW Recognized Sensitive Natural Communities

Project No.	**11187543**
Revision No.	**-**
Date	**10/07/2019**

FIGURE 4.4-4

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-4\11187543_04-04-04_WetVegImpacts_RevE.mxd
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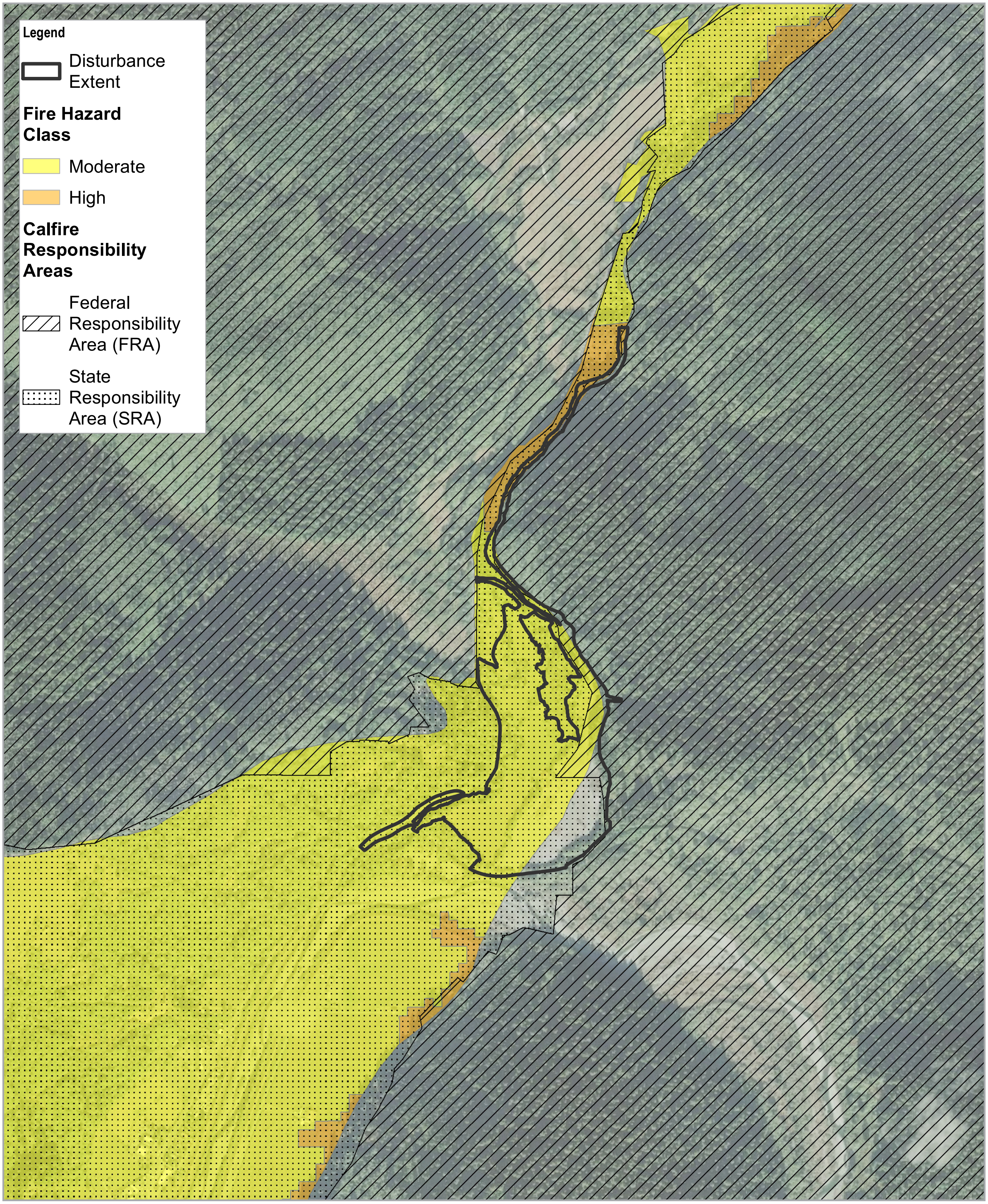


Paper Size ANSI A

0 420 840 1,260 1,680

Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

GHD

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

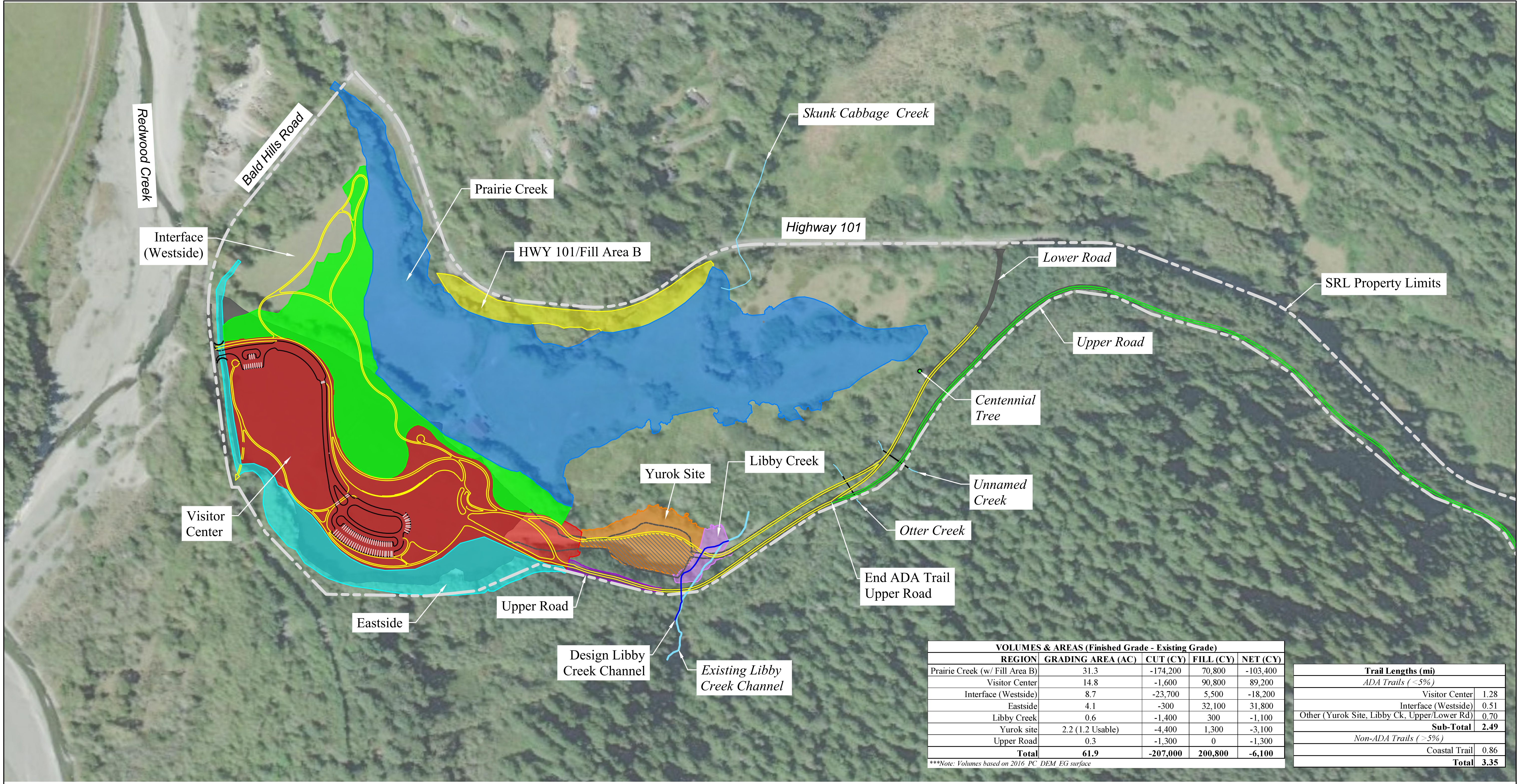
Project No.	**11187543**
Revision No.	**-**
Date	**20 Sep 2019**

Wildfire Responsibility Areas

FIGURE 4.20-1

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Deliverables\EIR\Ch4-20\11187543_04-20-01_WildfireRespAreas.mxd
Print date: 20 Sep 2019 - 12:01

Data source: Disturbance Extent, 5/06/2019; CalFire responsibility boundaries, v19; CalFire hazard areas, 2012; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2



VOLUMES & AREAS (Finished Grade - Existing Grade)				
REGION	**GRADING AREA (AC)**	**CUT (CY)**	**FILL (CY)**	**NET (CY)**
Prairie Creek (w/ Fill Area B)	31.3	-174,200	70,800	-103,400
Visitor Center	14.8	-1,600	90,800	89,200
Interface (Westside)	8.7	-23,700	5,500	-18,200
Eastside	4.1	-300	32,100	31,800
Libby Creek	0.6	-1,400	300	-1,100
Yurok site	2.2 (1.2 Usable)	-4,400	1,300	-3,100
Upper Road	0.3	-1,300	0	-1,300
Total	**61.9**	**-207,000**	**200,800**	**-6,100**

****Note: Volumes based on 2016_PC_DEM_EG surface*

Trail Lengths (mi)	
ADA Trails (<5%)	
Visitor Center	1.28
Interface (Westside)	0.51
Other (Yurok Site, Libby Ck, Upper/Lower Rd)	0.70
Sub-Total	**2.49**
Non-ADA Trails (>5%)	
Coastal Trail	0.86
Total	**3.35**

● Centennial Tree

- - - SRL Property Limits

— — Existing Edge Gravel

▨ Existing Pavement

— Proposed ADA Trail Edge

— Proposed Non-ADA Trail Edge

VOLUME/AREA CALCULATION REGION EXTENTS

🟦	Prairie Creek	🟦	Eastside
🟥	Visitor Center	🟪	Libby Creek
🟨	Fill Area B	🟧	Yurok Site
🟩	Interface (Westside)	▨	Usable Yurok Site Area
🟪	Upper Road		

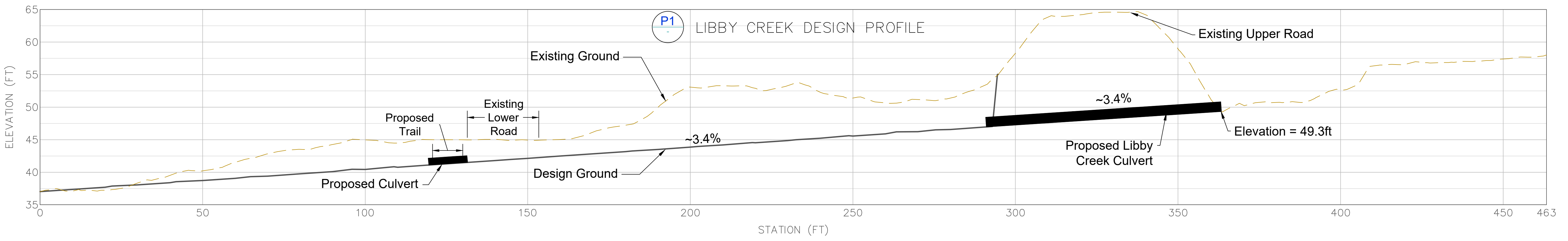
200 0 200 400
SCALE OF FEET

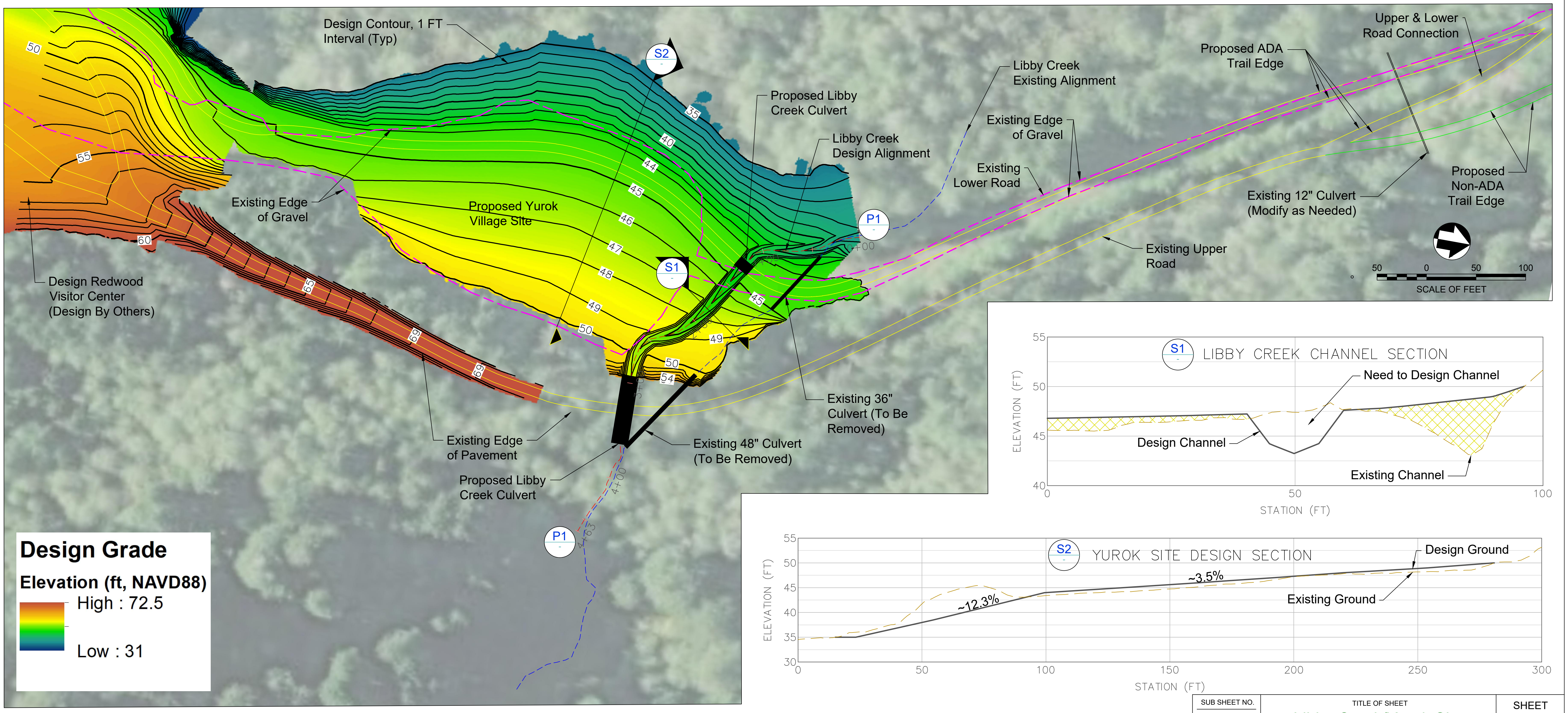
Northern Hydrology & Engineering

TITLE OF SHEET
Redwood Visitor Center
& Prairie Creek Restoration
VOLUMES REGIONS
Save the Redwoods League &
Redwood National Park

SHEET
1
OF
1

10/10/2019 DRAFT CONCEPTUAL DESIGN





10/10/2019 DRAFT CONCEPTUAL DESIGN

Northern
Hydrology &
Engineering

SUB SHEET NO.	TITLE OF SHEET	SHEET
1	Libby Creek/Yurok Site Conceptual Design Design - Aerial Image Save the Redwoods League & Redwood National Park	1 OF 1

Appendix B – LESA Analysis, GHD 2019a (and instructions)

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Land Evaluation and Site Assessment (LESA) Analysis
Redwood National and State Park Visitor Center and Restoration Project
9-May-19

Total Project Area: 89.2 acres

Land Evaluation

	A	B	C	D	E	F	G	H	I	J	K
Soil Unit Name	**Soil Map Unit**	**Project Acres**	**Proportion of Project Area**	**LCC***	**LCC Rating**	**LCC Score**	**Storie Index****	**Storie Index Score**	**LCC Class I-II**	**LCC Class III**	**LCC Class IV-VIII**
Fluvents	102	30.7	0.34	4w	40	13.77	28	9.64			30.7
Weott	110	6.9	0.08	5w	30	2.32	30	2.32			6.9
Arlynda	119	2.3	0.03	5w	30	0.77	27	0.70			2.3
Worwick-Arlynda complex	171	17.2	0.19	5w	30	5.78	50	9.64			17.2
Bigtree-Mystery complex	174	1.1	0.01	2e	90	1.11	80	0.99	1.1		
Madriver	196	13.7	0.15	2s	80	12.29	90	13.82	13.7		
Ferndale	220	7.1	0.08	2s	80	6.37	95	7.56	7.1		
Atwell-Ladybird complex	532	0.5	0.01	6e	20	0.11	35	0.20			0.5
Devilscreek-Panthercreek-Coppercreek complex	545	0.5	0.01	6e	20	0.11	36	0.20			0.5
Ladybird-Stonehill complex	553	8.6	0.10	6e	20	1.93	25	2.41			8.6
Sasquatch-Sisterrocks-Ladybird complex	591	0.4	0.004	6e	20	0.09	40	0.18		0	0.4
Subtotal:			**1.00**			**44.65**		**47.65**	**21.9**	**0**	**67.1**

*: LCC was determined using the NRCS Web Soil Survey value for nonirrigated lands, due to the Project area not utilizing irrigation.

**: For soil types that are a "complex", the Storie Index value of each soil type within the "complex" was averaged to determine the appropriate value.

Land Evaluation and Site Assessment (LESA) Analysis
Redwood National and State Park Visitor Center and Restoration Project
9-May-19

Total Project Area: 89.2 acres

Water Resource Availability

A	B	C	D	E
Project Portion	**Water Source**	**Proportion of Project Area**	**Water Availability Score**	**Weighted Availability Score (C x D)**
1	Dryland	1.0	25	25

Land Evaluation and Site Assessment (LESA) Analysis
Redwood National and State Park Visitor Center and Restoration Project
9-May-19

Total Project Area: 89.2 acres

Zone of Influence (ZOI)

A	B	C	D	E	F	G
Zone of Influence						
Total Acres	**Acres in Agriculture**	**Acres of Protected Resource Land**	**Percent in Agriculture**	**Percent Protected Resource Land**	**Surrounding Agricultural Land Score (From Table)**	**Surrounding Protected Resource Land Score (From Table)**
2703.82	24.94	2472.30	0.01	0.91	0	100

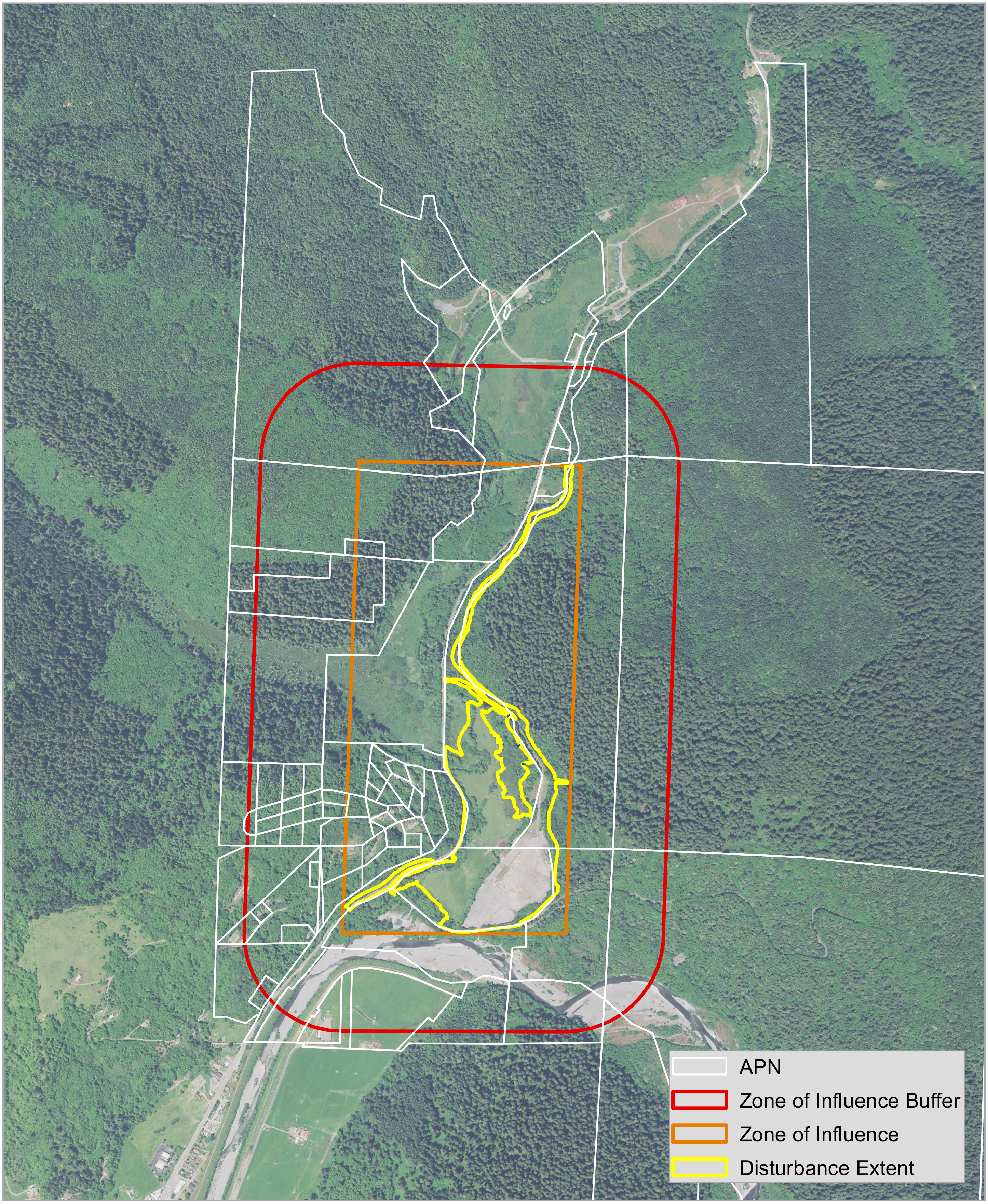
Table below exported from ArcGIS after creating the ZOI, and querying for parcels that intersect the ZOI utilizing Humboldt County parcel and land us

APN	ACRES	EXLU4
51922103	622.62	open space/parks
51920209	188.02	open space/parks
51920115	274.74	open space/parks
51920117	26.25	open space/parks
51923120	174.96	open space/parks
51923106	3.68	rural residential
51923125	2.52	open space/parks
51923121	79.50	open space/parks
51923122	12.80	open space/parks
51923124	28.76	open space/parks
51923103	25.22	open space/parks
51923123	79.23	open space/parks
51926112	536.93	open space/parks
51926107	84.73	open space/parks

51933106	1.43	open space/parks
51933105	2.01	rural residential - vacant
51933135	1.19	rural residential
51933102	1.85	open space/parks
51933104	1.28	open space/parks
51933107	0.77	open space/parks
51933108	1.14	open space/parks
51933114	1.29	rural residential
51933113	0.98	rural residential
51933103	9.75	open space/parks
51933110	1.41	open space/parks
51933111	1.36	open space/parks
51933109	1.78	open space/parks
51933131	1.05	open space/parks
51933130	11.53	open space/parks
51933129	4.43	open space/parks
51933133	1.89	open space/parks
51933128	1.31	open space/parks
51933127	1.47	open space/parks
51933125	1.13	open space/parks
51933126	1.36	open space/parks
51933123	2.05	open space/parks
51933122	1.02	open space/parks
51933121	1.31	open space/parks
51933132	1.50	open space/parks
51933124	2.91	open space/parks
51934103	1.89	open space/parks
51934118	22.66	open space/parks
51934105	1.41	rural residential - vacant
51934106	1.48	rural residential - vacant
51934121	3.87	rural residential - vacant
51934115	8.96	open space/parks
51934119	75.60	open space/parks
51933144	1.23	rural residential - vacant

51923117	67.49	open space/parks
51933137	4.67	open space/parks
51933150	1.56	rural residential - vacant
51925215	1.00	rural residential - vacant
hwy 101	20.68	rural residential - vacant
51933143	5.18	rural residential - vacant
51933142	5.67	rural residential
51933134	2.18	open space/parks
52001212	39.48	gravel mining
52001211	24.94	agriculture
51925213	2.36	rural residential
52001304	19.01	rural residential - vacant
51925221	1.00	rural residential
51925222	2.77	rural residential
51925225	20.19	rural residential - vacant
51925220	13.15	rural residential
51933112	0.50	rural residential - vacant
51933116	1.68	rural residential - vacant
51933139	1.05	rural residential
51933119	4.63	rural residential - vacant
51933117	2.12	rural residential
51933118	4.45	rural residential - vacant
51933148	4.92	rural residential - vacant
51933141	0.94	public
51933147	2.36	public
51923118	59.03	rural residential
52001213	43.00	heavy industrial
52001302	2.03	rural residential - vacant
52001207	18.57	open space/parks
52001205	6.59	public
52001210	3.88	public
humco	23.19	gravel mining
52001209	42.28	open space/parks
52001202	24.19	open space/parks

Acreage Subtotal:	2793.02	acres
Project Area	89.20	acres
Total Zone of Influence:	2703.82	acres
Agriculture Land Use:	24.94	
Protected Resource Lands:	2472.30	



Paper Size ANSI A

0 0.095 0.19 0.285 0.38

Miles

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

N

State Coastal Conservancy
RNSP Visitor Center and Restoration Project

LESA Analysis Zone of Influence

Project No.	**11187543**
Revision No.	**-**
Date	**5/19/2019**

FIGURE 1

N:\US\Eureka\Projects\111\11159100 STRL-Lower Prairie Crk Restore Env\08-GIS\Maps\Working\KM Analysis\11187543_02_DesignFeatures_RevF_KM.mxd
Print date: 18 Jul 2019 - 09:31

Data source: . Created by: kmcnamee

Land Evaluation and Site Assessment (LESA) Analysis
Redwood National and State Park Visitor Center and Restoration Project
9-May-19

Total Project Area: 89.2 acres

FINAL LESA Score

	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation (LE) Factors			
Land Capability Classification	44.65	0.25	11.16
Storie Index	47.65	0.25	11.91
LE Subtotal		*0.50*	23.08
Site Assessment (SA) Factors			
Project Size	50	0.15	7.50
Water Resource Availability	25	0.15	3.75
Surrounding Agricultural Land	0	0.15	0.00
Protected Resource Land	100	0.05	5.00
SA Subtotal		*0.50*	16.25
		FINAL LESA SCORE	**39.33**
		Rounded Score:	39

0 to 39:	Not Considered Significant
40 to 59:	Considered Significant only if LE **and** SA subscores are **each** greater than or equal to 20 points
60 to 79:	Considered Significant unless either LE or SA subscore is less than 20 points
80 to 100:	Considered Significant

NOTES

Calculation of the Land Evaluation (LE) Score

Part 1. Land Capability Classification (LCC) Score:

(1) Determine the total acreage of the project.
(2) Determine the soil types within the project area and enter them in **Column A** of the **Land Evaluation Worksheet** provided on page 2-A.
(3) Calculate the total acres of each soil type and enter the amounts in **Column B**.
(4) Divide the acres of each soil type (**Column B**) by the total acreage to determine the proportion of each soil type present. Enter the proportion of each soil type in **Column C**.
(5) Determine the LCC for each soil type from the applicable Soil Survey and enter it in **Column D**.
(6) From the LCC Scoring Table below, determine the point rating corresponding to the LCC for each soil type and enter it in **Column E**.

LCC Scoring Table

LCC Class	**I**	**IIe**	**IIs,w**	**IIIe**	**IIIs,w**	**IVe**	**IVs,w**	**V**	**VI**	**VII**	**VIII**
Points	**100**	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**	**10**	**0**

(7) Multiply the proportion of each soil type (**Column C**) by the point score (**Column E**) and enter the resulting scores in **Column F**.
(8) Sum the LCC scores in **Column F**.
(9) Enter the LCC score in box <1> of the **Final LESA Score Sheet** on page 10-A.

Part 2. Storie Index Score:

(1) Determine the Storie Index rating for each soil type and enter it in **Column G**.
(2) Multiply the proportion of each soil type (**Column C**) by the Storie Index rating (**Column G**) and enter the scores in **Column H**.
(3) Sum the Storie Index scores in **Column H** to gain the Storie Index Score.
(4) Enter the Storie Index Score in box <2> of the **Final LESA Score Sheet** on page 10-A.

Land Evaluation Worksheet

Land Capability Classification (LCC) and Storie Index Scores

A	B	C	D	E	F	G	H
Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
Totals		(Must Sum to 1.0)		***LCC Total Score***		***Storie Index Total Score***	

Site Assessment Worksheet 1.

Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV - VIII
Total Acres			
Project Size Scores			
Highest Project Size Score			

Updated 2011

NOTES

Calculation of the Site Assessment (SA) Score

Part 1. Project Size Score:.

(1) Using **Site Assessment Worksheet 1** provided on page 2-A, enter the acreage of each soil type from **Column B** in the **Column - I, J or K** - that corresponds to the LCC for that soil. (Note: While the Project Size Score is a component of the Site Assessment calculations, the score sheet is an extension of data collected in the Land Evaluation Worksheet, and is therefore displayed beside it).
(2) Sum **Column I** to determine the total amount of class I and II soils on the project site.
(3) Sum **Column J** to determine the total amount of class III soils on the project site.
(4) Sum **Column K** to determine the total amount of class IV and lower soils on the project site.
(5) Compare the total score for each LCC group in the Project Size Scoring Table below and determine which group receives the highest score.

Project Size Scoring Table

Class I or II		**Class III**		**Class IV or Lower**	
Acreage	Points	Acreage	Points	Acreage	Points
>80	100	>160	100	>320	100
60-79	90	120-159	90	240-319	80
40-59	80	80-119	80	160-239	60
20-39	50	60-79	70	100-159	40
10-19	30	40-59	60	40-99	20
10<	0	20-39	30	40<	0
		10-19	10		
		10<	0		

(6) Enter the **Project Size Score** (the highest score from the three LCC categories) in box <3> of the **Final LESA Score Sheet** on page 10-A.

NOTES

Part 2. Water Resource Availability Score:

(1) Determine the type(s) of irrigation present on the project site, including a determination of whether there is dryland agricultural activity as well.

(2) Divide the site into portions according to the type or types of irrigation or dryland cropping that is available in each portion. Enter this information in **Column B** of **Site Assessment Worksheet 2. - Water Resources Availability**.

(3) Determine the proportion of the total site represented for each portion identified, and enter this information in **Column C**.

(4) Using the Water Resources Availability Scoring Table, identify the option that is most applicable for each portion, based upon the feasibility of irrigation in drought and non-drought years, and whether physical or economic restrictions are likely to exist. Enter the applicable Water Resource Availability Score into **Column D**.

(5) Multiply the Water Resource Availability Score for each portion by the proportion of the project area it represents to determine the weighted score for each portion in **Column E**.

(6) Sum the scores for all portions to determine the project's total Water Resources Availability Score

(7) Enter the Water Resource Availability Score in box <4> of the **Final LESA Score Sheet** on page 10-A.

Site Assessment Worksheet 2. - Water Resources Availability

A	B	C	D	E
Project Portion	Water Source	Proportion of Project Area	Water Availability Score	Weighted Availability Score (C x D)
1				
2				
3				
4				
5				
6				
		(Must Sum to 1.0)	***Total Water Resource Score***	

Water Resource Availability Scoring Table

Option	Non-Drought Years			Drought Years			WATER RESOURCE SCORE
	RESTRICTIONS			RESTRICTIONS			
	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	
1	YES	NO	NO	YES	NO	NO	100
2	YES	NO	NO	YES	NO	YES	95
3	YES	NO	YES	YES	NO	YES	90
4	YES	NO	NO	YES	YES	NO	85
5	YES	NO	NO	YES	YES	YES	80
6	YES	YES	NO	YES	YES	NO	75
7	YES	YES	YES	YES	YES	YES	65
8	YES	NO	NO	NO	-- --	-- --	50
9	YES	NO	YES	NO	-- --	-- --	45
10	YES	YES	NO	NO	-- --	-- --	35
11	YES	YES	YES	NO	-- --	-- --	30
12	Irrigated production not feasible, but rainfall adequate for dryland production in both drought and non-drought years						25
13	Irrigated production not feasible, but rainfall adequate for dryland production in non-drought years (but not in drought years)						20
14	Neither irrigated nor dryland production feasible						0

NOTES

Part 3. Surrounding Agricultural Land Use Score:

(1) Calculate the project's Zone of Influence (ZOI) as follows:

(a) a rectangle is drawn around the project such that the rectangle is the smallest that can completely encompass the project area.

(b) a second rectangle is then drawn which extends one quarter mile on all sides beyond the first rectangle.

(c) The ZOI includes all parcels that are contained within or are intersected by the second rectangle, less the area of the project itself.

(2) Sum the area of all parcels to determine the total acreage of the ZOI.

(3) Determine which parcels are in agricultural use and sum the areas of these parcels

(4) Divide the area in agriculture found in step (3) by the total area of the ZOI found in step (2) to determine the percent of the ZOI that is in agricultural use.

(5) Determine the Surrounding Agricultural Land Score utilizing the Surrounding Agricultural Land Scoring Table below.

Surrounding Agricultural Land Scoring Table

Percent of ZOI in Agriculture	Surrounding Agricultural Land Score
90-100	100
80-89	90
75-79	80
70-74	70
65-69	60
60-64	50
55-59	40
50-54	30
45-49	20
40-44	10
<40	0

(5) Enter the Surrounding Agricultural Land Score in box <5> of the **Final LESA Score Sheet** on page 10-A.

Site Assessment Worksheet 3.
Surrounding Agricultural Land and Surrounding Protected Resource Land

A	B	C	D	E	F	G
Zone of Influence					Surrounding Agricultural Land Score (From Table)	Surrounding Protected Resource Land Score (From Table)
Total Acres	Acres in Agriculture	Acres of Protected Resource Land	Percent in Agriculture (A/B)	Percent Protected Resource Land (A/C)		

NOTES

Part 4. Protected Resource Lands Score:

The Protected Resource Lands scoring relies upon the same Zone of Influence information gathered in Part 3, and figures are entered in Site Assessment Worksheet 3, which combines the surrounding agricultural and protected lands calculations.

(1) Use the total area of the ZOI calculated in Part 3. for the Surrounding Agricultural Land Use score.

(2) Sum the area of those parcels within the ZOI that are protected resource lands, as defined in the California Agricultural LESA Guidelines.

(3) Divide the area that is determined to be protected in Step (2) by the total acreage of the ZOI to determine the percentage of the surrounding area that is under resource protection.

(4) Determine the Surrounding Protected Resource Land Score utilizing the Surrounding Protected Resource Land Scoring Table below.

Surrounding Protected Resource Land Scoring Table

Percent of ZOI Protected	Protected Resource Land Score
90-100	100
80-89	90
75-79	80
70-74	70
65-69	60
60-64	50
55-59	40
50-54	30
45-49	20
40-44	10
<40	0

(5) Enter the Protected Resource Land score in box <6> of the **Final LESA Score Sheet** on page 10-A.

NOTES

Final LESA Score Sheet

Calculation of the Final LESA Score:

(1) Multiply each factor score by the factor weight to determine the weighted score and enter in Weighted Factor Scores column.
(2) Sum the weighted factor scores for the LE factors to determine the total LE score for the project.
(3) Sum the weighted factor scores for the SA factors to determine the total SA score for the project.
(4) Sum the total LE and SA scores to determine the Final LESA Score for the project.

	Factor Scores	**Factor Weight**	**Weighted Factor Scores**
LE Factors			
Land Capability Classification	*<1>*	0.25	
Storie Index	*<2>*	0.25	
LE Subtotal		***0.50***	
SA Factors			
Project Size	*<3>*	0.15	
Water Resource Availability	*<4>*	0.15	
Surrounding Agricultural Land	*<5>*	0.15	
Protected Resource Land	*<6>*	0.05	
SA Subtotal		***0.50***	
		Final LESA Score	

For further information on the scoring thresholds under the California Agricultural LESA Model, consult Section 4 of the Instruction Manual.

Appendix C – CalEEMod Emissions Report, GHD 2019b

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Prairie Creek - Construction 2020

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Health Club	5.37	1000sqft	0.12	5,370.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - User defined as Visitor's Center.

Construction Phase - From Client

Off-road Equipment - Equip and Hours modified to equal total equip hours for duration of phase

Demolition - 3,637 CY Concrete to remove, equals 4,364.4 tons debris

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	90.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	13.00	10.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0474	0.4673	0.5075	1.0400e-003	0.0556	0.0186	0.0742	9.4900e-003	0.0171	0.0266	0.0000	92.7679	92.7679	0.0239	0.0000	93.3663
Maximum	**0.0474**	**0.4673**	**0.5075**	**1.0400e-003**	**0.0556**	**0.0186**	**0.0742**	**9.4900e-003**	**0.0171**	**0.0266**	**0.0000**	**92.7679**	**92.7679**	**0.0239**	**0.0000**	**93.3663**

2.2 Overall Operational

Not Applicable

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Foundation/Pavement Removal	Demolition	6/1/2020	10/2/2020	5	90	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Foundation/Pavement Removal	Excavators	2	6.27	158	0.38
Foundation/Pavement Removal	Off-Highway Trucks	1	2.30	402	0.38
Foundation/Pavement Removal	Other Material Handling Equipment	1	4.90	167	0.40
Foundation/Pavement Removal	Paving Equipment	1	5.20	132	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Foundation/Pavement Removal	5	10.00	0.00	432.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Foundation/Pavement Removal - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0467	0.0000	0.0467	7.0700e-003	0.0000	7.0700e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0401	0.3915	0.4569	8.1000e-004		0.0182	0.0182		0.0167	0.0167	0.0000	71.3895	71.3895	0.0231	0.0000	71.9668
Total	**0.0401**	**0.3915**	**0.4569**	**8.1000e-004**	**0.0467**	**0.0182**	**0.0649**	**7.0700e-003**	**0.0167**	**0.0238**	**0.0000**	**71.3895**	**71.3895**	**0.0231**	**0.0000**	**71.9668**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0500e-003	0.0709	0.0116	1.7000e-004	3.5500e-003	3.4000e-004	3.8900e-003	9.8000e-004	3.2000e-004	1.3000e-003	0.0000	16.4367	16.4367	5.0000e-004	0.0000	16.4492
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2600e-003	4.9500e-003	0.0390	6.0000e-005	5.4000e-003	5.0000e-005	5.4500e-003	1.4400e-003	5.0000e-005	1.4900e-003	0.0000	4.9416	4.9416	3.5000e-004	0.0000	4.9503
Total	**7.3100e-003**	**0.0758**	**0.0506**	**2.3000e-004**	**8.9500e-003**	**3.9000e-004**	**9.3400e-003**	**2.4200e-003**	**3.7000e-004**	**2.7900e-003**	**0.0000**	**21.3784**	**21.3784**	**8.5000e-004**	**0.0000**	**21.3995**

Prairie Creek - Construction 2021

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	40.00	Acre	40.00	1,742,400.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Prairie Creek restoration site.

Construction Phase - Durations provided by client and modified to account for internal phasing details

Off-road Equipment - Quantities found in AQ request form

Off-road Equipment - Equip and Hours modified to equal total equip hours for duration of phase

Grading - 220 CY export Site Prep, 596 CY Import Grading. All other material balanced onsite.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	740.00	40.00
tblConstructionPhase	NumDays	75.00	30.00

tblConstructionPhase	NumDays	55.00	90.00
tblConstructionPhase	NumDays	30.00	12.00
tblGrading	AcresOfGrading	66.38	66.26
tblGrading	MaterialExported	0.00	220.00
tblGrading	MaterialImported	0.00	596.00
tblOffRoadEquipment	HorsePower	168.00	84.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	LoadFactor	0.40	0.74
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	8.00	5.80
tblOffRoadEquipment	UsageHours	8.00	0.80
tblOffRoadEquipment	UsageHours	8.00	0.30
tblOffRoadEquipment	UsageHours	8.00	0.20
tblOffRoadEquipment	UsageHours	8.00	6.70
tblOffRoadEquipment	UsageHours	8.00	5.00
tblOffRoadEquipment	UsageHours	7.00	2.40
tblOffRoadEquipment	UsageHours	8.00	3.70

tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.3809	2.5447	2.7479	6.2600e-003	0.4284	0.0788	0.5072	0.1514	0.0732	0.2246	0.0000	563.6812	563.6812	0.0896	0.0000	565.9210
Maximum	**0.3809**	**2.5447**	**2.7479**	**6.2600e-003**	**0.4284**	**0.0788**	**0.5072**	**0.1514**	**0.0732**	**0.2246**	**0.0000**	**563.6812**	**563.6812**	**0.0896**	**0.0000**	**565.9210**

2.2 Overall Operational

Not Applicable

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	6/1/2021	6/16/2021	5	12	
2	Grading	Grading	6/1/2021	7/12/2021	5	30	
3	Paving/Site Restoration	Paving	6/1/2021	10/4/2021	5	90	
4	Trenching	Trenching	9/1/2021	9/10/2021	5	8	
5	Landscaping/Revegetation	Building Construction	10/1/2021	11/25/2021	5	40	

Acres of Grading (Site Preparation Phase): 9.98

Acres of Grading (Grading Phase): 66.26

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	1	13.30	212	0.43
Site Preparation	Excavators	1	7.30	158	0.38
Site Preparation	Other Material Handling Equipment	2	0.70	84	0.74
Grading	Crawler Tractors	2	7.30	212	0.43
Grading	Excavators	3	5.80	158	0.38
Grading	Generator Sets	2	12.00	84	0.74
Grading	Graders	1	0.80	187	0.41
Grading	Off-Highway Trucks	4	6.20	402	0.38
Grading	Other Material Handling Equipment	1	5.30	167	0.40
Grading	Rollers	4	7.50	80	0.38
Grading	Rubber Tired Dozers	2	6.70	247	0.40
Grading	Rubber Tired Loaders	2	6.70	203	0.36
Grading	Scrapers	2	5.00	367	0.48
Grading	Skid Steer Loaders	1	0.50	65	0.37
Grading	Tractors/Loaders/Backhoes	1	3.70	97	0.37
Paving/Site Restoration	Off-Highway Trucks	1	0.10	402	0.38
Paving/Site Restoration	Other Material Handling Equipment	4	0.20	167	0.40
Paving/Site Restoration	Pavers	1	0.30	130	0.42
Paving/Site Restoration	Rollers	1	0.20	80	0.38
Paving/Site Restoration	Skid Steer Loaders	2	0.20	65	0.37
Paving/Site Restoration	Tractors/Loaders/Backhoes	1	0.10	97	0.37
Trenching	Dumpers/Tenders	1	8.30	16	0.38
Trenching	Excavators	4	8.30	158	0.38
Trenching	Plate Compactors	6	11.00	8	0.43
Trenching	Rubber Tired Loaders	3	11.00	203	0.36
Landscaping/Revegetation	Other Material Handling Equipment	2	6.00	167	0.40
Landscaping/Revegetation	Tractors/Loaders/Backhoes	1	2.40	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	4	10.00	0.00	28.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	25	63.00	0.00	59.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving/Site Restoration	10	25.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	14	35.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Landscaping/Revegetation	3	732.00	286.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.3000e-003	0.0000	5.3000e-003	5.7000e-004	0.0000	5.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.0900e-003	0.0847	0.0464	1.1000e-004		3.3800e-003	3.3800e-003		3.1100e-003	3.1100e-003	0.0000	9.8596	9.8596	3.1900e-003	0.0000	9.9393
Total	**7.0900e-003**	**0.0847**	**0.0464**	**1.1000e-004**	**5.3000e-003**	**3.3800e-003**	**8.6800e-003**	**5.7000e-004**	**3.1100e-003**	**3.6800e-003**	**0.0000**	**9.8596**	**9.8596**	**3.1900e-003**	**0.0000**	**9.9393**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2000e-004	4.2700e-003	7.0000e-004	1.0000e-005	2.3000e-004	2.0000e-005	2.5000e-004	6.0000e-005	2.0000e-005	8.0000e-005	0.0000	1.0551	1.0551	3.0000e-005	0.0000	1.0559
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.7000e-004	6.0000e-004	4.7100e-003	1.0000e-005	7.2000e-004	1.0000e-005	7.3000e-004	1.9000e-004	1.0000e-005	2.0000e-004	0.0000	0.6406	0.6406	4.0000e-005	0.0000	0.6416
Total	**7.9000e-004**	**4.8700e-003**	**5.4100e-003**	**2.0000e-005**	**9.5000e-004**	**3.0000e-005**	**9.8000e-004**	**2.5000e-004**	**3.0000e-005**	**2.8000e-004**	**0.0000**	**1.6957**	**1.6957**	**7.0000e-005**	**0.0000**	**1.6975**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1864	0.0000	0.1864	0.0870	0.0000	0.0870	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1348	1.3792	0.9426	2.1900e-003		0.0606	0.0606		0.0563	0.0563	0.0000	191.5950	191.5950	0.0550	0.0000	192.9709
Total	**0.1348**	**1.3792**	**0.9426**	**2.1900e-003**	**0.1864**	**0.0606**	**0.2470**	**0.0870**	**0.0563**	**0.1433**	**0.0000**	**191.5950**	**191.5950**	**0.0550**	**0.0000**	**192.9709**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.6000e-004	9.0000e-003	1.4700e-003	2.0000e-005	4.9000e-004	4.0000e-005	5.3000e-004	1.3000e-004	4.0000e-005	1.7000e-004	0.0000	2.2233	2.2233	7.0000e-005	0.0000	2.2250
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0105	9.4500e-003	0.0742	1.1000e-004	0.0113	1.1000e-004	0.0114	3.0200e-003	1.0000e-004	3.1200e-003	0.0000	10.0888	10.0888	6.6000e-004	0.0000	10.1052
Total	**0.0108**	**0.0185**	**0.0757**	**1.3000e-004**	**0.0118**	**1.5000e-004**	**0.0120**	**3.1500e-003**	**1.4000e-004**	**3.2900e-003**	**0.0000**	**12.3121**	**12.3121**	**7.3000e-004**	**0.0000**	**12.3302**

3.4 Paving/Site Restoration - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.5600e-003	0.0247	0.0304	5.0000e-005		1.2100e-003	1.2100e-003		1.1100e-003	1.1100e-003	0.0000	4.4418	4.4418	1.4400e-003	0.0000	4.4777
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.5600e-003**	**0.0247**	**0.0304**	**5.0000e-005**		**1.2100e-003**	**1.2100e-003**		**1.1100e-003**	**1.1100e-003**	**0.0000**	**4.4418**	**4.4418**	**1.4400e-003**	**0.0000**	**4.4777**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0126	0.0113	0.0884	1.3000e-004	0.0135	1.3000e-004	0.0136	3.5900e-003	1.2000e-004	3.7100e-003	0.0000	12.0105	12.0105	7.8000e-004	0.0000	12.0300
Total	**0.0126**	**0.0113**	**0.0884**	**1.3000e-004**	**0.0135**	**1.3000e-004**	**0.0136**	**3.5900e-003**	**1.2000e-004**	**3.7100e-003**	**0.0000**	**12.0105**	**12.0105**	**7.8000e-004**	**0.0000**	**12.0300**

Prairie Creek - Construction 2022

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	40.00	Acre	40.00	1,742,400.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Construction Phase - Durations provided by client and modified to account for internal phasing details

Off-road Equipment - Equip and Hours modified to equal total equip hours for duration of phase

Grading - 10,864 CY Import in Grading

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	75.00	90.00
tblConstructionPhase	NumDays	740.00	10.00
tblConstructionPhase	NumDays	55.00	10.00

tblConstructionPhase	NumDays	740.00	40.00
tblGrading	MaterialImported	0.00	10,864.00
tblOffRoadEquipment	HorsePower	168.00	84.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	HorsePower	168.00	172.00
tblOffRoadEquipment	HorsePower	168.00	172.00
tblOffRoadEquipment	HorsePower	168.00	172.00
tblOffRoadEquipment	LoadFactor	0.40	0.74
tblOffRoadEquipment	LoadFactor	0.40	0.42
tblOffRoadEquipment	LoadFactor	0.40	0.42
tblOffRoadEquipment	LoadFactor	0.40	0.42
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	8.00	7.64
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	5.00
tblOffRoadEquipment	UsageHours	7.00	2.40
tblOffRoadEquipment	UsageHours	8.00	2.13
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3642	2.2534	2.9115	7.0200e-003	0.2957	0.0585	0.3542	0.0778	0.0556	0.1333	0.0000	635.7812	635.7812	0.0728	0.0000	637.6010
Maximum	**0.3642**	**2.2534**	**2.9115**	**7.0200e-003**	**0.2957**	**0.0585**	**0.3542**	**0.0778**	**0.0556**	**0.1333**	**0.0000**	**635.7812**	**635.7812**	**0.0728**	**0.0000**	**637.6010**

2.2 Overall Operational

Not Applicable

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	6/1/2022	6/14/2022	5	10	
2	Grading	Grading	6/1/2022	10/4/2022	5	90	
3	Trenching	Trenching	8/1/2022	8/5/2022	5	5	
4	Building Construction	Building Construction	8/1/2022	8/12/2022	5	10	
5	Paving/Site Restoration	Paving	8/1/2022	8/12/2022	5	10	
6	Landscaping/Revegetation	Building Construction	10/1/2022	11/25/2022	5	40	

Acres of Grading (Site Preparation Phase): 2.5

Acres of Grading (Grading Phase): 22.5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	1	4.00	212	0.43
Site Preparation	Excavators	1	3.20	158	0.38
Site Preparation	Other Material Handling Equipment	1	0.80	84	0.74
Grading	Crawler Tractors	1	4.00	212	0.43
Grading	Excavators	1	7.64	158	0.38
Grading	Generator Sets	1	24.00	84	0.74
Grading	Off-Highway Trucks	1	4.80	402	0.38
Grading	Other Material Handling Equipment	1	6.40	167	0.40
Grading	Rollers	1	3.64	80	0.38
Grading	Skid Steer Loaders	1	2.67	65	0.37
Grading	Tractors/Loaders/Backhoes	1	2.13	97	0.37
Building Construction	Excavators	1	3.60	158	0.38

Building Construction	Forklifts	1	8.00	89	0.20
Building Construction	Other Material Handling Equipment	1	0.40	172	0.42
Paving/Site Restoration	Graders	1	4.00	187	0.41
Paving/Site Restoration	Off-Highway Trucks	1	4.00	402	0.38
Paving/Site Restoration	Other Material Handling Equipment	2	5.50	172	0.42
Paving/Site Restoration	Pavers	1	4.00	130	0.42
Paving/Site Restoration	Rollers	4	5.00	80	0.38
Landscaping/Revegetation	Other Material Handling Equipment	1	15.20	172	0.42
Landscaping/Revegetation	Rubber Tired Loaders	2	4.00	203	0.36
Landscaping/Revegetation	Tractors/Loaders/Backhoes	1	2.40	97	0.37
Trenching	Excavators	1	4.00	158	0.38
Building Construction	Cranes	0	7.00	231	0.29
Landscaping/Revegetation	Cranes	0	7.00	231	0.29
Landscaping/Revegetation	Forklifts	0	8.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Landscaping/Revegetation	Generator Sets	0	8.00	84	0.74
Grading	Graders	0	8.00	187	0.41
Paving/Site Restoration	Paving Equipment	0	8.00	132	0.36
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Scrapers	0	8.00	367	0.48
Building Construction	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Landscaping/Revegetation	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	1,074.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	3	732.00	286.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving/Site Restoration	9	23.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Landscaping/Revegetation	4	732.00	286.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	1	3.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3300e-003	0.0000	1.3300e-003	1.4000e-004	0.0000	1.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.7700e-003	0.0200	0.0143	3.0000e-005		8.0000e-004	8.0000e-004		7.4000e-004	7.4000e-004	0.0000	2.8642	2.8642	9.3000e-004	0.0000	2.8873
Total	**1.7700e-003**	**0.0200**	**0.0143**	**3.0000e-005**	**1.3300e-003**	**8.0000e-004**	**2.1300e-003**	**1.4000e-004**	**7.4000e-004**	**8.8000e-004**	**0.0000**	**2.8642**	**2.8642**	**9.3000e-004**	**0.0000**	**2.8873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	3.6000e-004	2.8400e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4144	0.4144	2.0000e-005	0.0000	0.4150
Total	**4.3000e-004**	**3.6000e-004**	**2.8400e-003**	**0.0000**	**4.8000e-004**	**0.0000**	**4.8000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4144**	**0.4144**	**2.0000e-005**	**0.0000**	**0.4150**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0119	0.0000	0.0119	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0946	0.8649	0.9994	1.9700e-003		0.0406	0.0406		0.0389	0.0389	0.0000	171.5112	171.5112	0.0344	0.0000	172.3716
Total	**0.0946**	**0.8649**	**0.9994**	**1.9700e-003**	**0.0119**	**0.0406**	**0.0525**	**1.2900e-003**	**0.0389**	**0.0402**	**0.0000**	**171.5112**	**171.5112**	**0.0344**	**0.0000**	**172.3716**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.5100e-003	0.1510	0.0253	4.2000e-004	8.8300e-003	6.6000e-004	9.4900e-003	2.4300e-003	6.3000e-004	3.0600e-003	0.0000	40.0233	40.0233	1.2000e-003	0.0000	40.0533
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.6000e-003	8.1800e-003	0.0640	1.0000e-004	0.0108	1.0000e-004	0.0109	2.8800e-003	9.0000e-005	2.9600e-003	0.0000	9.3244	9.3244	5.6000e-004	0.0000	9.3385
Total	**0.0141**	**0.1592**	**0.0893**	**5.2000e-004**	**0.0196**	**7.6000e-004**	**0.0204**	**5.3100e-003**	**7.2000e-004**	**6.0200e-003**	**0.0000**	**49.3477**	**49.3477**	**1.7600e-003**	**0.0000**	**49.3918**

Prairie Creek - Construction 2023

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	40.00	Acre	40.00	1,742,400.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2024
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Construction Phase - Durations provided by client and modified to account for internal phasing details

Off-road Equipment - Equip and Hours modified to equal total equip hours for duration of phase

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	740.00	24.00
tblConstructionPhase	NumDays	75.00	60.00
tblConstructionPhase	NumDays	30.00	2.00
tblConstructionPhase	PhaseEndDate	8/26/2026	11/6/2023
tblConstructionPhase	PhaseEndDate	10/25/2023	10/4/2023
tblConstructionPhase	PhaseEndDate	7/12/2023	6/2/2023

tblConstructionPhase	PhaseStartDate	10/26/2023	10/4/2023
tblOffRoadEquipment	HorsePower	168.00	84.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	HorsePower	168.00	167.00
tblOffRoadEquipment	LoadFactor	0.40	0.74
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	8.00	8.67
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	2.40
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.1903	1.1214	1.6411	3.7400e-003	0.1453	0.0355	0.1808	0.0375	0.0341	0.0715	0.0000	335.0189	335.0189	0.0380	0.0000	335.9693
Maximum	**0.1903**	**1.1214**	**1.6411**	**3.7400e-003**	**0.1453**	**0.0355**	**0.1808**	**0.0375**	**0.0341**	**0.0715**	**0.0000**	**335.0189**	**335.0189**	**0.0380**	**0.0000**	**335.9693**

2.2 Overall Operational

Not Applicable

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	6/1/2023	6/2/2023	5	2	
2	Grading	Grading	7/13/2023	10/4/2023	5	60	
3	Landscaping/Revegetation	Building Construction	10/4/2023	11/6/2023	5	24	

Acres of Grading (Site Preparation Phase): 1.5

Acres of Grading (Grading Phase): 19.01

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	2	6.00	212	0.43
Site Preparation	Excavators	2	6.00	158	0.38
Site Preparation	Other Material Handling Equipment	1	4.00	84	0.74
Grading	Crawler Tractors	1	5.07	212	0.43
Grading	Excavators	1	8.67	158	0.38
Grading	Generator Sets	3	12.00	84	0.74
Grading	Off-Highway Trucks	1	4.80	402	0.38
Grading	Other Material Handling Equipment	1	5.60	167	0.40
Grading	Rollers	1	5.47	80	0.38
Grading	Skid Steer Loaders	1	2.93	65	0.37
Grading	Tractors/Loaders/Backhoes	1	2.40	97	0.37
Landscaping/Revegetation	Other Material Handling Equipment	1	12.00	167	0.40
Landscaping/Revegetation	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Landscaping/Revegetation	Cranes	0	7.00	231	0.29
Landscaping/Revegetation	Forklifts	0	8.00	89	0.20
Landscaping/Revegetation	Generator Sets	0	8.00	84	0.74

Grading	Graders	0	8.00	187	0.41
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Scrapers	0	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Landscaping/Revegetation	Welders	0	8.00	46	0.45

<u>Trips and VMT</u>

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	5	13.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	10	25.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Landscaping/Revegetation	2	732.00	286.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					8.0000e-004	0.0000	8.0000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0700e-003	0.0113	0.0102	2.0000e-005		4.7000e-004	4.7000e-004		4.3000e-004	4.3000e-004	0.0000	1.9479	1.9479	6.3000e-004	0.0000	1.9636
Total	**1.0700e-003**	**0.0113**	**0.0102**	**2.0000e-005**	**8.0000e-004**	**4.7000e-004**	**1.2700e-003**	**9.0000e-005**	**4.3000e-004**	**5.2000e-004**	**0.0000**	**1.9479**	**1.9479**	**6.3000e-004**	**0.0000**	**1.9636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-004	1.1000e-004	8.3000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1304	0.1304	1.0000e-005	0.0000	0.1306
Total	**1.3000e-004**	**1.1000e-004**	**8.3000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**0.0000**	**0.1304**	**0.1304**	**1.0000e-005**	**0.0000**	**0.1306**

3.3 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0101	0.0000	0.0101	1.0900e-003	0.0000	1.0900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0755	0.6787	0.8549	1.6700e-003		0.0311	0.0311		0.0300	0.0300	0.0000	144.8199	144.8199	0.0255	0.0000	145.4578
Total	**0.0755**	**0.6787**	**0.8549**	**1.6700e-003**	**0.0101**	**0.0311**	**0.0412**	**1.0900e-003**	**0.0300**	**0.0311**	**0.0000**	**144.8199**	**144.8199**	**0.0255**	**0.0000**	**145.4578**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6300e-003	6.1700e-003	0.0478	8.0000e-005	8.9900e-003	8.0000e-005	9.0700e-003	2.4000e-003	7.0000e-005	2.4700e-003	0.0000	7.5255	7.5255	4.2000e-004	0.0000	7.5360
Total	**7.6300e-003**	**6.1700e-003**	**0.0478**	**8.0000e-005**	**8.9900e-003**	**8.0000e-005**	**9.0700e-003**	**2.4000e-003**	**7.0000e-005**	**2.4700e-003**	**0.0000**	**7.5255**	**7.5255**	**4.2000e-004**	**0.0000**	**7.5360**

3.4 Landscaping/Revegetation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.5100e-003	0.0467	0.0806	1.2000e-004		2.4900e-003	2.4900e-003		2.2900e-003	2.2900e-003	0.0000	10.7263	10.7263	3.4700e-003	0.0000	10.8130
Total	**5.5100e-003**	**0.0467**	**0.0806**	**1.2000e-004**		**2.4900e-003**	**2.4900e-003**		**2.2900e-003**	**2.2900e-003**	**0.0000**	**10.7263**	**10.7263**	**3.4700e-003**	**0.0000**	**10.8130**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0110	0.3061	0.0868	8.6000e-004	0.0199	5.4000e-004	0.0204	5.7700e-003	5.1000e-004	6.2900e-003	0.0000	81.7300	81.7300	3.0800e-003	0.0000	81.8069
Worker	0.0894	0.0723	0.5599	9.8000e-004	0.1053	8.8000e-004	0.1062	0.0281	8.1000e-004	0.0289	0.0000	88.1389	88.1389	4.9000e-003	0.0000	88.2614
Total	**0.1004**	**0.3784**	**0.6468**	**1.8400e-003**	**0.1252**	**1.4200e-003**	**0.1266**	**0.0338**	**1.3200e-003**	**0.0352**	**0.0000**	**169.8689**	**169.8689**	**7.9800e-003**	**0.0000**	**170.0683**

3.4 Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.5000e-004	2.2200e-003	4.0700e-003	1.0000e-005		1.1000e-004	1.1000e-004		1.0000e-004	1.0000e-004	0.0000	0.5670	0.5670	1.8000e-004	0.0000	0.5716
Total	**2.5000e-004**	**2.2200e-003**	**4.0700e-003**	**1.0000e-005**		**1.1000e-004**	**1.1000e-004**		**1.0000e-004**	**1.0000e-004**	**0.0000**	**0.5670**	**0.5670**	**1.8000e-004**	**0.0000**	**0.5716**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	7.0000e-005	5.3000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0777	0.0777	0.0000	0.0000	0.0778
Total	**8.0000e-005**	**7.0000e-005**	**5.3000e-004**	**0.0000**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0777**	**0.0777**	**0.0000**	**0.0000**	**0.0778**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.1000e-003	9.8800e-003	0.0141	2.0000e-005		5.8000e-004	5.8000e-004		5.3000e-004	5.3000e-004	0.0000	1.8285	1.8285	5.9000e-004	0.0000	1.8433
Total	**1.1000e-003**	**9.8800e-003**	**0.0141**	**2.0000e-005**		**5.8000e-004**	**5.8000e-004**		**5.3000e-004**	**5.3000e-004**	**0.0000**	**1.8285**	**1.8285**	**5.9000e-004**	**0.0000**	**1.8433**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.1400e-003	0.1601	0.0419	3.7000e-004	8.2900e-003	6.1000e-004	8.9100e-003	2.4000e-003	5.8000e-004	2.9900e-003	0.0000	34.5983	34.5983	1.7400e-003	0.0000	34.6417
Worker	0.0391	0.0333	0.2601	4.2000e-004	0.0439	3.9000e-004	0.0443	0.0117	3.6000e-004	0.0121	0.0000	37.9194	37.9194	2.2900e-003	0.0000	37.9765
Total	**0.0452**	**0.1934**	**0.3020**	**7.9000e-004**	**0.0522**	**1.0000e-003**	**0.0532**	**0.0141**	**9.4000e-004**	**0.0150**	**0.0000**	**72.5176**	**72.5176**	**4.0300e-003**	**0.0000**	**72.6183**

3.6 Paving/Site Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.9300e-003	0.0666	0.0710	1.4000e-004		3.1800e-003	3.1800e-003		2.9200e-003	2.9200e-003	0.0000	12.0215	12.0215	3.8900e-003	0.0000	12.1187
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**6.9300e-003**	**0.0666**	**0.0710**	**1.4000e-004**		**3.1800e-003**	**3.1800e-003**		**2.9200e-003**	**2.9200e-003**	**0.0000**	**12.0215**	**12.0215**	**3.8900e-003**	**0.0000**	**12.1187**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	1.0500e-003	8.1700e-003	1.0000e-005	1.3800e-003	1.0000e-005	1.3900e-003	3.7000e-004	1.0000e-005	3.8000e-004	0.0000	1.1915	1.1915	7.0000e-005	0.0000	1.1933
Total	**1.2300e-003**	**1.0500e-003**	**8.1700e-003**	**1.0000e-005**	**1.3800e-003**	**1.0000e-005**	**1.3900e-003**	**3.7000e-004**	**1.0000e-005**	**3.8000e-004**	**0.0000**	**1.1915**	**1.1915**	**7.0000e-005**	**0.0000**	**1.1933**

3.7 Landscaping/Revegetation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0177	0.1622	0.1978	3.8000e-004		7.5500e-003	7.5500e-003		6.9400e-003	6.9400e-003	0.0000	33.3694	33.3694	0.0108	0.0000	33.6393
Total	**0.0177**	**0.1622**	**0.1978**	**3.8000e-004**		**7.5500e-003**	**7.5500e-003**		**6.9400e-003**	**6.9400e-003**	**0.0000**	**33.3694**	**33.3694**	**0.0108**	**0.0000**	**33.6393**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0246	0.6405	0.1675	1.4600e-003	0.0332	2.4500e-003	0.0356	9.6200e-003	2.3400e-003	0.0120	0.0000	138.3930	138.3930	6.9600e-003	0.0000	138.5670
Worker	0.1562	0.1331	1.0406	1.6900e-003	0.1755	1.5500e-003	0.1771	0.0468	1.4300e-003	0.0482	0.0000	151.6774	151.6774	9.1400e-003	0.0000	151.9061
Total	**0.1808**	**0.7735**	**1.2081**	**3.1500e-003**	**0.2087**	**4.0000e-003**	**0.2127**	**0.0564**	**3.7700e-003**	**0.0602**	**0.0000**	**290.0704**	**290.0704**	**0.0161**	**0.0000**	**290.4730**

3.5 Trenching - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0111	0.1097	0.0887	2.1000e-004		4.2500e-003	4.2500e-003		3.9500e-003	3.9500e-003	0.0000	17.8535	17.8535	5.5000e-003	0.0000	17.9910
Total	**0.0111**	**0.1097**	**0.0887**	**2.1000e-004**		**4.2500e-003**	**4.2500e-003**		**3.9500e-003**	**3.9500e-003**	**0.0000**	**17.8535**	**17.8535**	**5.5000e-003**	**0.0000**	**17.9910**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5600e-003	1.4000e-003	0.0110	2.0000e-005	1.6800e-003	2.0000e-005	1.6900e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.4946	1.4946	1.0000e-004	0.0000	1.4971
Total	**1.5600e-003**	**1.4000e-003**	**0.0110**	**2.0000e-005**	**1.6800e-003**	**2.0000e-005**	**1.6900e-003**	**4.5000e-004**	**1.0000e-005**	**4.6000e-004**	**0.0000**	**1.4946**	**1.4946**	**1.0000e-004**	**0.0000**	**1.4971**

3.6 Landscaping/Revegetation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.9200e-003	0.0908	0.1265	1.9000e-004		4.6900e-003	4.6900e-003		4.3200e-003	4.3200e-003	0.0000	16.7791	16.7791	5.4300e-003	0.0000	16.9147
Total	**9.9200e-003**	**0.0908**	**0.1265**	**1.9000e-004**		**4.6900e-003**	**4.6900e-003**		**4.3200e-003**	**4.3200e-003**	**0.0000**	**16.7791**	**16.7791**	**5.4300e-003**	**0.0000**	**16.9147**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0264	0.6733	0.1830	1.4700e-003	0.0332	2.7400e-003	0.0359	9.6200e-003	2.6200e-003	0.0122	0.0000	139.3427	139.3427	7.1700e-003	0.0000	139.5220
Worker	0.1634	0.1464	1.1499	1.7400e-003	0.1755	1.6400e-003	0.1772	0.0468	1.5200e-003	0.0483	0.0000	156.2966	156.2966	0.0102	0.0000	156.5506
Total	**0.1898**	**0.8196**	**1.3329**	**3.2100e-003**	**0.2087**	**4.3800e-003**	**0.2131**	**0.0564**	**4.1400e-003**	**0.0605**	**0.0000**	**295.6393**	**295.6393**	**0.0173**	**0.0000**	**296.0726**

Redwood Natn'l Visitor Center - Const Only

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Health Club	5.37	1000sqft	0.12	5,370.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - User defined as Visitor's Center.

Construction Phase -

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0381	0.3844	0.2994	4.6000e-004	1.1500e-003	0.0234	0.0245	3.1000e-004	0.0215	0.0218	0.0000	41.1971	41.1971	0.0126	0.0000	41.5117
2020	0.0102	0.1035	0.0874	1.4000e-004	3.4000e-004	6.0200e-003	6.3600e-003	9.0000e-005	5.5400e-003	5.6300e-003	0.0000	12.0412	12.0412	3.7500e-003	0.0000	12.1351
Maximum	**0.0381**	**0.3844**	**0.2994**	**4.6000e-004**	**1.1500e-003**	**0.0234**	**0.0245**	**3.1000e-004**	**0.0215**	**0.0218**	**0.0000**	**41.1971**	**41.1971**	**0.0126**	**0.0000**	**41.5117**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**8-28-2019**	**11-27-2019**	0.2941	0.2941
2	**11-28-2019**	**2-27-2020**	0.2429	0.2429
		Highest	0.2941	0.2941

2.2 Overall Operational

Not Applicable

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	9/14/2019	1/31/2020	5	100	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction	5	2.00	1.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0369	0.3781	0.2904	4.4000e-004		0.0233	0.0233		0.0214	0.0214	0.0000	39.3857	39.3857	0.0125	0.0000	39.6972
Total	**0.0369**	**0.3781**	**0.2904**	**4.4000e-004**		**0.0233**	**0.0233**		**0.0214**	**0.0214**	**0.0000**	**39.3857**	**39.3857**	**0.0125**	**0.0000**	**39.6972**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.6000e-004	5.4100e-003	1.6600e-003	1.0000e-005	2.2000e-004	5.0000e-005	2.7000e-004	6.0000e-005	5.0000e-005	1.1000e-004	0.0000	0.9441	0.9441	6.0000e-005	0.0000	0.9455
Worker	9.5000e-004	9.3000e-004	7.3200e-003	1.0000e-005	9.2000e-004	1.0000e-005	9.3000e-004	2.5000e-004	1.0000e-005	2.5000e-004	0.0000	0.8674	0.8674	7.0000e-005	0.0000	0.8690
Total	**1.2100e-003**	**6.3400e-003**	**8.9800e-003**	**2.0000e-005**	**1.1400e-003**	**6.0000e-005**	**1.2000e-003**	**3.1000e-004**	**6.0000e-005**	**3.6000e-004**	**0.0000**	**1.8114**	**1.8114**	**1.3000e-004**	**0.0000**	**1.8145**

3.2 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.9100e-003	0.1018	0.0850	1.3000e-004		6.0100e-003	6.0100e-003		5.5300e-003	5.5300e-003	0.0000	11.5070	11.5070	3.7200e-003	0.0000	11.6000
Total	**9.9100e-003**	**0.1018**	**0.0850**	**1.3000e-004**		**6.0100e-003**	**6.0100e-003**		**5.5300e-003**	**5.5300e-003**	**0.0000**	**11.5070**	**11.5070**	**3.7200e-003**	**0.0000**	**11.6000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.0000e-005	1.4600e-003	4.2000e-004	0.0000	7.0000e-005	1.0000e-005	8.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.2817	0.2817	1.0000e-005	0.0000	0.2821
Worker	2.7000e-004	2.5000e-004	1.9900e-003	0.0000	2.8000e-004	0.0000	2.8000e-004	7.0000e-005	0.0000	8.0000e-005	0.0000	0.2526	0.2526	2.0000e-005	0.0000	0.2530
Total	**3.3000e-004**	**1.7100e-003**	**2.4100e-003**	**0.0000**	**3.5000e-004**	**1.0000e-005**	**3.6000e-004**	**9.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**0.5343**	**0.5343**	**3.0000e-005**	**0.0000**	**0.5351**

Redwood National and State Park Vistor Center Project - Operational Emissions

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	40.00	Acre	40.00	1,742,400.00	0
Health Club	5.85	1000sqft	0.13	5,847.00	0
User Defined Recreational	1.00	User Defined Unit	0.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2024
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Operational Emissions

Land Use - From TIS

Construction Phase - Operational VMT Only

Vehicle Trips - Trip Gen from TIS, 100% Primary, 171 mi C-C, 20 mi C-NW. User Defined trip gen modified to account for annual trips of Brush Site (941 annual trips)

Table Name	Column Name	Default Value	New Value
tblLandUse	LandUseSquareFeet	5,850.00	5,847.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

tblVehicleTrips	CC_TL	6.60	171.00
tblVehicleTrips	CC_TL	6.60	171.00
tblVehicleTrips	CC_TL	6.60	171.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	CNW_TL	6.60	20.00
tblVehicleTrips	CNW_TL	6.60	20.00
tblVehicleTrips	CNW_TL	6.60	20.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	DV_TP	39.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	9.00	0.00
tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	PR_TP	52.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	ST_TR	22.75	2.85
tblVehicleTrips	ST_TR	20.87	37.38
tblVehicleTrips	ST_TR	0.00	2.58
tblVehicleTrips	SU_TR	16.74	2.85
tblVehicleTrips	SU_TR	26.73	37.38
tblVehicleTrips	SU_TR	0.00	2.58
tblVehicleTrips	WD_TR	1.89	2.85
tblVehicleTrips	WD_TR	32.93	37.38
tblVehicleTrips	WD_TR	0.00	2.58

2.0 Emissions Summary

2.1 Overall Construction

Not Applicable

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0460	0.0000	4.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.4000e-004	8.4000e-004	0.0000	0.0000	8.9000e-004
Energy	1.1000e-004	1.0100e-003	8.5000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	8.3753	8.3753	3.5000e-004	9.0000e-005	8.4103
Mobile	0.8382	6.7482	17.3104	0.0567	4.7961	0.0576	4.8537	1.2913	0.0542	1.3456	0.0000	5,193.3784	5,193.3784	0.1825	0.0000	5,197.9396
Waste						0.0000	0.0000		0.0000	0.0000	7.4660	0.0000	7.4660	0.4412	0.0000	18.4967
Water						0.0000	0.0000		0.0000	0.0000	0.1098	49.2867	49.3965	0.0135	7.3000e-004	49.9508
Total	**0.8843**	**6.7492**	**17.3117**	**0.0567**	**4.7961**	**0.0577**	**4.8538**	**1.2913**	**0.0543**	**1.3456**	**7.5758**	**5,251.0413**	**5,258.6171**	**0.6375**	**8.2000e-004**	**5,274.7983**

3.0 Construction Detail

Not Applicable

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.8382	6.7482	17.3104	0.0567	4.7961	0.0576	4.8537	1.2913	0.0542	1.3456	0.0000	5,193.3784	5,193.3784	0.1825	0.0000	5,197.9396
Unmitigated	0.8382	6.7482	17.3104	0.0567	4.7961	0.0576	4.8537	1.2913	0.0542	1.3456	0.0000	5,193.3784	5,193.3784	0.1825	0.0000	5,197.9396

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	114.00	114.00	114.00	3,764,974	3,764,974
Health Club	218.67	218.67	218.67	9,224,915	9,224,915
User Defined Recreational	2.58	2.58	2.58	160,590	160,590
Total	335.25	335.25	335.25	13,150,478	13,150,478

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	14.70	171.00	20.00	33.00	48.00	19.00	100	0	0
Health Club	14.70	171.00	20.00	16.90	64.10	19.00	100	0	0
User Defined Recreational	14.70	171.00	20.00	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.506370	0.040262	0.210861	0.130062	0.033832	0.005682	0.014144	0.046470	0.003574	0.001376	0.005181	0.001483	0.000702
Health Club	0.506370	0.040262	0.210861	0.130062	0.033832	0.005682	0.014144	0.046470	0.003574	0.001376	0.005181	0.001483	0.000702
User Defined Recreational	0.506370	0.040262	0.210861	0.130062	0.033832	0.005682	0.014144	0.046470	0.003574	0.001376	0.005181	0.001483	0.000702

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	7.2801	7.2801	3.3000e-004	7.0000e-005	7.3086
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	7.2801	7.2801	3.3000e-004	7.0000e-005	7.3086
NaturalGas Mitigated	1.1000e-004	1.0100e-003	8.5000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.0952	1.0952	2.0000e-005	2.0000e-005	1.1017
NaturalGas Unmitigated	1.1000e-004	1.0100e-003	8.5000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.0952	1.0952	2.0000e-005	2.0000e-005	1.1017

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	20523	1.1000e-004	1.0100e-003	8.5000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.0952	1.0952	2.0000e-005	2.0000e-005	1.1017
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.1000e-004**	**1.0100e-003**	**8.5000e-004**	**1.0000e-005**		**8.0000e-005**	**8.0000e-005**		**8.0000e-005**	**8.0000e-005**	**0.0000**	**1.0952**	**1.0952**	**2.0000e-005**	**2.0000e-005**	**1.1017**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Health Club	25025.2	7.2801	3.3000e-004	7.0000e-005	7.3086
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**7.2801**	**3.3000e-004**	**7.0000e-005**	**7.3086**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0460	0.0000	4.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.4000e-004	8.4000e-004	0.0000	0.0000	8.9000e-004
Unmitigated	0.0460	0.0000	4.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.4000e-004	8.4000e-004	0.0000	0.0000	8.9000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.7800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0392					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	4.0000e-005	0.0000	4.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.4000e-004	8.4000e-004	0.0000	0.0000	8.9000e-004
Total	**0.0460**	**0.0000**	**4.3000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**8.4000e-004**	**8.4000e-004**	**0.0000**	**0.0000**	**8.9000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	49.3965	0.0135	7.3000e-004	49.9508
Unmitigated	49.3965	0.0135	7.3000e-004	49.9508

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 47.6593	48.5262	2.1900e-003	4.5000e-004	48.7163
Health Club	0.345987 / 0.212057	0.8703	0.0113	2.7000e-004	1.2345
User Defined Recreational	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**49.3965**	**0.0135**	**7.2000e-004**	**49.9508**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	7.4660	0.4412	0.0000	18.4967
Unmitigated	7.4660	0.4412	0.0000	18.4967

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	3.44	0.6983	0.0413	0.0000	1.7300
Health Club	33.34	6.7677	0.4000	0.0000	16.7667
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**7.4660**	**0.4412**	**0.0000**	**18.4967**

Appendix D – Special-status Wildlife Evaluation and Wildlife Surveys for the Redwood National and State Park Visitor Center and Restoration Project, GHD 2019c

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August 15, 2019

To:	Petra Unger (AECOM/Save The Redwoods League)	Ref. No.:	11187543.120.2
From:	Ken Mierzwa and Genevieve Rozhon (GHD)	Tel:	707-443-8326
CC:	Misha Schwarz (GHD)	Tel:	707-443-8326

Subject: **Special-Status Wildlife Evaluation and Wildlife Surveys for the Redwood National and State Park Visitor Center and Restoration Project**

1. Introduction

Site visits were conducted to inventory avian and terrestrial wildlife at the Redwood National and State Park Visitor Center and Restoration Project (Project) site and to evaluate the site's potential to provide habitat for special-status wildlife species. The wildlife species evaluations were not protocol-level and were intended to document known special-status species presence and identify additional potential species and habitat that could be present within the Project Area. The results of these field efforts will provide baseline information to analyze the proposed project's potential impacts to special-status wildlife. If applicable, the information will also be applied to avoid, minimize, and/or mitigate potential impacts associated with Project activities, guide future management goals and decisions, and inform the necessary environmental documents and permits needed for the Project. Results of surveys for special-status plants (and associated environmental analysis) are provided in a separate memo (GHD 2018). Potential impact to wetlands and other sensitive natural vegetation communities will be analyzed in the biological resources section of the environmental documentation pursuant to the California Environmental Quality Act (CEQA) for the Project.

The emphasis of the wildlife surveys was on amphibians, reptiles, and birds, with a lesser focus on mammals. GHD made no attempt to sample fish or aquatic invertebrate assemblages, because past data available for Prairie Creek and its tributaries (Wilzbach and Ozaki 2017) contributes substantial information to the characterization of aquatic conditions within the Project Area.

1.1 Location

The Project Area is located north of Orick, California (Figures 1 and 2, Appendix C). The site is accessed from the south via Bald Hills Road, and it is bounded on the west by U.S. 101. The Pacific Ocean is located approximately 3.5 km west of the site. The confluence of Prairie Creek and Redwood Creek is located less than 0.2 km southwest of the downstream end of the site. Portions of the Project Area are bordered by Redwood National Park to the east.

For purposes of wildlife surveys, GHD defined a Wildlife Study Boundary (WSB) as shown in Figure 2 which is the same as the Project Area. The WSB includes lower Prairie Creek, the associated floodplain and terrace areas proposed for ground disturbance (cut or fill) including the Upper and Lower Road which traverse along the northern and northeastern property boundaries, and the former Orick Mill A site as seen by the concrete pads and asphalt located in the southern section of the property, potential adjacent staging areas (within the proposed restoration area), and portions of the lower forested slope (see Figure 2 and Figure 3 in Appendix C). Highway 101 serves as an effective barrier for some smaller terrestrial species and has existing noise, vibration, and traffic influences on the adjacent area. For the remainder of the area that is not adjacent to Highway 101, GHD examined up to a 500-foot buffer beyond the WSB in inaccessible areas to the degree feasible with binoculars to account for more mobile species (predominantly avian species) which occur in proximity to the Project Area and may be affected by construction noise or visual impacts. To account for the mobility of some wildlife species and because Project impacts can extend well beyond the actual ground disturbance footprint, the study area for smaller terrestrial and semi-aquatic species (species which can be found in both terrestrial and aquatic habitats such as amphibians), included areas to the east and a short distance up adjacent forested slopes. Beyond that distance or where obstructions preclude visual analysis, we relied on remote sensing and aerial photograph interpretation to assess nearby habitat types. In general, the WSB includes the Project Area, a short distance up the forested slopes east of the Project Area, and areas approximately 500 feet beyond the Project Area not adjacent to Highway 101 which were assessed via binoculars.

1.2 Environmental Setting

Wilzbach and Ozaki (2017) described the Prairie Creek watershed as follows:

> “Prairie Creek drains 103 km^2 of the northwestern portion of the 731 km^2 Redwood Creek basin, in coastal northern California. The largest and most pristine of the Redwood Creek tributaries, Prairie Creek, enters Redwood Creek close to its mouth, at river km 5.6. Redwood Creek flows into the Pacific Ocean 2.7 km west of the town of Orick, California. The Prairie Creek sub-basin is composed of forested terrain from approximately 8 m to 692 m in elevation, nearly all (98%) of which is in public ownership, and managed by Redwood National and State Parks.”

The Prairie Creek sub-basin is 93 percent forested, and almost half of that forest is late seral stands of coast redwood (*Sequioa sempervirens*) and other conifers (Wilzbach and Ozaki 2017).

Bueno (2015) provides a detailed land use history for the Orick Mill A site, which includes the Project Area east of lower Prairie Creek. In summary, early settlers mentioned large Sitka spruce trees and heavy growth of alder and various shrubs on the Orick floodplain with some open wet meadows. They also commented that the trees were cut and stumps blasted or burned to open up ranching lands. From the 1880s the “partially wooded” land passed through a series of questionable transactions by timber speculators. The area was then used as a ranch beginning in 1907. A 1948 aerial photograph shows almost the entire Project Area cleared and more open than it is today, with Bald Hills Road running north of its present location, bisecting the property.

In about 1958-1960, Mill A was constructed by Arcata Redwood Company and Bald Hills Road was relocated to its present position at this time. In a 1958 photo, the riparian area along Prairie Creek within the Project Area was limited to a few scattered patches of trees on the immediate bank, with portions at the north and south ends of the site completely open. The same photo shows the timbered slopes to the northeast relatively intact, but other adjacent slopes to the east and west partly to almost completely logged.

Save The Redwoods League purchased the property in 2013. Today the Project Area remains relatively open, with dense riparian trees and shrubs along the immediate Prairie Creek banks. See Figure 3 – Project Area Streams, Wetlands and Paved Infrastructure for a visual representation of existing hydrology and infrastructure within the Project Area. Prairie Creek flows along the entire length of the westerly Project Area before joining Redwood Creek just downstream of the Project Area. Four tributaries (Skunk Cabbage Creek, Libby Creek, Otter Creek, and an Unnamed Tributary) join Prairie Creek within the Project Area. The headwaters to Libby Creek, Otter Creek and the Unnamed Tributary are in the forested area to the east, and each creek flows through culvert crossings beneath the Upper and Lower Roads before discharging into the wetlands east of Prairie Creek. These tributaries do not have defined channels within the wetland, and the wetland area ultimately drains into a drainage ditch that flows to Prairie Creek. These wetlands grade into forested seeps in the northern half of the property, adjacent to the Lower Road, below the base of the forested slopes. An open grassy area exists adjacent (south of) Libby Creek and to the wetlands mentioned above (featured within the enclosed polygon area on Figure 3 in Appendix C). This area was previously disturbed and received fill in order to create living accommodations for mill workers, and is the location of the proposed Ceremonial Brush Dance Site. An old growth redwood tree, termed the Centennial Tree, exists along the Lower Road approximately 175 meters from Highway 101. An elevated tree canopy walkway is proposed at this location under the Project, and would extend west from the Upper Road to the Lower Road, and allow visitors to view the base of the Centennial Tree canopy at approximately fifty feet above the ground. Emergent seasonal wetlands are also present on parts of the open areas east of Prairie Creek, with many showing signs of degradation. The wooded slopes to the east and within the WSB include areas of late seral stage redwood forest with numerous snags and down woody debris, and second-growth but relatively mature stands. More detailed information on wetlands and special-status plants can be found in other GHD reports prepared for the Project.

1.3 Regulatory Setting

Special-status animal species include those listed as endangered (E), threatened (T), and candidate (C) species by U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) under the U.S. Endangered Species Act (ESA), or by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act (CESA), and species on the most recent CDFW special animals list (CDFW 2019b).

2. Methods

2.1 Pre-Survey Database Review

Prior to initiating field work, database searches were conducted of the California Natural Diversity Database (CNDDB) in 2018 and subsequently in 2019 (CDFW 2019a), USFWS, and NMFS listed/proposed threatened and endangered species list to compile a list of potential special-status species that are known to occur in the Project vicinity and/or have the potential to occur at the Project Area. Relevant literature was also reviewed, including recovery plans, status reports, published articles, species lists maintained by various entities, and previous regulatory review documents, when available. Topographic maps and aerial photography were also consulted prior to and during the field survey to determine potential habitats for target special-status species occurrence.

The resulting list of special-status wildlife species contains taxa that may occur in the Project Area because habitat is suitable and the Project is within or near the known range of the species. The list included species with potential to occur on the USGS 7.5 Minute quadrangles in which the Project is located (Orick), as well as the surrounding five quads (Fern Canyon, Rodgers Peak, Ah Pah Ridge, Holter Ridge, and Bald Hills), deemed the assessment area. Due to the Project's coastal location, the available five surrounding quads were included in the assessment area, as oppose to the typical eight surrounding quads as is common in non-coastal project sites. The queries yielded seventy-seven special-status species previously documented in the assessment area. Of these taxa, several species have a moderate to high probability of occurring within the WSB and two have thus far been documented as present during GHD site visits (Appendix B). Of the seventy-seven special-status species queried to potentially occur within the assessment area, six species have no potential of occurring due to the absence of suitable habitat. These species are excluded from further consideration and include: Western Snowy Plover (*Charadrius nivosus nivosus*), Short-tailed Albatross (*Phoebastria albatrus*), Green Sea Turtle (*Chelonia mydas*), Leatherback Sea Turtle (*Dermochelys coriacea*), Olive Ridley Sea Turtle (*Lepidochelys olivacea*), Tidewater Goby (*Eucyclogobius newberryi*). See Appendix B for a list of special-status wildlife species queried to occur in the assessment area that were either observed as present or contain a low, moderate or high potential of occurring within the Project Area.

2.2 Survey Methods

A preliminary site visit was conducted on September 20, 2017 by Ken Mierzwa (GHD), Mary Burke (CalTrout), and Christine Aralia (Save the Redwoods League). The preliminary site visit included a walking tour and review of the site in the late afternoon and until dusk, and then a nocturnal survey of a portion of Prairie Creek using headlamps.

Additional survey efforts took place during a second site visit on May 24, 2018. Genevieve Rozhon (GHD) conducted an avian survey from 0600 to 1000 hours, followed by a survey for terrestrial and semi-aquatic wildlife, by Ken Mierzwa and Genevieve Rozhon from 1020 to 1430 hours. Conditions were generally mild and overcast with light winds during the May 24th survey.

A more focused survey took place on September 19, 2018 with the emphasis on selected semi-aquatic species. This visit was conducted by Ken Mierzwa. The survey was relatively brief, lasting from 1100 through 1400 hours.

Detailed sampling of Libby Creek was conducted by Ken Mierzwa on May 30, 2019 from 1130 to 1345 hours. This sampling was intended to monitor aquatic amphibian larvae within a 50-meter stream segment centered on a concrete impoundment within Libby Creek.

An additional avian survey was conducted by Genevieve Rozhon on June 5, 2019 from 0600 to 1000 hours. Conditions were mild with sunny skies and wind speeds below 5 mph.

Visual encounter surveys were the primary method used for amphibians and reptiles (Heyer et al. 1994). Observers walked through suitable habitat, noting any animals in the open and turning logs, rocks, anthropogenic debris, and other cover objects. In the two high gradient headwater streams (Libby and Otter Creeks), rocks in the splash zone were turned and gravel in riffles, runs, and glides disturbed to dislodge larvae and aquatic adults, with a dipnet placed across the stream below the sample area. In the May 2019 stream survey, riffles and runs were kicked to dislodge larvae into a net. A small ponded area in the open part of the site was also dipnetted to sample for amphibian larvae.

The avian surveys included the proposed Project extent and adjacent vegetation. To the degree feasible, inaccessible areas within 500 feet of the Project's disturbance area were surveyed with binoculars. The survey methods were intended to document avian habitat onsite and to compose a general species list for the Project Area. Where the habitat allowed the surveyor (Genevieve Rozhon) to walk without risk of damaging nests and surrounding vegetation, the survey included a physical search of the area. This included inspecting the ground, shrubs, and trees for the presence of active nests (cup nests, stick nests, mud nests, and cavities) and any songbird or raptor species within them. Additionally, the bark of vegetation and the ground layer under vegetation were inspected for evidence of songbird and raptor species, such as feathers, pellets, or whitewash. Where the habitat was dense or otherwise impenetrable/inaccessible, observations were made from fixed locations.

With a few exceptions, mammals are not likely to be encountered during daytime surveys without use of specialized techniques. We did note mammal sign such as tracks and scat, and recorded observations of large grazers, skeletal remains, and other incidental observations.

As stated above, no attempt was made at this time to sample fish and other fully aquatic organisms in Prairie Creek. See Wilzbach and Ozaki (2017) for an overview of past datasets in the drainage. Fish species in Prairie Creek will be addressed by other Project collaborators.

3. Results

Key habitat types within or near the Project Area include old growth redwood forest on slopes to the east outside of the Project Area, three small high-gradient streams (Libby Creek, Otter Creek and the Unnamed Tributary) bordered by late seral stage forest and with excellent instream habitat structure (gravel/cobble/boulder substrate with little sedimentation and considerable interstitial space), riparian habitat adjacent to the creeks (including Prairie Creek), a conifer swamp maintained by flow from the three small creeks and seepage at the base of the slope and with some areas of perennial water (just west of the Lower and Upper Roads), seasonal herbaceous wetlands in the grassland features east of Prairie Creek, and Prairie Creek itself (especially the portion which loops away from Hwy 101). Each of these community types supports or has the potential to support special-status wildlife species. Additionally, the Centennial Tree contains two main trunks, and its crown size and complexity rank among the highest of the species ever measured which is remarkable considering the tree is relatively small and only 630 years old (Sillet and Campbell-Spickler 2017). Mammal species documented via camera traps within the crown of the Centennial Tree include: Red Tree Vole (*Arborimus pomo* or *longicaudus*), Ringtail (*Bassariscus astutus*), Northern Flying Squirrel (*Glaucomys sabrinus*), Shadow Chipmunk (*Noetamias senex*), Dusky-footed Woodrat

(*Neotoma fuscipes*), Fisher (*Pekania pennant*), Deer Mouse (*Peromyscus maniculatus*), and Douglas Squirrel (*Tamiasciurus douglasii*) (Sillet and Campbell-Spickler 2017).

Upland non-native herbaceous communities east of Prairie Creek and the degraded pavement of the Orick Mill site contain fewer native elements and tend to be dominated by common wildlife adapted to human disturbance.

Restoration of natural habitat types, especially expansion of riparian habitat along Prairie Creek and a continuous transition from there into conifer forest to the east, along with longer-term buffer restoration and reduction of forest fragmentation has the potential to greatly enhance conditions for a diverse array of wildlife.

3.1 Semi-aquatic Species

We documented the presence of ten semi-aquatic species comprised of seven amphibian species and three reptile species within the WSB. Most are common species, although two are special-status species.

Southern Torrent Salamanders (*Rhyacotriton variegatus*), CDFW Species of Special Concern (SSC) were observed on both site visits and in small tributaries of Prairie Creek (Libby Creek and Otter Creek). A large larvae was observed below the impoundment in Libby Creek in September 2017, and an adult was observed in Otter Creek a short distance to the north in May 2018. The adult was under mossy cobbles in the splash zone of a small waterfall about fifty meters above the Upper Road. A small adult and a larvae were found in Libby Creek above the impoundment in May 2019. Relatively little effort was required to document presence, thus presence throughout the high gradient, forested portion of both small tributaries should be assumed. There is no suitable habitat for this species on level portions of the site to the west of the base of the slope.

Northern Red-legged Frogs (*Rana aurora*, CDFW SSC) were observed in two areas on multiple visits: in a small remnant ponded area at the northwest corner of the former Orick Mill site which contains asphalt over approximately 20 acres, and within and adjacent to an extensive forested seepage and wetland complex just west of the Lower Road and north of the Libby Creek outfall. Small juveniles including some with remnant tail stubs were observed in both locations indicating breeding and successful recruitment in both areas. In May 2019, some of these juveniles were foraging in damp vegetation alongside the road immediately above the forested wetland.

Although not observed within the WSB (and thus not included in Table 1), presence of Foothill Yellow-legged Frog (CESA-candidate) was confirmed immediately to the south of the Project Area in Redwood Creek in September 2018. Tadpoles were observed about 80 meters directly south of the entrance gate, and the species is well documented from other parts of Redwood Creek. GHD did not observe any optimal FYLF habitat such as waterways that are located in sunny conditions, with cobble substrate, and visible flow but containing refugia from the fastest current, within the WSB and if FYLF enters the area it is likely as an occasional dispersing individual.

Other semi-aquatic species observed during site visits are relatively common in the region and do not have special status. A few additional species potentially present are covered below in the discussion section.

Table 1. Semi-aquatic Species Survey Results

Scientific Name	Common Name	Listing Status	Approximate Number of Individuals	Location and habitat
Dicamptodon tenebrosus	Pacific Giant Salamander	None	40 larvae of various sizes	Libby Creek, Otter Creek, seeps along upper road; high-gradient stream and seep
Rhyacotriton variegatus	Southern Torrent Salamander	CDFW SSC	2 adult and 2 larvae	Libby Creek and Otter Creek; high-gradient stream, in and near splash zone
Batrachoseps attenuatus	Western Slender Salamander	None	7, including adults and juveniles	Near road margins; *Sequioa sempervirons* Alliance
Ensatina eschscholtzii	Ensatina	None	4, including adults and juveniles	Near road margins; *Sequioa sempervirons* Alliance
Anaxyrus boreas	Western Toad	None	8, including adults and juveniles	North end of former Orick Mill site, Ceremonial Site; non-native grassland
*Pseudacris regilla**	Pacific Chorus frog	None	12+, including 4 adults and multiple tadpoles and egg masses	North end of former Orick Mill site, small man-made pond and nearby non-native grassland and in forested seeps at base of slopes
Rana aurora	Northern Red-legged Frog	CDFW SSC	14+ subadults and recent metamorphs, plus several tadpoles	North end of former Orick Mill site, small man-made pond and in forested seeps at base of slopes and along adjacent vegetated road margin
Elgaria coerulea	Northern Alligator Lizard	None	4 adults and juveniles	Ceremonial Brush Dance site; open grassy area
Thamnophis elegans	Coast Garter Snake	None	3 sub adults	North of former Orick Mill site,

Table 1. Semi-aquatic Species Survey Results

Scientific Name	Common Name	Listing Status	Approximate Number of Individuals	Location and habitat
				under boards in non-native grassland
Thamnophis sirtalis	Common Garter Snake	None	5 adults	North of former Orick Mill site, under boards in non-native grassland near forest edge

*The species boundary between *Pseudacris regilla* and *P. sierra* is uncertain at this time pending future genetic studies. We are retaining the older *P. regilla* usage for this memo.

3.2 Raptors

Several species of raptors (Osprey, Red-shouldered Hawk, Red-tailed Hawk, Northern Harrier, Bald Eagle, etc.) have potential to occur on or adjacent to the Project Area. No raptor nests were noted within the Project Area during the May 24th, 2018 and June 5th, 2019 avian surveys. However, many large trees that could support nests are present at the site.

3.3 Other Avian Species

GHD conducted avian surveys of the site on May 24th, 2018 and June 5, 2019 (during the avian nesting season). A list of avian species observed or heard is included in Table 2. Numerous tree cavities (habitat for birds as well as bats and mesocarnivores, or species whose diet consists of 30 to 70 percent meat) were observed onsite and some were currently in use by nesting avian species (i.e. Tree Swallows). In addition, structures onsite such as the old barn contained numerous swallow nests (evidence of a colony) (note: the structures were removed between the 2018 and 2019 surveys in March 2019). A total of 43 avian species were observed or heard during the survey (Table 2). Evidence of breeding activity (i.e. active nests) by Black Phoebes, Barn Swallows, Tree Swallows, House Finches, Wilson's Warblers, Chestnut-backed Chickadees, White-crowned Sparrows, and Cedar Waxwings was also observed onsite. In addition, significant territorial behavior and pre-breeding activity was observed by other species (observed both Violet-green Swallows and Warbling Vireos engaging in copulation). Overall, the site provides considerable nesting and foraging habitat for a variety of avian species and the adjacent coniferous forest habitat likely serves as potential habitat for other nocturnal/crepuscular species not observed during the May 24th and June 5th surveys, such as Northern Spotted Owls and Marbled Murrelets (both federally and state-listed). Although the riparian corridor along Prairie Creek is heavily overgrown with invasive plants such as Himalayan blackberry, the area could serve as low quality breeding habitat for species such as the Little Willow Flycatcher (state listed as endangered) and Yellow Warbler (SSC). Special-status avian species may occur at the site both seasonally and year-round.

Table 2. Avian Survey Results

Alpha Code	Common Name	Latin Name	Special Status	Highest Breeding Status
AMGO	American Goldfinch	*Spinus tristis*	None	Encountered in study area
TRES	Tree Swallow	*Tachycineta bicolor*	None	Active nest
AMRO	American Robin	*Turdus migratorius*	None	Encountered in study area
PSFL	Pacific-slope Flycatcher	*Empidonax difficilis*	None	Territorial song or drumming heard
SWTH	Swainson's Thrush	*Catharus ustulatus*	None	Territorial song or drumming heard
SOSP	Song Sparrow	*Melospiza melodia*	None	Territorial behavior
BARS	Barn Swallow	*Hirundo rustica*	None	Active nest
NRWS	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	None	Encountered in study area
ANHU	Anna's Hummingbird	*Calypte anna*	None	Territorial song or drumming heard.
CAQU	California Quail	*Callipepla californica*	None	Encountered in study area
TUVU	Turkey Vulture	*Cathartes aura*	None	Encountered flying over study area
HOSP	House Sparrow	*Passer domesticus*	None	Local young fed by parents
WCSP	White-crowned Sparrow	*Zonotrichia leucophrys*	None	Encountered in study area
HOFI	House Finch	*Haemorhous mexicanus*	None	Active nest
CORA	Common Raven	*Corvus corax*	None	Encountered in study area
CEDW	Cedar Waxwing	*Bombycilla cedrorum*	None	Active nest
WAVI	Warbling Vireo	*Vireo gilvus*	None	Copulation observed
WEWP	Western Wood-Pewee	*Contopus sordidulus*	None	Territorial song or drumming heard
WREN	Wrentit	*Chamaea fasciata*	None	Territorial behavior
BHCO	Brown-headed Cowbird	*Molothrus ater*	None	Encountered in study area
EUST	European Starling	*Sturnus vulgaris*	None	Encountered in study area

Table 2. Avian Survey Results

Alpha Code	Common Name	Latin Name	Special Status	Highest Breeding Status
BLPH	Black Phoebe	*Sayornis nigricans*	None	Active nest
VGSW	Violet-green Swallow	*Tachycineta thalassina*	None	Copulation observed
PAWR	Pacific Wren	*Troglodytes pacificus*	None	Territorial behavior
WIWA	Wilson's Warbler	*Cardellina pusilla*	None	Copulation or courtship observed
MAWR	Marsh Wren	*Cistothorus palustris*	None	Territorial behavior
VATH	Varied Thrush	*Ixoreus naevius*	None	Encountered in study area
BHGR	Black-headed Grosbeak	*Pheucticus melanocephalus*	None	Encountered in study area
NOFL	Northern Flicker	*Colaptes auratus*	None	Encountered in study area
RTHA	Red-tailed Hawk	*Buteo jamaicensis*	None	Encountered flying over study area
GCKI	Golden-crowned Kinglet	*Regulus satrapa*	None	Territorial behavior
WETA	Western Tanager	*Piranga ludoviciana*	None	Encountered in study area
BTPI	Band-tailed Pigeon	*Patagioenas fasciata*	None	Encountered flying over study area
STJA	Steller's Jay	*Cyanocitta stelleri*	None	Carrying nesting material
ALHU	Allen's Hummingbird	*Selasphorus sasin*	None	Encountered in study area
DOWO	Downy Woodpecker	*Picoides pubescens*	None	Encountered in study area
CBCH	Chestnut-backed Chickadee	*Poecile rufescens*	None	Carrying nesting material
BRCR	Brown Creeper	*Certhia americana*	None	Encountered in study area
CAGO	Canada Goose	*Branta canadensis*	None	Encountered flying over study area
OCWA	Orange-crowned Warbler	*Oreothlypis celata*	None	Encountered in study area
CAVI	Cassin’s Vireo	*Vireo cassinii*	None	Encountered in study area
SPTO	Spotted Towhee	*Pipilo maculatus*	None	Encountered in study area
HAWO	Hairy Woodpecker	*Leuconotopicus villosus*	None	Encountered in study area

3.4 Mammals

Only common mammal species were observed during site visits, although no extensive surveys were attempted.

Table 3. Mammal Incidental Observations

Scientific Name	Common Name	Listing Status	Approximate Number of Individuals	Location and habitat
Procyon lotor	Raccoon	None	Numerous tracks	Numerous locations throughout site
Ursus americanus	Black Bear	None	1 juvenile (incidentally observed during 7/11/19 site visit); tracks and scat	Lower road
Microtus californicus	California Vole	None	7, including adults and juveniles	North of former Orick Mill site, under boards in non-native grassland near forest edge
Cervus canadensis roosevelti	Roosevelt Elk	None	Numerous	Open portions of site, observed on two of three visits
Odocoileus hemionus	Black-tailed Deer	None	2 does	Observed 2 does onsite in the vicinity of the grassy open portions of the site

4. Discussion

The purpose of the wildlife surveys was to identify the presence of special-status avian, terrestrial, and semiaquatic wildlife at the Project Area at a preliminary level, and to note habitat types which may support these and other special-status species identified during the pre-survey database review (see Appendix B). No attempt was made to conduct protocol-level surveys or to exhaustively survey every habitat. Additional field work including pre-construction surveys is anticipated in the future as the Project moves through permitting and construction. Fully aquatic species were not part of the present scope, as considerable information on Prairie Creek is available from others sources.

Below we briefly summarize a few key special-status species known to be present and those which potentially may occur, and discuss important habitat types.

Torrent salamanders (*Rhyacotriton variegatus*, CDFW SSC) were observed in Libby and Otter Creeks and appear to be moderately common in those high-gradient streams. Although seeps on the nearby lower slope could also be occupied, there is no suitable habitat on the more level portions of the site to the west of Lower Road.

Although not noted in early surveys, Pacific Tailed Frogs, *Ascaphus truei* (CDFW SSC) occupy similar high-gradient stream habitat including tributaries of upper Prairie Creek, and numerous CNDDB records are available within a few miles of the Project Area. There is a high probability that they are present in Libby and Otter Creeks.

Northern Red-legged Frogs (*Rana aurora*, CDFW SSC) are relatively common in certain portions of the Project Area and potential habitat is extensive in the forested seeps and wetlands and adjacent open/herbaceous wetlands west of the Lower and Upper Roads in the northern central portion of the Project Area. There are excellent opportunities to expand available habitat for this species and expand population size in the longer term as part of the Project. Individual frogs could be encountered in much of the WSB, although highest densities are concentrated in areas where little or no work is anticipated.

Foothill Yellow-legged Frogs (*Rana boylii*, CESA candidate) were not observed within the Project Area and the requisite cobble streambed habitat is scarce or absent within the site including in the relatively low gradient Lower Prairie Creek. This species is present in Redwood Creek within eighty meters of the wildlife study boundary. A CESA listing decision is expected in late 2019 or early 2020.

Western Pond Turtle (*Emys marmorata*, CDFW SSC) was not noted during active season visits in May and September; the fall visit focused on this species and it was conducted under good weather conditions. Although pond turtles are likely not abundant in the Project vicinity, in part because of relatively cool coastal conditions, they have been reported in low numbers within nearby park areas including in Redwood Creek.

Little Willow Flycatchers (*Empidonax traillii brewsteri*, State Endangered) were not detected during site visits to the Project Area, but the species has been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as September 2018, with additional records nearby during the breeding season (eBird 2019). These sightings were of individual birds. Some low quality breeding and foraging habitat for the species is present within the Project Area along the riparian corridor of Prairie Creek. This area is considered low quality because it is heavily overgrown with invasive plants such as Himalayan blackberry.

Yellow Warblers (*Setophaga petechia*, CDFW SSC) and Yellow-breasted Chats (*Icteria virens*, CDFW SSC) were not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (eBird 2019). Low quality breeding and foraging habitat for the species is present at the Project Area along the riparian corridor of Prairie Creek.

Northern Spotted Owls (*Strix occidentalis caurina*, Federally and State Threatened) were not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding and foraging habitat for the species is present adjacent to the Project Area in late seral forest habitat in NPS property.

Marbled Murrelets (*Brachyramphus marmoratus*, Federally and State Threatened) were not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity, specifically immediately east of the Project Area (LACO 2012). Some breeding and foraging habitat for the species is present adjacent to the Project Area in late seral forest habitat in NPS property.

Northern Harriers (*Circus hudsonius*, CDFW SSC) were not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding and foraging habitat for the species is present in the Project vicinity near marshes, wetlands, grasslands and areas of coastal scrub along Redwood Creek.

Bald Eagles (*Haliaeetus leucocephalus*, State Endangered) were not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding habitat for the species is present adjacent to the Project Area in the forested corridor along Redwood Creek, and old growth stands east in NPS property.

Special-status bats may occur in several areas of the Project Area, including in the Prairie Creek corridor. Acoustic surveys were not conducted as part of this survey although some data are available from earlier studies within the nearby park. Based on limited available information we assume presence of up to several CDFW SSC bat species.

The Sonoma Tree Vole (*Arborimus pomo*, CDFW SSC) has been detected in the Centennial Tree at the Project Area and breeding habitat is assumed to be present.

Humboldt Marten (*Martes caurina humboldtensis*, State Endangered) is mostly known from more inland sites. However, a few individual sightings have been made over the past several years within Prairie Creek Redwoods State Park several miles north of the Project Area. (USFWS 2018). Given the proximity of old growth forest habitat with many of the required habitat elements for this species, occasional presence on the edge of the Project Area is presumed, although at any given time it is considered unlikely.

Pacific Fisher (*Pekania pennanti*) is slightly more widespread than the Humboldt Marten and an older record of the species occurring from 1991 is available a few miles southeast of the Project Area (CNDDB 2019). The species has also been detected using the Centennial Tree onsite (Sillet and Campbell-Spickler 2017). Given the proximity of old growth forest habitat with many of the required habitat elements for this species, occasional presence on the edge of the Project Area is presumed, although at any given time it is considered unlikely.

Although not addressed in detail in the present report, Coastal Cutthroat Trout, Coho Salmon, Chinook Salmon, Steelhead, Pacific Lamprey, and Eulachon have all been detected in Prairie Creek, with the watershed serving as suitable and productive breeding habitat for several of these species (Wilzbach and Ozaki 2017). Special-status mussel species may also be present onsite (CDFW 2019).

Avoidance, minimization, and mitigation measures will need to be developed in conjunction with CDFW and USFWS during the permitting process.

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Appendix A. Photographs

Photograph 1. A bull Roosevelt Elk just above the east bank of Prairie Creek, September 19, 2018.

Foothill Yellow-legged Frog tadpole in Redwood Creek just south of the Project Area; September 19, 2018

Appendix B. Special-status Wildlife Species Lists (CNDDB, IPaC, NMFS)

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
							Mammals			
Antrozous pallidus	Pallid Bat	None	None	G5	S3	BLM-S, CDFW-SSC, IUCN-LC, USFS-S, WBWG-H	Chaparral | Coastal scrub | Desert wash | Great Basin grassland | Great Basin scrub | Mojavean desert scrub | Riparian woodland | Sonoran desert scrub | Upper montane coniferous forest | Valley & foothill grassland	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting.	Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Low Potential.** Project area does not provide xeric habitat preferred by this species. However, there is a record of this species from the vicinity of the Bald Hills (CDFW 2019).
Arborimus pomo	Sonoma Tree Vole	None	None	G3	S3	CDFW-SSC, IUCN-NT	North coast coniferous forest | Old growth | Redwood	North coast fog belt from Oregon border to Sonoma County. In Douglas-fir, redwood & montane hardwood-conifer forests.	Feeds almost exclusively on Douglas-fir needles. Will occasionally take needles of grand fir, hemlock or spruce.	**High Potential.** Project Area located in North Coast fog belt, and Douglas-fir trees located within the Project area. Possible species detection in Centennial Tree (Sillett and Campbell-Spickler 2017).
Corynorhinus townsendii	Townsend's Big-eared Bat	None	None	G3G4	S2	BLM-S, CDFW-SSC, IUCN-LC, USFS-S, WBWG-H	Broadleaved upland forest | Chaparral | Chenopod scrub | Great Basin grassland |	Throughout California in a wide variety of habitats. Most common in mesic sites.	Roosts in the open, hanging from walls and ceilings. Roosting sites limiting.	**Moderate Potential.** No records of the species from the immediate Project Area. However,

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
							Great Basin scrub | Joshua tree woodland | Lower montane coniferous forest | Meadow & seep | Mojavean desert scrub | Riparian forest | Riparian woodland | Sonoran desert scrub | Sonoran thorn woodland | Upper montane coniferous forest | Valley & foothill grassland		Extremely sensitive to human disturbance.	species is known to roost in Redwood basal hollows (Gellman and Zielinski 1996). Requisite roosting and foraging habitat is present in the Project vicinity.
Erethizon dorsatum	North American Porcupine	None	None	G5	S3	IUCN-LC	Broadleaved upland forest | Cismontane woodland | Closed-cone coniferous forest | Lower montane coniferous forest | North coast coniferous forest | Upper montane coniferous forest	Forested habitats in the Sierra Nevada, Cascade, and Coast ranges, with scattered observations from forested areas in the Transverse Ranges.	Wide variety of coniferous and mixed woodland habitat.	**Low Potential.** The species is regionally rare. Although some habitat for the species is present at the Project Area, there are no recent records of this species from the Project vicinity (CDFW 2019).
Lasionycteris noctivagans	Silver-haired Bat	None	None	G5	S3S4	IUCN-LC, WBWG-M	Lower montane coniferous forest | Oldgrowth | Riparian forest	Primarily a coastal and montane forest dweller, feeding over streams, ponds & open brushy areas.	Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes, and rarely under rocks. Needs drinking water.	**High Potential.** Suitable habitat for this species is present in the Project Area and there are records from the Project vicinity (CDFW 2019, iNaturalist 2019).
Martes caurina humboldtensis	Humboldt Marten	None	Candidate Endangered	G5T1	S1	CDFW-SSC, USFS-S	North coast coniferous forest | Oldgrowth | Redwood	Occurs only in the coastal redwood zone from the Oregon border south to Sonoma County.	Associated with late-successional coniferous forests, prefer forests with	**Low Potential.** There have been two detections of this species in Prairie Creek Redwoods State Park in the last 15 years, although

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
									low, overhead cover.	the Park does not appear to support a viable population. The primary existing populations are in Del Norte County (CDFW 2018). Occurrence would be unlikely but not impossible.
Myotis evotis	Long-eared Myotis	None	None	G5	S3	BLM-S, IUCN-LC, WBWG-M		Found in all brush, woodland and forest habitats from sea level to about 9000 ft. Prefers coniferous woodlands and forests.	Nursery colonies in buildings, crevices, spaces under bark, and snags. Caves used primarily as night roosts.	**High Potential.** Suitable habitat exists in Project Area and there is a record of this species from the Project vicinity (CDFW 2019).
Myotis yumanensis	Yuma Myotis	None	None	G5	S4	BLM-S, IUCN-LC, WBWG-L/M	Lower montane coniferous forest | Riparian forest | Riparian woodland | Upper montane coniferous forest	Optimal habitats are open forests and woodlands with sources of water over which to feed.	Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings or crevices.	**High Potential.** Suitable habitat exists in Project Area and there is a record of this species from the Project vicinity (CDFW 2019).
Pekania pennanti	Pacific Fisher	None	Candidate Threatened	G5T2T3Q	S2S3	BLM-S, CDFW-SSC, USFS-S	North coast coniferous forest | Oldgrowth | Riparian forest	Intermediate to large-tree stages of coniferous forests and deciduous-riparian areas with high percent canopy closure.	Uses cavities, snags, logs and rocky areas for cover and denning. Needs large areas of mature, dense forest.	**Present.** This species has been detected onsite (in the centennial tree) and suitable habitat is present in the Project Area (Sillett and Campbell-Spicker 2017).
Birds										
Accipiter cooperii	Cooper's Hawk	None	None	G5	S4	CDFW-WL, IUCN-LC	Cismontane woodland | Riparian forest | Riparian woodland | Upper montane coniferous forest	Woodland, chiefly of open, interrupted or marginal type.	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-	**Moderate Potential.** Suitable breeding and foraging habitat is present for this species in the Project Area. In addition, there

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
									plains; also, live oaks.	are a few records of this species from the Project vicinity (eBird 2019).
Accipiter striatus	Sharp-shinned Hawk	None	None	G5	S4	CDFW-WL, IUCN-LC	Cismontane woodland | Lower montane coniferous forest | Riparian forest | Riparian woodland	Ponderosa pine, black oak, riparian deciduous, mixed conifer, and Jeffrey pine habitats. Prefers riparian areas.	North-facing slopes with plucking perches are critical requirements. Nests usually within 275 ft of water.	**Moderate Potential.** Suitable breeding and foraging habitat is present for this species in the Project Area. In addition, there are a few records of this species from the Project vicinity (eBird 2019).
Ardea herodias	Great Blue Heron	None	None	G5	S4	CDF-S, IUCN-LC	Brackish marsh | Estuary | Freshwater marsh | Marsh & swamp | Riparian forest | Wetland	Colonial nester in tall trees, cliffsides, and sequestered spots on marshes.	Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	**Moderate Potential.** There are species records from the vicinity and requisite foraging habitat may be present (eBird 2019).
Bonasa umbellus	Ruffed Grouse	None	None	G5	S3S4	CDFW-WL, IUCN-LC	North coast coniferous forest | Riparian forest | Upper montane coniferous forest	Extreme northern humid coastal strip, in Del Norte, Humboldt, and Siskiyou counties.	Inhabits dense canyon-bottom or stream-side growths, usually of mixed deciduous and coniferous trees.	**Moderate Potential.** Habitat onsite would be considered marginal for the species, and higher quality habitat is present to the east of the Project Area. However, there are a few species occurrences from the Project vicinity (eBird 2019).
Brachyramphus marmoratus	Marbled Murrelet	Threatened	Endangered	G3G4	S1	CDF-S, IUCN-EN NABCI-RWL	Lower montane coniferous forest | Old growth | Redwood	Feeds near-shore; nests inland along coast from Eureka to Oregon border and from Half	Nests in old-growth redwood-dominated forests, up to	**High Potential.** Suitable habitat exists adjacent to Project Area. Known

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
								Moon Bay to Santa Cruz.	six miles inland, often in Douglas-fir.	occurrences of this species have occurred within Project vicinity (CDFW 2019).
Chaetura vauxi	Vaux's Swift	None	None	G5	S2S3	CDFW-SSC, IUCN-LC	Lower montane coniferous forest | North coast coniferous forest | Old growth | Redwood	Redwood, Douglas-fir, & other coniferous forests. Nests in large hollow trees & snags. Often nests in flocks.	Forages over most terrains and habitats but shows a preference for foraging over rivers and lakes.	**Moderate Potential.** Suitable habitat exists within Project Area and there are numerous records from the Project vicinity (eBird 2019).
Circus hudsonius	Northern Harrier	None	None	G5	S3	CDFW-SSC, IUCN-LC	Coastal scrub | Great Basin grassland | Marsh & swamp | Riparian scrub | Valley & foothill grassland | Wetland	Coastal salt & freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas.	Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	**Moderate Potential.** Species not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding and foraging habitat for the species is present adjacent to the Project Area (GHD 2019, eBird 2019).
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Threatened	Endangered	G5T2T3	S1	BLM-S, NABCI-RWL, USFS-S, USFWS-BCC	Riparian forest	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape.	**Low Potential.** Although some riparian habitat is present at the Project Area, there are no records of this species from the Project vicinity and the riparian habitat is considered marginal. The closest recent occurrences of this species to the

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
										Project Area are from the Arcata Marsh (eBird 2019).
Empidonax traillii brewsteri	Little Willow Flycatcher	None	Endangered	G5T3T4	S1S2	USFWS-BCC	Meadow & seep | Riparian woodland	Mountain meadows and riparian habitats in the Sierra Nevada and Cascades.	Nests near the edges of vegetation clumps and near streams.	**Moderate Potential.** The species not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (GHD 2019, eBird 2019). Some marginal breeding and foraging habitat for the species is present at the Project Area.
Falco peregrinus anatum	Peregrine Falcon	Delisted	Delisted	G4T4	S3S4	CDF-S CDFW-FP, USFWS-BCC		Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures.	Nest consists of a scrape or a depression or ledge in an open site.	**Moderate Potential.** The species is relatively common in the Project vicinity, with known breeding pairs in the Park. Although the majority of the records for this species in the Project vicinity are located along the beach to the west, species presence at the site is possible (eBird 2019).

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Haliaeetus leucocephalus	Bald Eagle	Delisted	Endangered	G5	S3	BLM-S, CDF-S, CDFW-FP, IUCN-LC, USFS-S, USFWS-BCC	Lower montane coniferous forest | Oldgrowth	Ocean shore, lake margins, and rivers for both nesting and wintering. Most nests within 1 mile of water.	Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	**Moderate Potential.** Species not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Some breeding habitat for the species is present within the Project vicinity (eBird 2019, GHD 2019).
Icteria virens	Yellow-breasted Chat	None	None	G5	S3	CDFW-SSC, IUCN-LC	Riparian forest | Riparian scrub | Riparian woodland	Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses.	Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 ft of ground.	**Moderate Potential.** The species not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (GHD 2019, eBird 2019). Some breeding and foraging habitat for the species is present at the Project Area.
Nycticorax nycticorax	Black-crowned Night Heron	None	None	G5	S4	IUCN-LC	Marsh & swamp | Riparian forest | Riparian woodland | Wetland	Colonial nester, usually in trees, occasionally in tule patches.	Rookery sites located adjacent to foraging areas: lake margins, mud-bordered bays, marshy spots.	**Low Potential.** Project Area contains aquatic features, however the riparian forest habitat would be considered marginal for the species. Most records of this

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
										species from the Project vicinity are along Redwood Creek, close to the confluence (eBird 2019).
Pandion haliaetus	Osprey	None	None	G5	S4	CDF-S, CDFW-WL,| IUCN-LC	Riparian forest	Ocean shore, bays, freshwater lakes, and larger streams.	Large nests built in tree-tops within 15 miles of a good fish-producing body of water.	**High Potential.** Species not detected during site visits to the Project Area, but the species is known to occur in the Project vicinity. Suitable breeding habitat for the species is present within the Project vicinity (eBird 2019, GHD 2019).
Poecile atricapillus	Black-capped Chickadee	None	None	G5	S3	CDFW-WL, IUCN-LC	Riparian woodland	Inhabits riparian woodlands in Del Norte and northern Humboldt counties.	Mainly found in deciduous tree-types, especially willows and alders, along large or small watercourses.	**Moderate Potential.** Although the species was not detected during GHD surveys in 2018, 2019, there are numerous records of this species from the Project vicinity and some riparian habitat is present onsite (GHD 2019, eBird 2019).
Riparia riparia	Bank Swallow	None	Threatened	G5	S2	BLM-S, IUCN-LC	Riparian scrub | Riparian woodland	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**Low Potential.** Project Area contains limited vertical banks. Incised channel of Libby Creek and Prairie Creek may provide marginal breeding habitat. Closest known species records

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
										are from the Thomas A. Kuchel Park Visitor Center (eBird 2019).
Setophaga petechia	Yellow Warbler	None	None	G5	S3S4	CDFW-SSC, USFWS-BCC	Riparian forest | Riparian scrub | Riparian woodland	Riparian plant associations in close proximity to water. Also nests in montane shrubbery in open conifer forests in Cascades and Sierra Nevada.	Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	**Moderate Potential.** The species not detected during site visits to the Project Area, but the species have been reported in the immediate vicinity (base of Bald Bills Rd.) as recently as 2018, with additional records during the breeding season (GHD 2019, eBird 2019). Some breeding and foraging habitat for the species is present at the Project Area.
Strix occidentalis caurina	Northern Spotted Owl	Threatened	Threatened	G3T3	S2S3	CDF-S, CDFW-SSC, IUCN-NT, NABCI-YWL	North coast coniferous forest | Oldgrowth | Redwood	Old-growth forests or mixed stands of old-growth and mature trees. Occasionally in younger forests with patches of big trees.	High, multistory canopy dominated by big trees, many trees with cavities or broken tops, woody debris, and space under canopy.	**High Potential.** Suitable habitat exists adjacent to Project Area. Known occurrences of this species have occurred within Project vicinity (CDFW 2019).
					Reptiles					
Emys marmorata	Western Pond Turtle	None	None	G3G4	S3	BLM-S, CDFW-SSC, IUCN-VU, USFS-S	Aquatic | Artificial flowing waters | Klamath/North coast flowing waters | Klamath/North coast standing waters | Marsh &	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation.	Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**Moderate Potential.** Species was not noted during active season visits in May and September; the fall visit focused on this species

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
							swamp | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters | South coast flowing waters | South coast standing waters | Wetland			and it was conducted under good weather conditions (GHD 2019). Although pond turtles are likely not abundant in the Project Area, in part because of relatively cool coastal conditions, they have been reported in low numbers within nearby park areas including in Redwood Creek (Personal comm. David Anderson, NPS 2018 and Justin Garwood, CDFW 2018).
					Amphibians					
Ascaphus truei	Pacific Tailed Frog	None	None	G4	S3S4	CDFW-SSC, IUCN-LC	Aquatic | Klamath/North coast flowing waters | Lower montane coniferous forest | North coast coniferous forest | Redwood | Riparian forest	Occurs in montane hardwood-conifer, redwood, Douglas-fir & ponderosa pine habitats.	Restricted to perennial montane streams. Tadpoles require water below 15 degrees C.	**Moderate Potential.** Project Area contains suitable coniferous forest and cool perennial streams. Although the species was not detected during amphibian surveys onsite, there are numerous CNDDB records within a few miles of the Project Area (CDFW 2019, GHD 2019).
Plethodon elongatus	Del Norte salamander	None	None	G4	S3	CDFW-WL, IUCN-NT	Oldgrowth	Old-growth associated species with optimum conditions in the	Cool, moist, stable microclimate, a deep litter layer, closed	**Moderate Potential.** Project Area contains limited habitat, however there is

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
								mixed conifer/hardwood ancient forest ecosystem.	multi-storied canopy, dominated by large, old trees.	abundant suitable habitat adjacent to Project Area. Species has been detected in the Project vicinity (iNaturalist 2019).
Rana aurora	Northern Red-legged Frog	None	None	G4	S3	CDFW-SSC, IUCN-LC, USFS-S	Klamath/North coast flowing waters | Riparian forest | Riparian woodland	Humid forests, woodlands, grasslands, and streamsides in northwestern California, usually near dense riparian cover.	Generally near permanent water, but can be found far from water, in damp woods and meadows, during non-breeding season.	**Present.** Various life stages of this species have been documented at the Project Area. The site likely provides habitat for the species year-round, including breeding sites (GHD 2019).
Rana boylii	Foothill Yellow-legged Frog	None	Candidate Threatened	G3	S3	BLM-S, CDFW-SSC, IUCN-NT, USFS-S	Aquatic | Chaparral | Cismontane woodland | Coastal scrub | Klamath/North coast flowing waters | Lower montane coniferous forest | Meadow & seep | Riparian forest | Riparian woodland | Sacramento/San Joaquin flowing waters	Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats.	Needs at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis.	**Low Potential.** Confirmed immediately to the south in Redwood Creek in September 2018. Tadpoles were observed about 80 meters directly south of the entrance gate, and the species is well documented from other parts of Redwood Creek. However, no optimal habitat is present for this species within the Project Area, and if the species enters the Area, it is likely as an occasional dispersing individual.

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Rhyacotriton variegatus	Southern Torrent Salamander	None	None	G3G4	S2S3	CDFW-SSC, IUCN-LC, USFS-S	Lower montane coniferous forest | Oldgrowth | Redwood | Riparian forest	Coastal redwood, Douglas-fir, mixed conifer, montane riparian, and montane hardwood-conifer habitats. Old growth forest.	Cold, well-shaded, permanent streams and seepages, or within splash zone or on moss-covered rocks within trickling water.	**Present.** Project Area contains well shaded, permanent streams. Species was observed onsite in both small tributaries of Prairie Creek. A large larvae was observed below the impoundment in Libby Creek in September 2017, and an adult was observed in Otter Creek a short distance to the north in May 2018 (GHD 2019).
					Fish					
Acipenser medirostris	Green Sturgeon - sDPS	Threatened	None	G3	S1S2	AFS-VU, CDFW-SSC, IUCN-NT NMFS-SC	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters	These are the most marine species of sturgeon. Abundance increases northward of Point Conception. Spawns in the Sacramento, Klamath, & Trinity Rivers.	Spawns at temps between 8-14 C. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.	**Low Potential.** Species typically found in large estuarine rivers. Project Area contains waterways that are too narrow and no records of the species are known from Prairie Creek.
Cottus klamathensis polyporus	Lower Klamath Marbled Sculpin	None	None	G4T2T4	S2S4	CDFW-SSC	Aquatic	Found in cold (<20°C) spring-fed streams that have a low gradient and adequate aquatic vegetation.	They tend to occupy pools or runs with cover. In some isolated streams, the species is found to have greater temperature tolerances and may be found in riffles and shallow water.	**Low Potential.** Although other sculpin species have been detected in Prairie Creek, there is no occurrence data for this species in the Project Area (Wilzbach 2016).

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Oncorhynchus clarkii clarkii	Coastal Cutthroat Trout	None	None	G4T4	S3	AFS-VU, CDFW-SSC, USFS-S	Aquatic | Klamath/North coast flowing waters	Small coastal streams from the Eel River to the Oregon border.	Small, low gradient coastal streams and estuaries. Needs shaded streams with water temperatures <18C, and small gravel for spawning.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Oncorhynchus kisutch pop. 2	Coho Salmon - southern Oregon / northern California ESU	Threatened	Endangered	G4	S2?	AFS-EN	Aquatic	Federal listing = pops between Punta Gorda & San Lorenzo River. State listing = pops south of Punta Gorda.	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Oncorhynchus mykiss irideus	Steelhead - northern California DPS	Threatened	None	G5T2T3Q	S2S3	AFS-TH	Aquatic | Sacramento/San Joaquin flowing waters	Coastal basins from Redwood Creek south to the Gualala River, inclusive. Does not include summer-run steelhead.		**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Oncorhynchus tshawytscha	Chinook Salmon - California Coastal ESU	Threatened	None	G5	S1	AFS-TH	Aquatic | Sacramento/San Joaquin flowing waters	Federal listing refers to wild spawned, coastal, spring & fall runs between Redwood Cr, Humboldt Co & Russian River, Sonoma Co		**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Thaleichthys pacificus	Eulachon	Threatened	None	G5	S3		Aquatic | Klamath/North coast flowing waters	Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries.	Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand,	**Moderate Potential.** Suitable habitat exists in Project Area and the species has recently been detected in small

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
									and woody debris.	numbers in Prairie Creek (Gustafson et al. 2016).
Lamprey										
Entosphenus tridentatus	Pacific Lamprey	None	None	G4	S4	AFS-VU, BLM-S, CDFW-SSC, USFS-S	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters | South coast flowing waters	Found in Pacific Coast streams north of San Luis Obispo County, however regular runs in Santa Clara River. Size of runs is declining.	Swift-current gravel-bottomed areas for spawning with water temps between 12-18 C. Ammocoetes need soft sand or mud.	**High Potential**. Project Area contains suitable habitat. Species documented in Prairie Creek within Project Area (Wilzbach and Ozaki 2017).
Invertebrates										
Margaritifera falcata	Western Pearlshell	None	None	G2	S1S2		Aquatic | Klamath/North coast flowing waters	High to low elevation coastal streams in northwestern California & southern Oregon.	Small spring-fed permament rivulets to creeks, often on gravel, always in unpolluted, clear, cold, running water.	**Moderate Potential.** Species has been reported in the vicinity of Orick and streams/creeks on the Project Area meet some of the requistie habitat characteristics for the species (CDFW 2019).
Speyeria zerene behrensii	Behren's Silverspot Butterfly	None	None	G4G5	S1S2		Aquatic	Aquatic.	Prefers lower velocity waters.	**Moderate Potential.** Species has been detected in nearby Redwood Creek and some marginal habitat is present in the Project vicinity (CDFW 2019).
Bombus caliginosus	Obscure Bumble Bee	Endangered	None	G5T1	S1	XERCES-CI	Coastal prairie	Restricted to the Pacific side of the Coast Ranges, from Point Arena to Cape Mendocino, Mendocino Co.	Inhabits coastal terrace prairie habitat. Foodplant is Viola sp.	**Low Potential.** The current species range is restricted to the vicinity of Point Arena (USFWS 2011).

Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur
Bombus occidentalis	Western Bumble Bee	None	None	G4?	S1S2	IUCN-VU	Pacific coast fog-belt from British Columbia to Southern California (Hatfield, et al. 2015).	Coastal areas from Santa Barabara county to north to Washington state.	Food plant genera include Baccharis, Cirsium, Lupinus, Lotus, Grindelia and Phacelia	**Moderate Potential.** Some habitat exisits for the species in the Project Area and there are records from the Project vicinity (CDFW 2019).

Potential to Occur:

No Potential.	Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
Low Potential.	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 of 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	Known to occur based on GHD sites visits, citizen science data, or historical records.

Other Status Key:

AFS-TH/VU/EN	American Fisheries Society- Ranks fish species as either Threatened, Vulnerable or Endangered.
BLM-S	Bureau of Land Management Sensitive Species: Sensitive species are those species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA (CDFW 2019b).
CDFW-SSC	California Department of Fish and Wildlife Species of Special Concern: CDFW has designated certain vertebrate species as SSC because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction (CDFW 2019b).
CDFW-FP	California Department of Fish and Wildlife Fully Protected. This designation was the State's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction (CDFW 2019b).
CDFW-WL	California Department of Fish and Wildlife Watch List. CDFW maintains a list consisting of taxa that were previously designated as Species of Special Concern, but no longer merit that status, or which do not yet meet SSC criteria but for which there is concern and a need for additional information to clarify status (CDFW 2019b).
CDF-S	California Department of Forestry and Fire Protection classified "sensitive species" as those species that warrant special protection during timber operations (CDFW 2019b).
IUCN-LC, NT, EN, VU	International Union for Conservation of Nature. This organization publishes a red list of the global conservation status of animals, fungi and plant species. Ranks include species of Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN) (CDFW 2019b)

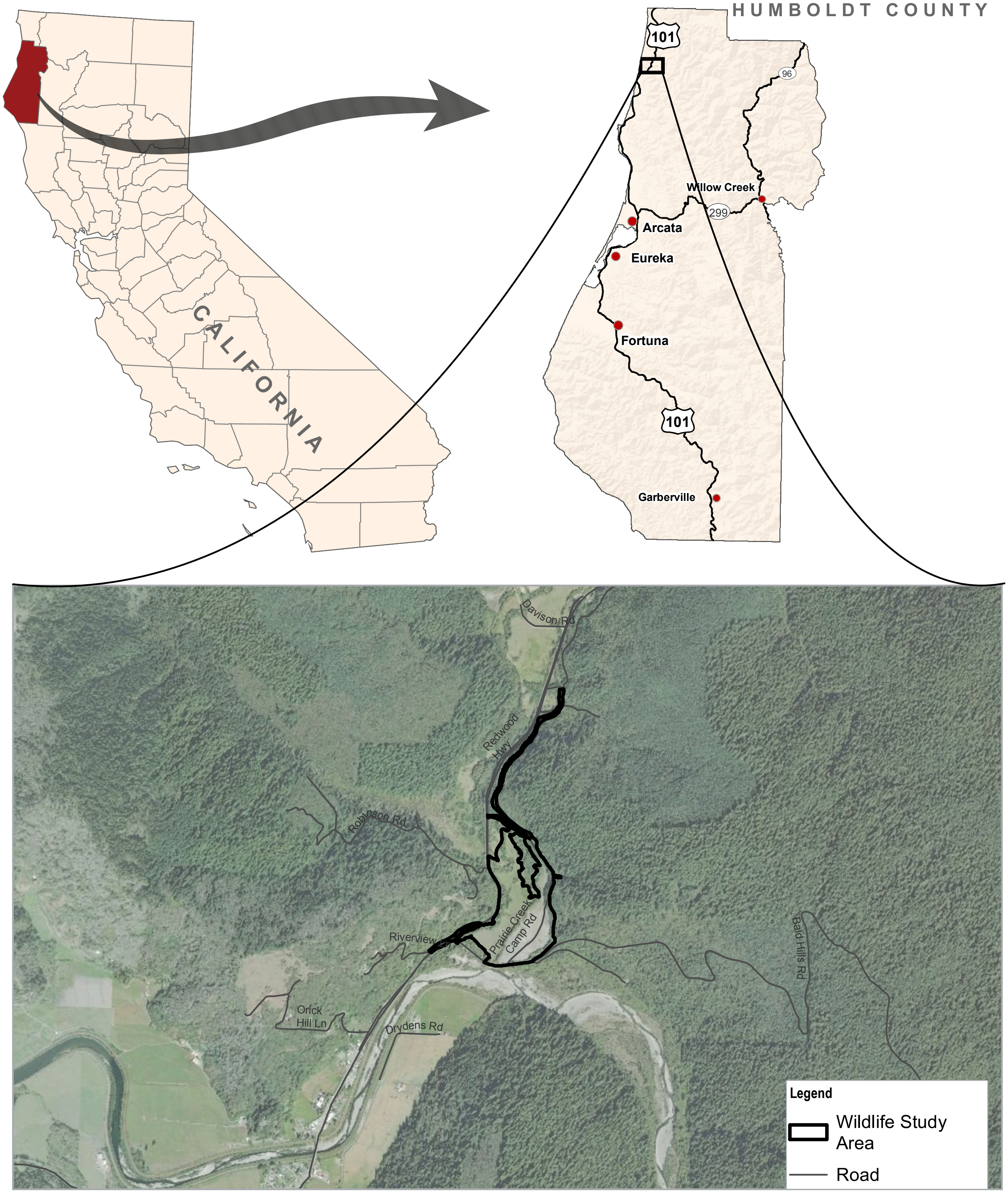
Table 3. Special-status Wildlife Species that May Occur in the Project Area

Scientific Name	Common Name	Federally Listed	California Listed	Global Rank	State Rank	Other Status	Habitats	General Habitat	Micro Habitat	Potential to Occur

NABCI-RWL/YWL	North American Bird Conservation Initiative. The coalition publishes an annual State of the Birds report which includes a watch list of bird species in need of conservation help. Species on the list are assigned to either the Red Watch List (RWL) for species with extremely high vulnerability, or Yellow Watch List (YWL) for species that may be range restrictive of may be more widespread but with declines and high threats (CDFW 2019b).
NMFS-SC	National Marine Fisheries Service Species of Concern are species about which NOAA Fisheries has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA (CDFW 2019b).
USFS-S	U.S. Forest Service Sensitive Species; defined as plant and animal species identified by a regional forester that are not listed or proposed for listing under the Federal ESA for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (CDFW 2019b).
USFWS-BCC	U.S. Fish and Wildlife Service's Birds of Conservation Concern (BCC). The goal of the BCC report (2008) is to accurately identify the migratory and non-migratory bird species (beyond those already designated as Federally Threatened or Endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action (CDFW 2019b).
WBWG-H,M, or L	Western Bat Working Group. Species are ranked as High, Medium, or Low Priority in each of 10 regions in western North America. The WBWG is composed of agencies, organizations, and individuals interested in bat research, management and conservation from the 13 western states and provinces (CDFW 2019b).
Xerces	The Xerces Society is an international non-profit organization dedicated to protecting biological diversity through invertebrate conservation. They publish a red list of species with the conservation status including: Data Deficient (DD), Vulnerable (V), Imperiled (I), Critically Imperiled (CI), and Possibly Extinct (PE) (Xerces 2019).

Table compiled from the California Department of Fish and Wildlife (CDFW) Natural Diversity Database, U.S. Fish and Wildlife Service (USFWS) Species Lists, and National Marine Fisheries Service (NMFS) Electronic Inventory searches of 6 USGS 7.5 Minute Quadrangles around the Orick Quad (CDFW 2019; USFWS 2019; NMFS 2019).

Appendix C. Figures



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Save the Redwoods League
Prairie Creek Restoration Project

Project No.	**11159100**
Revision No.	**-**
Date	**06 Jun 2019**

Vicinity

FIGURE 1

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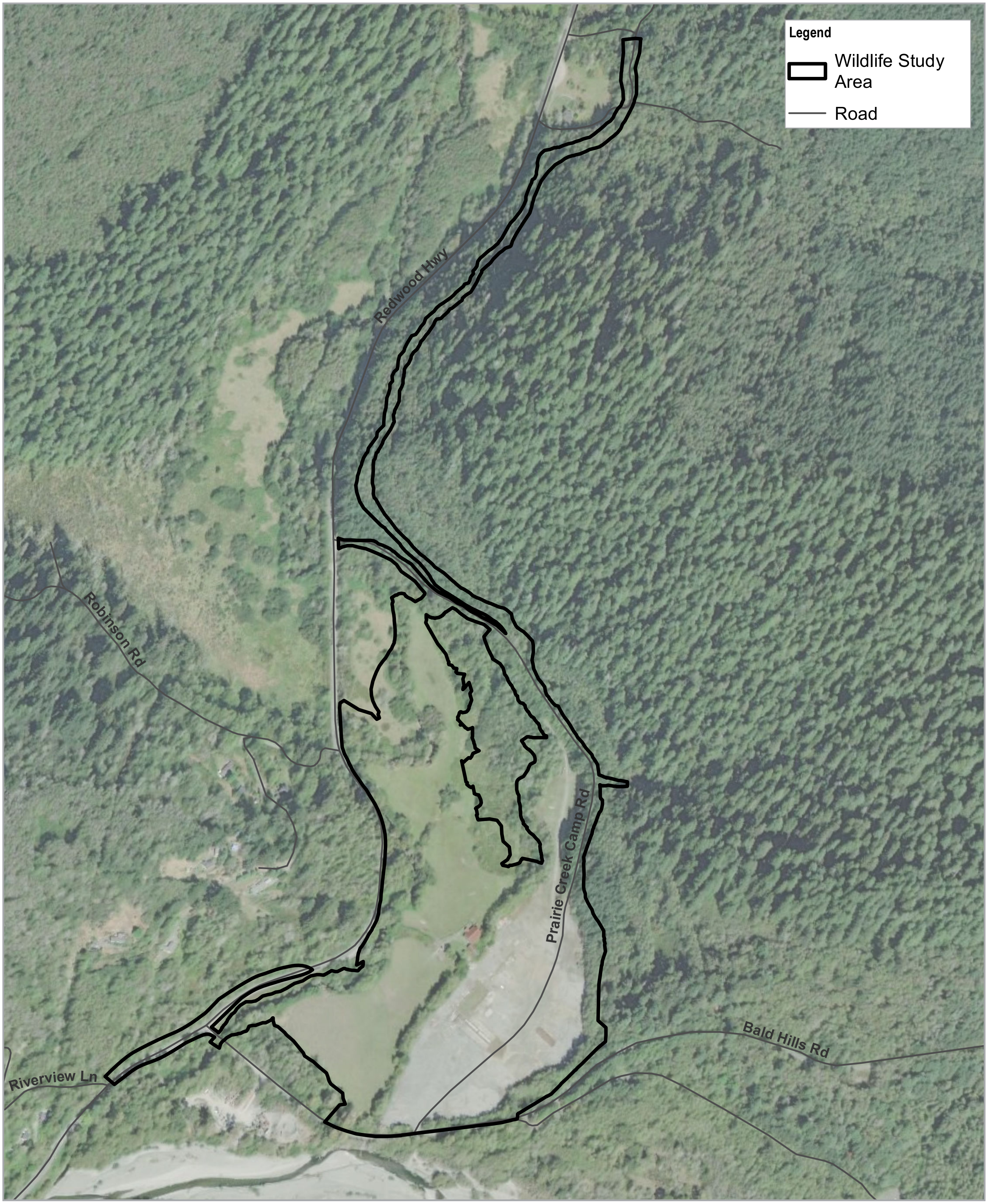
Print date: 06 Jun 2019 - 09:32

Data source: Disturbance Extent Bounday, GHD, 5/06/2019; Sources: Esri, USGS, NOAA Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2



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GHD

Save the Redwoods League
Prairie Creek Restoration Project

Project No.	**11159100**
Revision No.	**-**
Date	**06 Jun 2019**

Wildlife Study Area

FIGURE 2

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Print date: 06 Jun 2019 - 09:28

Data source: Disturbance Extent Boundary, GHD, 5/06/2019; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
Created by: jclark2

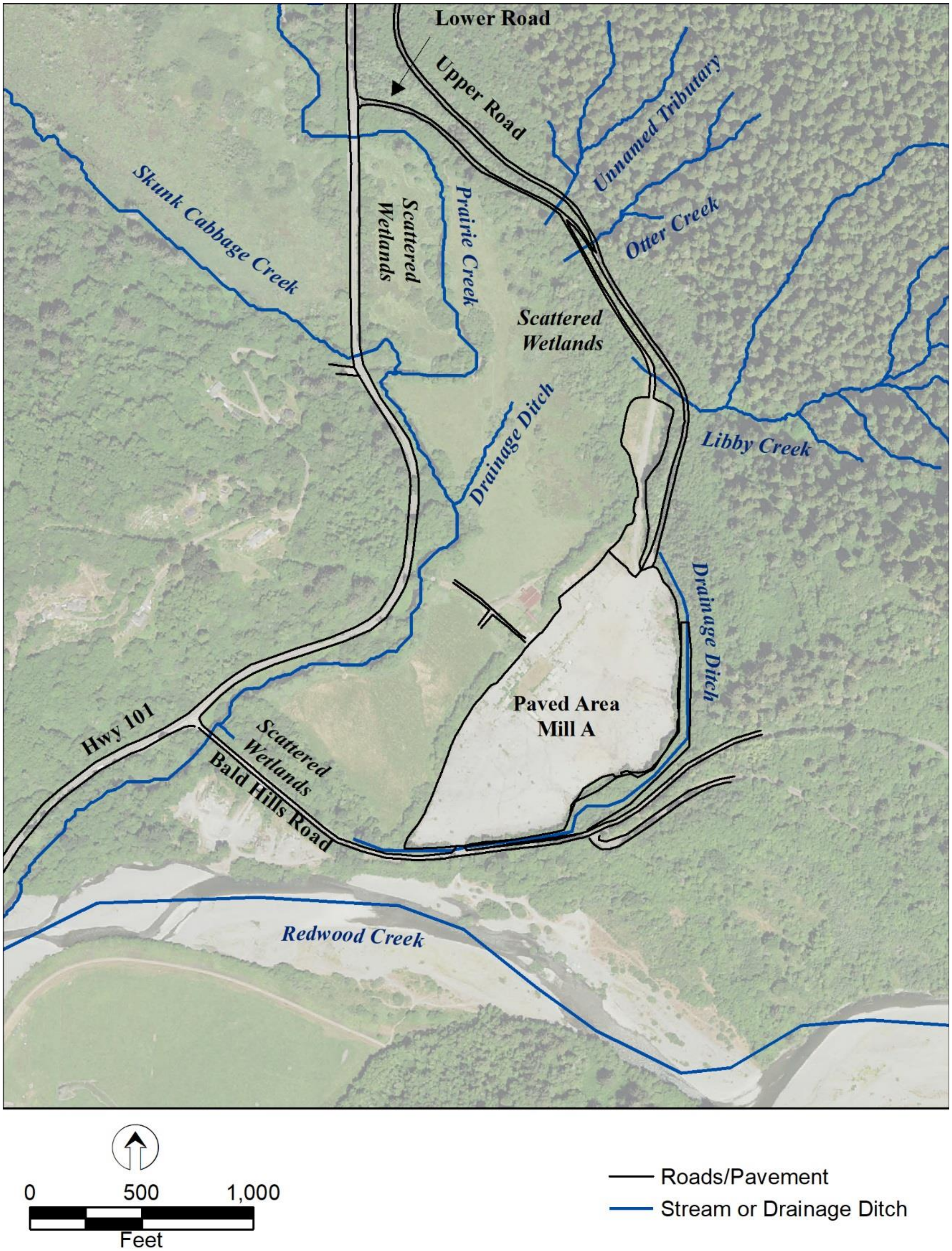

Figure 3. Project Area streams, wetlands and paved infrastructure features (NHE 2019)

Appendix E – Orick Mill Site Construction Noise Constraints Memo, Sensitive Species Protection, LACO 2016

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LACO

TECHNICAL MEMORANDUM

Orick Mill Site Construction Noise Constraints Memo
Sensitive Species Protection

Date: July 15, 2016
Project No.: 7787.16

Prepared For: Christine Aralia, Land Project Manager
Save the Redwoods League

Prepared By: Randy Rouda, AICP, Sr. Planner

Reviewed By: Michael D. Nelson, Principal

Cc:

Attachments:
Appendix 1: Figures
Appendix 2: USFWS Memorandum: July 31, 2006
Appendix 3: RNSP Guidelines: May, 2007

1.0 INTRODUCTION AND BACKGROUND

This Technical Memorandum is presented pursuant to Task No. 2415 of Service Agreement No. 7787.16 dated January 26, 2016. Save the Redwoods League (SRL) intends to carry out a variety of activities including demolition, asphalt removal, construction, and adaptive reuse of a former mill site located at 122305 U.S. Highway 101, Orick, California, 95555 (Assessor's Parcel Numbers (APNs) 519-231-018 and 520-012-013) (Appendix 1, Figure 1, Location Map). The site includes wetland and riparian habitat which may provide nesting opportunities for birds protected by the Migratory Bird Treaty Act (MBTA) (Appendix 1, Figure 6 as included in *Mill A Planning Project, Delineation of Wetlands* by Humboldt State University, July 6, 2016). The hillside immediately adjacent and to the west of the site contains old growth redwood stands which are potential habitat for marbled murrelet (Brachyramphys marmoratus) (MAMU) and northern spotted owl (Strix occidentalis caurina) (NSO), both of which are federally listed sensitive species. This Technical Memorandum summarizes seasonal restrictions, setbacks, noise limitations and other construction related limitations intended to avoid the disturbance of nesting birds and fledglings in potential violation of the MBTA and to avoid the incidental take of avian species identified as sensitive

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pursuant to the federal or state Endangered Species Acts by interfering with typical nesting, foraging, and other behaviors.

LACO Associates has prepared this Technical Memorandum in consultation with representatives of the United States Fish and Wildlife Service, the National Parks Service and the California Department of Fish and Wildlife. This Technical Memorandum relies on guidance that was provided by the United States Fish and Wildlife Service (Arcata Fish and Wildlife Office) Memorandum dated July 31, 2006, Titled Transmittal of Guidance: Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California (Appendix 2) and Redwood National and State Parks Auditory Disturbance Guidelines for Projects in Suitable Spotted Owl and Marbled Murrelet Nesting Habitat During the Breeding Season, May, 2007 (Appendix 3).

2.0 CRITICAL SEASONS

On-site demolition work, construction, and eventual site operations are not likely to cause direct harm (such as injury or mortality) to adult birds. However, tree removal during nesting season or construction activities that cause changes in nesting behavior through noise or visual disturbance, do have the potential to interfere with breeding and fledging, which could have an unintended (incidental) effect to the ongoing health of the affected species. Those effects are limited to the breeding and nesting season of each species. Note that riparian, wetland and old growth habitat areas, are protected by a variety of local, state, and federal regulations. This Technical Memorandum focuses on those which apply primarily to raptors, migratory birds, and state and federally listed avian species. Additional restrictions on activities which would affect on-site streambeds, riparian habitat, and wetlands will also apply.

Specific nesting and breeding seasons are as follows:

Table 1: Nesting and Breeding Seasons

Protected Species	Breeding Season Starts	Breeding Season Ends	Typical Constraints
Northern Spotted Owl	February 1	July 9	Construction and operational noise restrictions.
Raptor/Migratory Birds	March 1	August 15	Pre-construction nest surveys prior to tree or major brush removal. Construction setbacks from active nests.
Marbled Murrelet	March 24	September 15	Construction and operational noise restrictions.

Grading activity affecting one acre or more will require a Stormwater Pollution Prevention Plan (SWPPP), which will identify Best Management Practices (BMP's). Rainy season BMP's are more robust and will be required if work is carried out between October 15 and April 15. General permit requirements will also require on-site testing after every significant rain event while work is underway. These requirements can increase the cost and complexity of construction in the rainy season. Ultimately, it will likely be necessary to balance the cost of compliance with rainy season construction standards with the cost of modification of construction methods to meet on-site nesting season noise standards.

3.0 SETBACKS AND NOISE RESTRICTIONS

3.1 Raptors and Migratory Birds

Anticipated restrictions to protect raptors and birds covered by the MBTA are limited to a breeding season from March 1 through August 15. Likely restrictions within the breeding season consist of the following:

1) Retain a qualified biologist to conduct a nest survey no more than 15 days prior to any proposed tree or major vegetation removal, and
2) If nests are found, maintain a 500 foot construction activity buffer around affected trees until either the end of the nesting season or a qualified biologist has verified that the nest is no longer in use.

Depending on the type of permits required, modifications to the setbacks, or the establishment of activities within those setbacks which are not likely to affect nesting and fledging behaviors may be negotiated with the approving agencies.

3.2 Marbled Murrelets and Northern Spotted Owls

SRL and a prior property owner have convened periodic meetings of local experts and regulators to discuss design, educational, and operational protections for protected avian species. In the course of those meetings, biologists working for USFWS and NPS have indicated the site is unlikely to provide habitat to NSO due to the known presence of barred owls, which typically outcompete NSO within a given territory. However, as the adjacent old growth habitat areas have not been comprehensively surveyed, for the purpose of this memorandum, we will assume the potential presence of NSO and will include appropriate protective measures to avoid incidental take of this species.

Restrictions for MAMU and NSO take three primary forms. Avoidance of noise impacts, avoidance of visual impacts, and avoidance of increased predation from corvids (MAMU only). Visual and noise impact prevention measures apply only during the nesting season from February 1 (start of NSO) through September 15 (end of MAMU). Measures to discourage increased corvid activities must be followed year-round to be effective.

During the nesting season, MAMU are most active in the vicinity of their nests in the two hours after sunrise and the two hours before sunset. For that reason, and to account for the typically reduced nighttime ambient noise and activity, mid-day construction, and operational restrictions are modestly less strict in mid-day when MAMU nesting activity is lowest.

3.2.1 Visual Impact Avoidance

The USFWS has established a guideline that any human activity within a visual line of site of 40 meters (130 feet) of an active nest has the potential to create an incidental take by interfering with typical nesting behavior. No active nests have been identified in the old growth habitat adjacent to the site. As a precaution, we recommend that activity within the old growth habitat areas be avoided entirely unless a specific project and approach is approved by USFWS and NPS. Construction and operational activity within 130 feet of old growth habitat (shown on Appendix 1, Figure N1.1) should be restricted to mid-day.

3.2.2 Noise Impact Avoidance

The USFWS and NPS guidance documents described in Section 1.0 above (Appendix 2 and Appendix 3) identify a number of variables which affect the potential for construction or operational noise to interfere with nesting behavior including time of day, distance from noise source to habitat, background (ambient) noise intensity, and project noise intensity. The most important variable is the pre-project ambient noise environment. The guidance documents provided by USFWS and NPS indicate MAMU and NSO can inhabit and acclimate to areas with considerable noise intensity, such as tree stands adjacent to busy highways. Birds acclimated to ambient noise are less likely to react to additional noise sources in a similar range (Appendix 2).

There are two old growth redwood habitat areas (North and South) (Appendix 1, Figure N1.1) located on the hillside to the east of the subject site. Both habitat areas have the potential to be affected by on-site noise emissions. The southerly area is near Bald Hills Road, which carries considerable commuter, tourist, and logging (truck) traffic. In 2012, LACO Associates prepared a Noise Study for a proposed project on the subject site. That study indicates Bald Hills Road regularly generates a noise intensity of approximately 70dB. The southerly habitat area is close enough to Bald Hills Road that resident birds may be expected to be acclimated to noise in the 51 dB to 70 dB (Very Low to Low) range. The USFWS and NPS guidance documents indicate that MAMU and NSO in the southerly habitat area are less likely to be affected by project related noise sources than those in the northerly habitat area which are exposed to much more attenuated noise from Bald Hills Road and State Highway 101 in the range of 40 to 50 dB (Natural Ambient).

The USFWS and NPS guidance documents recommend setbacks from habitat areas based on the intensity of the noise to be generated and the intensity existing noise (Appendix 3, Table 1). Maximum noise intensity in each location is reduced by 10dB at night and within two hours of sunrise and sunset to account for lower typical ambient noise intensity and the greater nesting activity in those times. LACO Associates has applied that guidance to the subject site and recommends noise generation for demolition, construction, and operations follow these guidelines during the NSO and MAMU nesting seasons:

[See Table 2 Below]

TABLE 2:
MAMU NESTING SEASON CONSTRUCTION, DEMOLITION AND OPERATIONAL NOISE CONSTRAINTS

Area	Description	Maximum Noise Generation (dB)		Likely Permitted Activities (Mid-Day)
		Night and Within 2 Hours of Sunset and Sunrise (Avoid all mechanical noise if feasible)	Mid-Day	
A	Northern Old Growth Habitat. Acclimated to Natural Ambient (<50 dB) to Very Low (51-60 dB). Natural sources and adjacent road noise.	50	60	60 dB) No amplified or motorized sounds. Hand tools only. Limited impact noise (hammering).
B	Southern Old Growth Habitat. Acclimated to Very Low (51-60 dB) to Low (61-70 dB). Adjacent road noise (Bald Hills Road).	60	70	70 dB) Hand tools. Small power tools (generally battery operated and hand-held). Light vehicular traffic at slow speeds on paved surfaces.
C	Northern Low Noise Buffer (0-165 feet from Northern Old Growth Habitat).	60	70	70 dB) Hand tools. Small power tools (generally battery operated and hand-held). Light vehicular traffic at slow speeds on paved surfaces.
D	Northern Moderate Noise Buffer (165 to 500 feet from Northern Old Growth Habitat) and Southern Moderate Noise Buffer (0-165 feet from Southern Old Growth Habitat.	70	80	80 dB) Small gas powered engines (lawn mowers and small chain saws), electric hand tools (except circular saws and impact wrenches), passenger vehicles, street legal motorcycles and small trail motorcycles.
E	Northern High Noise Buffer (500-1,320 feet from Northern Old Growth Habitat) and Southern High Noise Buffer (165-825 feet from Southern Old Growth Habitat).	80	90	90 dB) Medium to large construction equipment such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, and moderate to large diesel engines. Large gasoline powered tools, power saws, large chainsaws, pneumatic drills and impact wrenches, circular saws and hammering.
F	Southern Very High Noise Buffer (825 -1,320 feet from Southern Old Growth Habitat).	90	100	100 dB) Jackhammers, smaller pile drivers, wood chippers.
G	Northern Very High/Extreme Noise Buffer (1,320 feet from Northern Old Growth Habitat to Property Line).	90	110	110 dB) Larger pile drivers. Ground level explosives. Asphalt grinders. Note: In the unlikely event that any project related noise source may exceed 110 dB, specific analysis of noise type, intensity and location will be required.
H	Southern Extreme Noise Buffer (1,320 feet from Southern Old Growth Habitat to Property Line).	100	110	

The setback areas are shown on the Noise Constraints Map (Appendix 1, Figure N1.1). See Appendix 2 for a more complete list of typical intensity of noise generation for a variety of equipment and activities. Note that most construction activities generate noise up to 90 dB. During the nesting season (mid-day), such activities should be set back at least 165 feet from the southerly habitat area and at least 500 feet from the northerly habitat area. Where demolition or construction activity must take place within those setbacks, such actions should be scheduled to take place outside of the NSO and MAMU nesting seasons. Special consultation with USFWS, NPS, CDFW and others is required if project related noise is expected to exceed the identified limits.

3.2.3 *Increased Corvid Predation Avoidance*

Corvids such as jays, ravens, and crows are attracted to food scraps often associated with human activity. Once a corvid population is established, individuals may also predate MAMU and NSO eggs and fledglings. Careful control of food and food waste is essential to avoid increased corvid predation. LACO Associates has collected five years of baseline data regarding corvid presence on the subject site which will be used to establish operational controls and an adaptive management plan. That plan is outside the scope of this technical memorandum.

Food and food waste control are also important during demolition and construction. All contracts related to such work should include the following language (or the equivalent) with sufficient monitoring and incentives to ensure compliance:

> The contractor shall keep food contained or attended at all times. Unattended food may attract ravens, crows, jays, bears, mountain lions, and other wildlife. The contractor will not leave the kitchen/food booth/food preparation area unattended when food of any type is outside of animal-proof containers. Note that coolers are not animal-proof when left unattended. "Food" includes spices and condiments as well as raw uncooked food. The contractor shall clean up after meals are served and at the end of each day, or if the kitchen will not be attended after each meal, the contractor shall store all food including spices and condiments in animal-proof containers. The contractor will deposit food scraps and trash in animal-proof trash cans or remove them from the site and park.

3.2.4 *Calendar of Restrictions*

Table 3: Calendar of Restrictions

Start Date	End Date	Typical Constraints
January 1	January 31	Maintain corvid restrictions.
February 1	February 28/29	Maintain corvid restrictions. Conform to Noise and Visual Impact restrictions.
March 1	August 15	Maintain corvid restrictions. Conform to Noise and Visual Impact restrictions. Pre-construction nesting surveys for tree and major brush removal.
August 16	September 15	Maintain corvid restrictions. Conform to Noise and Visual Impact restrictions.
September 16	December 31	Maintain corvid restrictions

4.0 CONCLUSION

The proposed Visitor Center is in an area that has a history of intensive human activity, but is in close proximity to a variety of sensitive habitats. Throughout the design, construction and operational phases of the project, the Save the Redwoods League should continue to coordinate closely with regulatory agencies and other experts to limit the effects of the visitor center on the environment, and, where possible, to enhance existing habitats.

As described above, construction in close proximity to the old growth redwood habitat areas to the east of the subject site has the potential to disturb nesting sensitive avian species. Based on the guidance from the USFWS and NPS, LACO Associates has recommended time of year, time of day, and location restrictions intended to avoid such disturbance. Prior to final adoption, these recommendations should be reviewed by USFWS, NPS and others to verify their adequacy and accuracy.

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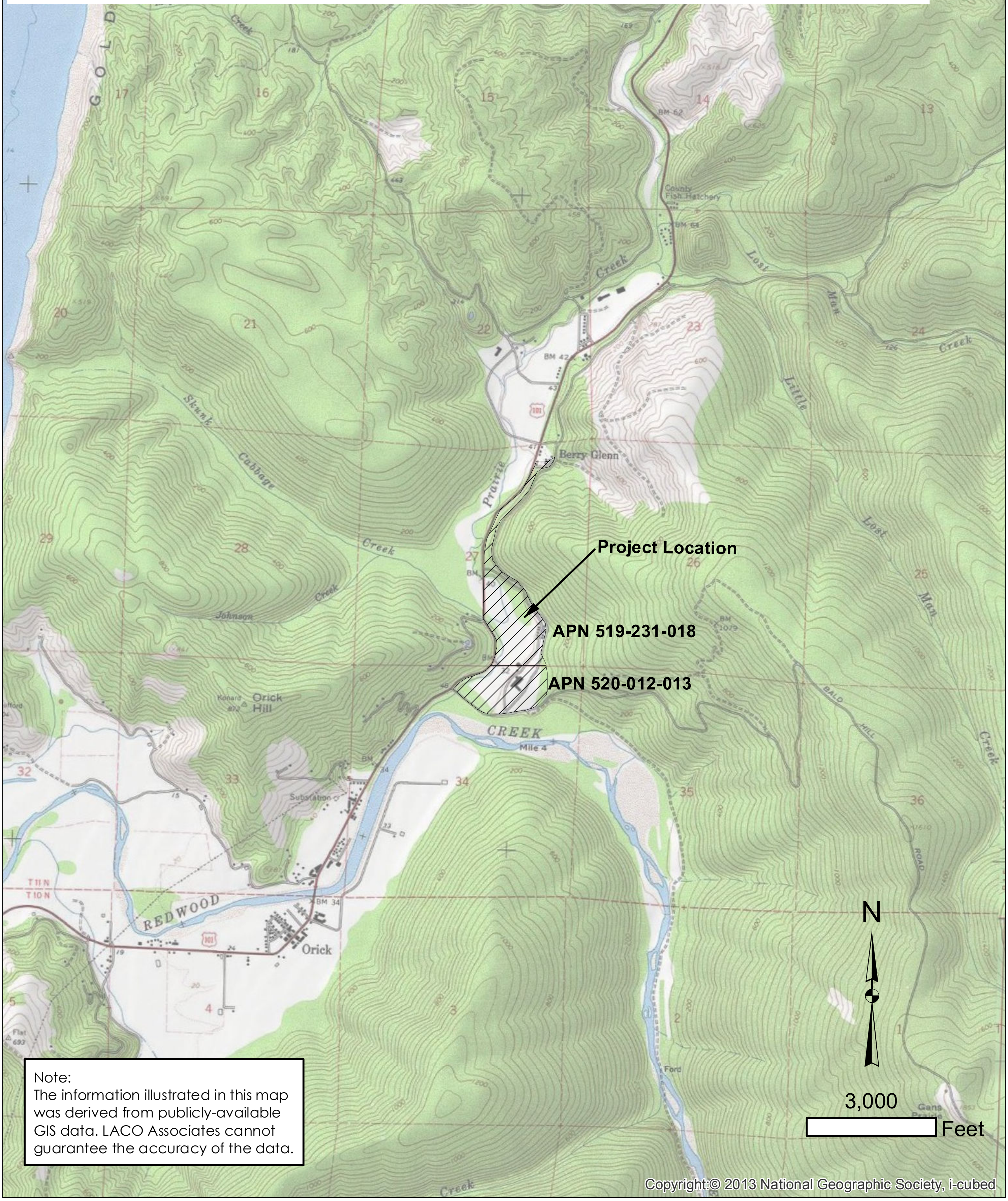
APPENDIX 1

Figures

LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT NOISE CONSTRAINTS ANALYSIS	BY JB	FIGURE 1
	CLIENT SAVE-THE-REDWOODS LEAGUE	CHECK MMM	
	LOCATION ORICK, CA.	DATE 7/15/2016	JOB NO. 7787.16
	LOCATION MAP		

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.



Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.

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Date: 7/15/2016 Time: 1:24:28 PM
Path: P:\7700\7787 Save-the-Redwoods League\7787.16 Noise Constraints Analysis\12 Figures_Maps\GIS\7787.16 PLAN NOISE FIGURE 1.mxd

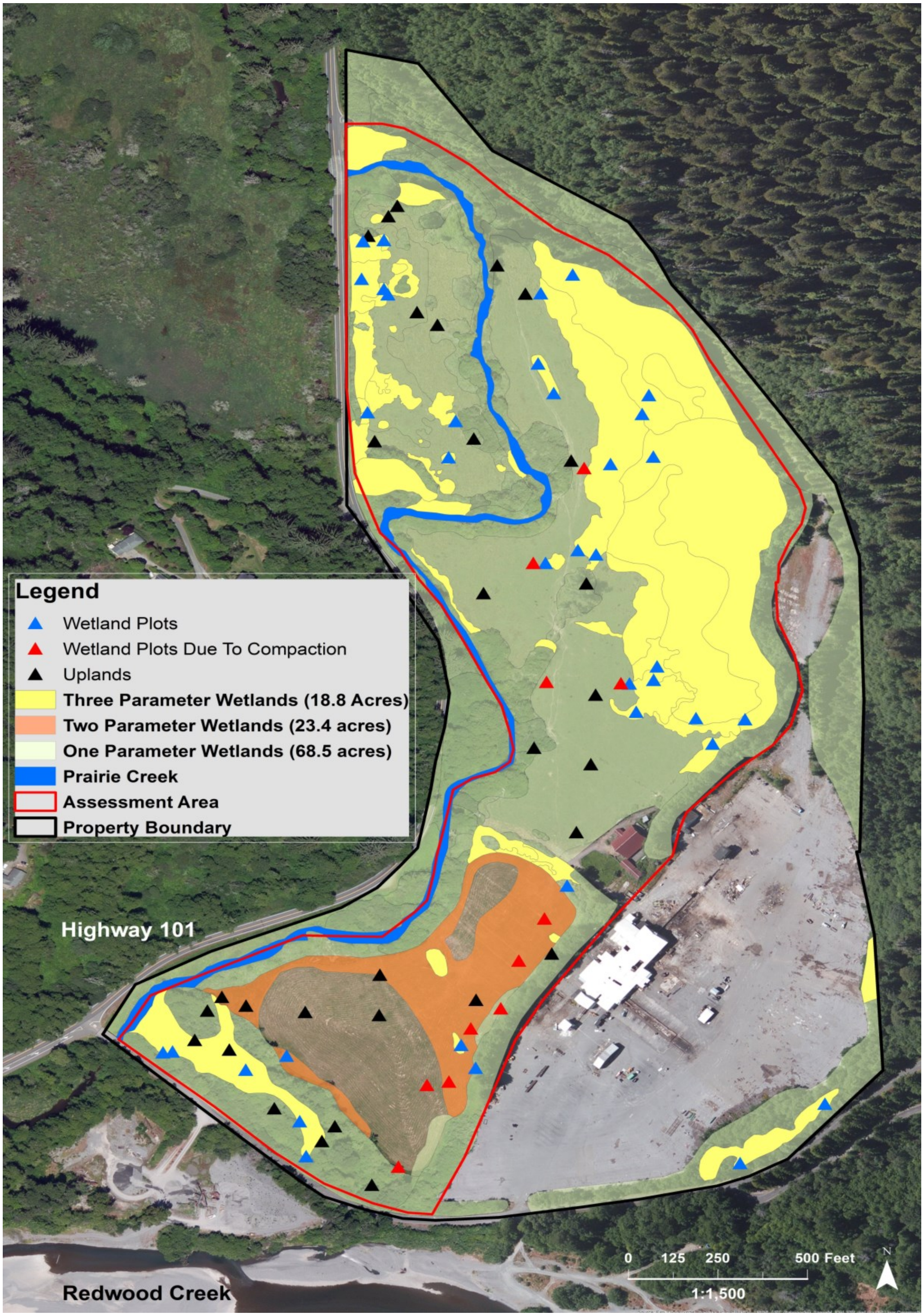

Figure 6. Map of one, two and three parameter wetlands, and plot locations.

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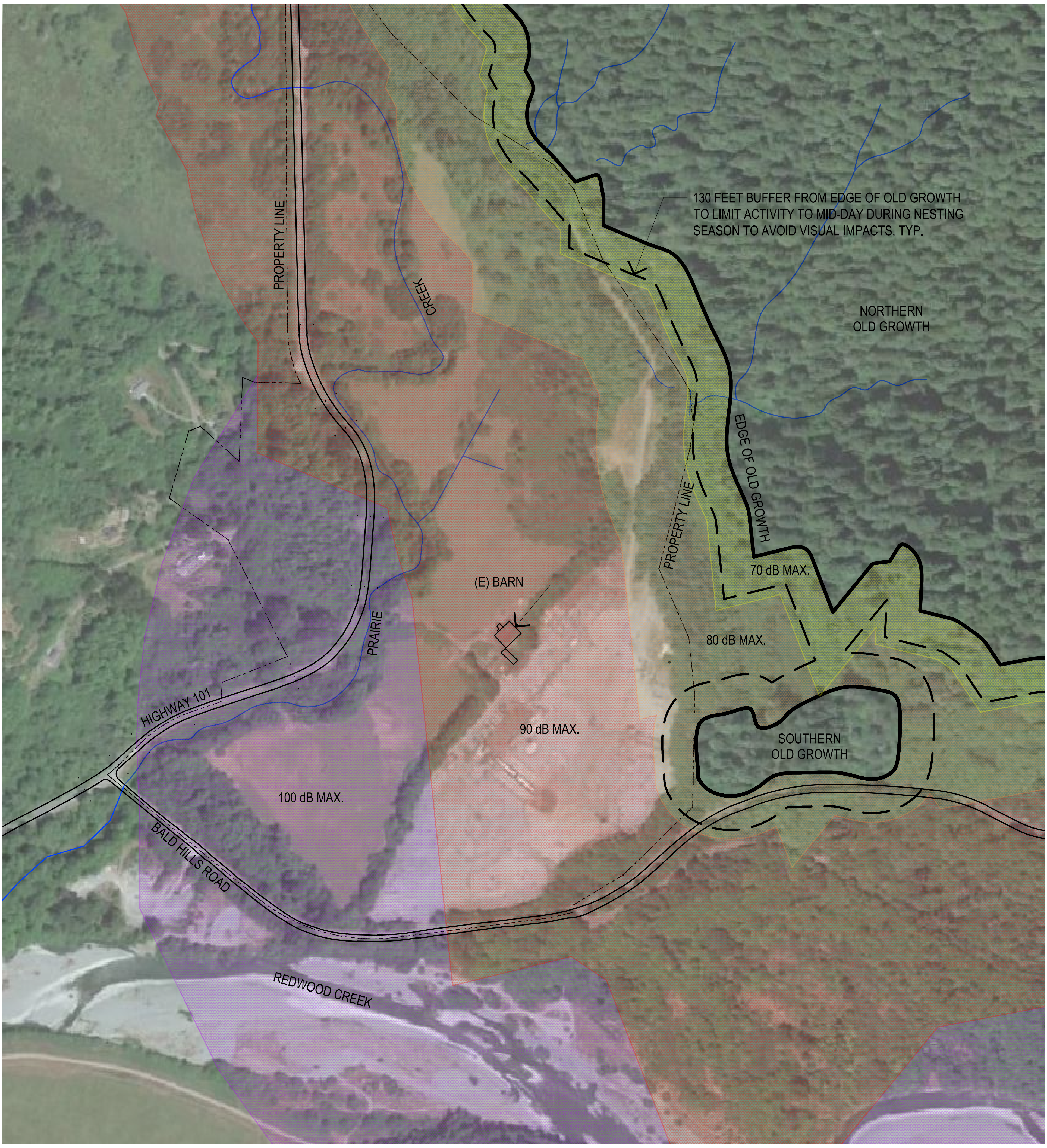

CONSTRUCTION, DEMOLITION AND OPERATIONAL NOISE CONSTRAINTS DURING MAMU NESTING SEASON - 2/1 THROUGH 9/15				
Area	Description	Maximum Noise Generation (dB)		Likely Permitted Activities (Mid-Day)
		Night and Within 2 Hours of Sunset and Sunrise (Avoid all mechanical noise if feasible)	Mid-Day	
A	Northern Old Growth Habitat. Acclimated to Natural Ambient (<50 dB) to Very Low (51-60 dB). Natural sources and adjacent road noise.	50 dB	60 dB	60 dB) No amplified or motorized sounds. Hand tools only. Limited impact noise (hammering).
B	Southern Old Growth Habitat. Acclimated to Very Low (51-60 dB) to Low (61-70 dB). Adjacent road noise (Bald Hills Road)	60 dB	70 dB	70 dB) Hand tools. Small power tools (generally battery operated and hand-held). Light vehicular traffic at slow speeds on paved surfaces.
C	Northern Low Noise Buffer (0-165 feet from Northern Old Growth Habitat)	60 dB	70 dB	70 dB) Hand tools. Small power tools (generally battery operated and hand-held). Light vehicular traffic at slow speeds on paved surfaces.
D	Northern Moderate Noise Buffer (165 to 500 feet from Northern Old Growth Habitat) and Southern Moderate Noise Buffer (0-165 feet from Southern Old Growth Habitat	70 dB	80 dB	80 dB) Small gas powered engines (lawn mowers and small chain saws), electric hand tools (except circular saws and impact wrenches), passenger vehicles, street legal motorcycles and small trail motorcycles.
E	Northern High Noise Buffer (500-1,320 feet from Northern Old Growth Habitat) and Southern High Noise Buffer (165-825 feet from Southern Old Growth Habitat)	80 dB	90 dB	90 dB) Medium to large construction equipment such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, and moderate to large diesel engines. Large gasoline powered tools, power saws, large chainsaws, pneumatic drills and impact wrenches, circular saws and hammering.
F	Southern Very High Noise Buffer (825 -1,320 feet from Southern Old Growth Habitat)	90 dB	100 dB	100 dB) Jackhammers, smaller pile drivers, wood chippers.

NOTE: MARKED AREAS ARE APPROXIMATE. HABITAT LOCATIONS ARE ESTIMATED FROM AERIAL PHOTOGRAPHY AND HAVE NOT BEEN FIELD VERIFIED BY A QUALIFIED BIOLOGIST. HABITAT AREAS AND SETBACKS HAVE NOT BEEN SURVEYED.

DRAFT CONSTRUCTION NOISE SETBACKS AND BUFFERS - FOR DISCUSSION PURPOSES ONLY

SCALE:
1"=400'

01

PRELIMINARY DRAFT - FOR DISCUSSION PURPOSES ONLY - PRELIMINARY DRAFT - FOR DISCUSSION PURPOSES ONLY

DRAWN	SMS
CHECK	RSR
APPROVED	MDN
DATE	7-1-16
JOB NUMBER	7787.16
FIGURE	N1.1

ORICK MILL SITE - OLD GROWTH NOISE BUFFER
ORICK, CA
CONSTRUCTION NOISE SETBACKS AND BUFFERS

SAVE THE REDWOODS LEAGUE
111 SUTTER ST., 11th FLOOR, SAN FRANCISCO, CA 94104

NO.	HISTORY / REVISION	BY	CHK.	DATE

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APPENDIX 2

USFWS Memorandum: July 31, 2006

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521-5582
Phone: (707) 822-7201 Fax: (707) 822-8411

In Reply Refer To:
8-14-2006-2887

JUL 31 2006

Memorandum

To: All Interested Parties

From: Field Supervisor, Arcata Fish and Wildlife Office
Arcata, California

Michael M. Long

Subject: Transmittal of Guidance: Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California

This memorandum transmits guidance prepared by the Arcata Fish and Wildlife Office (AFWO) that addresses the potential effects of disturbance on the federally listed northern spotted owl (*Strix occidentalis caurina*) (owl) and marbled murrelet (*Brachyramphus marmoratus*) (murrelet). This guidance promotes consistent and reasonable determinations of effects for activities that occur in or near owl or murrelet suitable habitat and result in elevated human-generated sounds or human activities in close proximity to nest trees. This guidance applies to activities occurring within the jurisdictional area of AFWO; generally, that area including Humboldt, Del Norte, and Trinity Counties, western Siskiyou County, and Mendocino County exclusive of the Russian River watershed.

This guidance applies to activities which have the potential to harass the owl or the murrelet as a result of substantially elevated sound levels or human presence near nests during the breeding season. This guidance was developed as a local adaptation of more general recommendations provided in 2005 by Region 1 of the Fish and Wildlife Service; those general recommendations are included as appendices to our guidance. This local adaptation resulted from extensive discussions among AFWO staff, consideration of local data, and comments provided by biologists from other Service offices and other agencies in California.

Through this memorandum, I am making this new guidance available for use by AFWO staff and the agencies and partners with whom we interact in project design, analysis, and consultation. This guidance will become fully effective as of the 2007 breeding seasons for the affected species. We are releasing it now to facilitate your project planning processes. However, as special case-by-case circumstances may warrant, and as our staff resources permit, we may consider implementation of this guidance this year for certain projects. If you have such projects, we will work with you to apply it on a site-specific basis. While this guidance is the result of lengthy and detailed discussion and development, and should be implemented substantially as written, it is to be viewed as a living document subject to continued, ongoing revision and improvement as additional data and experience are acquired.

Questions regarding implementation and interpretation of this guidance should be directed to Amedee Brickey, Endangered Species Program Lead, at (707) 822-7201.

Attachments

Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California, July 26, 2006
Marbled Murrelet Sound and Visual Harassment Decision Support Tool Draft User Guide, October 2003
Northern Spotted Owl Sound and Visual Harassment Decision Support Tool Draft User Guide, March 2004

Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California

July 26, 2006

Executive Summary

The issue of project-induced noise disturbance to northern spotted owls and marbled murrelets has drawn increasing attention in recent years, yet remains a complex, controversial, and poorly understood subject. The data available to assess impacts to terrestrial wildlife from these effects are limited, and fewer data yet are specific to these listed species. This guidance document builds upon and consolidates prior efforts (see Appendices) to interpret the limited available data to draw objective conclusions about the potential for these effects to rise to the level of take.

Through this guidance, the US Fish and Wildlife Service (Service) describes behaviors of these two forest species that reasonably characterize when disturbance effects rise to the level of take (i.e., harass), as defined in the implementing regulations of the Endangered Species Act of 1973, as amended (the Act). These behaviors include:

- Flushing an adult or juvenile from an active nest during the reproductive period.
- Precluding adult feeding of the young for a daily feeding cycle.
- Precluding feeding attempts of the young during part of multiple feeding cycles.

We have attempted to provide objective metrics based on a substantial review of the existing literature, as it pertains to these species and appropriate surrogate species. Our recommended methodology relies on a comparison of sound levels generated by the proposed action to pre-project ambient conditions. Disturbance may reach the level of take when at least one of the following conditions is met:

- Project-generated sound exceeds ambient nesting conditions by 20-25 decibels (dB).
- Project-generated sound, when added to existing ambient conditions, exceeds 90 dB.
- Human activities occur within a visual line-of-sight distance of 40 m or less from a nest.

To simplify the analysis of these potential effects, and to promote consistency in interpretation of the analytical results, we established sound level categories of 10-dB increments. The analysis relies on a simple comparison of project-generated sound levels against ambient conditions. Our recommended analysis includes a simple comparison of project and pre-project sound levels within a matrix of estimated distances for which available data support a conclusion of harassment. We provide a real-world example to assist the reader in understanding the correct application of the methodology.

Finally, we provide additional information the analyst should consider in conducting the analysis, as well as guidance on interpretation the final numbers derived from the analysis. We describe site-specific information that is important to include in project analyses, caution against inappropriate inclusion of information and circumstances not relevant to the results, and provide context to the final interpretation.

Introduction

The issue of elevated sound and visual disturbance of forest wildlife species, especially as it affects the northern spotted owl (owl) and the marbled murrelet (murrelet), has received increased attention in recent years, yet remains a complex, controversial, and poorly understood subject. In an effort to provide objective criteria for determining when disturbance of these species might rise to the level of "take", and to promote consistency in the interpretation of analytical results, the Arcata Fish and Wildlife Office (AFWO) developed the following guidance. The purposes of this guidance are (a) to describe the scientific basis for considering the effects of auditory and visual disturbance to owls and murrelets, and (b) to provide a methodology to simplify the analysis of these effects for the large majority of project circumstances typically encountered in or near owl and/or murrelet habitat.

This guidance attempts to quantify the effects of elevated sound levels and visual proximity of human activities to owls and murrelets, and primarily applies to these species within their suitable forest habitats in northwestern California. It may have some applicability to other forest nesting avian species, but was not developed with other species specifically in mind. Future updates of this guidance may address other forest birds.

This guidance has been developed through an extensive consideration of the available literature, incorporating species-specific information as available, but relying substantially on data from a variety of other surrogate avian species and local applications, as appropriate. This guidance is adapted from information compiled and distributed by the Service's Pacific Region, Office of Technical Support, while allowing for local conditions. Appendices A and B of this document include that information. The reader is referred to those documents for important and extensive background information regarding this issue, methods used to estimate the physical attenuation of sound in the forested landscape, and a complete list of cited material supporting our analysis. However, this guidance is intended to stand alone; the user need not read and digest the extensive appended material to fully implement this guidance.

Behaviors Indicating Harassment

The definition of "take" prescribed by the Act includes "harass". The Act's implementing regulations further define harass as "… an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering" [50 CFR §17.3]. Activities that create elevated sound levels or result in close visual proximity of human activities at sensitive locations (e.g., nest trees), have the potential to significantly disrupt normal behavior patterns.

While owls and murrelets may be disturbed by many human activities, we anticipate that such disturbance rises to the level of harassment under a limited range of conditions. For purposes of this guidance, we assume harassment may occur when owls or murrelets demonstrate behavior suggesting that the safety or survival of the individual is at significant risk, or that a reproductive effort is potentially lost or compromised. Examples of this behavior include, but are not limited to:

- An adult or juvenile is flushed from a nest during the incubation, brooding, or fledging period, that potentially results in egg failure or reduced juvenile survival.
- An adult abandons a feeding attempt of a dependent juvenile for an entire daily feeding period, that potentially results in malnutrition or starvation of the young.
- An adult delays feeding attempts of dependent birds on multiple occasions during the breeding season, potentially reducing the growth or likelihood of survival of young.

Other essential behaviors, if disrupted, may also indicate harassment.

We conclude, based on our interpretation of the available literature, that these behaviors may occur when owls or murrelets are subject to elevated sound levels or visual detection of human activities near their active nests or dependent offspring. We interpret the available published data on owls, murrelets and appropriate surrogate species as indicating that the above behaviors may manifest when: (a) the action-generated sound level substantially exceeds (i.e., by 20-25 dB or more as experienced by the animal) ambient conditions existing prior to the project; (b) when the total sound level, including the combined existing ambient and action-generated sound, is very high (i.e., exceeds 90 dB, as experienced by the animal); or (c) when visual proximity of human activities occurs close to (i.e., within 40 m of) an active nest site. Sound levels of lesser amplitude or human presence at farther distances from active nests have the potential to disturb these species, but have not been clearly shown to cause behaviors that meet the definition of harassment. We estimate distances at which conditions (a) and (b) occur by calculating attenuation rates of sound across habitat conditions representative of the forest habitats occupied by owls and murrelets. We describe this calculation in detail in a later section.

These behaviors are difficult to witness or quantify under field conditions. The difficulty associated with documentation of these behaviors, especially in species such as the marbled murrelet that rely on cryptic coloration and behavior to avoid detection, warrants a conservative interpretation of the limited data available on this subject. However, at this time, we have identified only those behaviors associated with active nest sites during the nesting season as potentially indicating harassment.

Sound Level Categories

The analysis of auditory and visual disturbance provided herein relies substantially on a simple comparison of the sound level generated by sources (e.g., chainsaws, dozers, trucks, power tools, etc.) anticipated for use in a proposed action against ambient sound conditions prevalent in the action area prior to implementing the project. The analysis compares the sound level that a nesting owl or murrelet is likely to be subject to as a result of implementing a proposed action against the sound levels to which the species may be exposed under existing, pre-project conditions.

Note that in this guidance we define the "ambient" sound level as that sound environment in existence prior to the implementation of the proposed action, and may include any and all human-generated sound sources when they constitute a long-term presence in the habitat being analyzed. Temporary, short-term sources, even if in effect during or immediately prior to the proposed action, would generally not be considered as part of the ambient but would instead be considered as a separate effect, or considered in combination with the sources from the proposed action. A special case of ambient is the “natural ambient”, which includes sound sources native to the forested habitat being considered, such as wind in trees, bird calls, and distant water flow. Human-generated, “white noise” sources, such as a distant highway, may also be part of the natural ambient if (a) distant to the area being considered, (b) relatively low in volume (i.e., <50 dB), and (c) relatively uniform in sound level over the area of consideration. Ambient sound should be estimated based on typical sources experienced on a daily or more frequent basis. For other than “natural ambient”, sources are generally located within or near the footprint of the proposed action.

The analytical comparison is provided graphically in Table 1. However, before discussing the methodology incorporated into this table, and the interpretation of numeric values derived from its use, we define and describe the sound level categories used in this analysis. We created sound level categories of 10-dB increments as a means to simplify the analysis. Each sound level category is described in terms of the conditions, equipment, tools, and other sound sources common to the particular level.

The following subsections provide concise descriptions of sound levels typically encountered under pre-project ambient conditions or during project implementation (including post-project use, if future use of the project area results in a long-term alteration of the sound/visual environment). Each description includes the decibel range, a general description, and examples of equipment or tools that typify that sound environment. Measurements and estimates from a broad range of tools and equipment are provided for reference purposes in Table 2.

It should be noted that many tools and equipment demonstrate a range of sound production substantially wider than the 10-dB sound level categories provided here. That range of sound production represents the inherent variability among similar sources, and the variation that typically occurs among measurements of even identical sources. This can easily be seen in a cursory examination of Table 2. When the range of sound measures for a source exceed the 10-dB range of a single sound level category, the analyst should consider the sound source in the context of other sources typical to the proposed activity. For example, chain saws used in timber harvest operations would include those in the higher sound measures, and would not include lower sound levels more representative of homeowner applications. In a related issue, the sound of small trees being felled is not anticipated to be substantially higher than the sound of the saws and other activities. However, the felling of larger trees may exceed the sound of the equipment used to fall and yard them; we have addressed this situation in the sound level descriptions.

We have attempted to create categories here that include similar sound sources, and have generally applied more median values (that is, we have discounted outliers) where multiple values for similar sound sources are encountered. While there may be exceptions within and among these categories, we have attempted to address this variability through an otherwise conservative approach to estimating distances at which harassment behaviors may manifest.

Natural Ambient: Refers to ambient sound levels (generally < 50 dB) typically experienced in owl or murrelet habitat not substantially influenced by human activities, and includes sources native to forest habitats. Human-generated "white noise", such as from a *distant* highway, may apply when < 50 dB and relatively uniform across the action area.

Very Low: Typically 50-60 dB, and generally limited to circumstances where human-generated sound would never include amplified or motorized sources. Includes forest habitats close to less-frequently encountered natural sources, such as rapids along large streams, or wind-exposure, and may include quiet human activities such as nature trails and walk-in picnic areas.

Low: Typically 61-70 dB, and generally limited to sound from small power tools, light vehicular traffic at slow speeds on paved surfaces, non-gas-powered recreational activities, and residential activities, such as those associated with small parks, visitor centers, bike paths, and residences. Includes most hand tools and battery operated, hand-held tools.

Moderate: Typically 71-80 dB, generally characterized by the presence of passenger vehicles and street-legal motorcycles, small trail cycles (not racing), small gas-powered engines (e.g., lawn mowers, *small* chain saws, portable generators), and high-tension power lines. Includes electric hand tools (except circular saws, impact wrenches and similar).

High: Typically 81-90 dB, and would include medium- and large-sized construction equipment, such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, drill rigs, and other moderate to large diesel engines. Would include high speed highway traffic including RVs, large trucks and buses, large street legal and trail (not racing) motorcycles. Also includes power saws, large chainsaws, pneumatic drills and impact wrenches, and large gasoline-powered tools.

Very High: Typically 91-100 dB, and is generally characterized by impacting devices, jackhammers, racing or Enduro-type motorcycles, compression ("jake") brakes on large trucks, and trains. This category includes both vibratory and impact pile drivers (smaller steel or wood piles) such as used to install piles and guard rails, and large pneumatic tools such as chipping machines. It may also include largest diesel and gasoline engines, especially if in concert with other impacting devices. Felling of large trees (defined as dominant or subdominant trees in mature forests), truck horns, yarding tower whistles, and muffled or underground explosives are also included.

Extreme: Typically 101-110 dB. Generally includes use of ground-level, unmuffled explosives, pile driving of large steel piles, low-level over flights or hovering of helicopters, and heavily amplified music.

Sound Levels Exceeding 110 dB: These sound levels, typified by sources such as jet engines and military over flights, large sirens, open air (e.g., treetop) explosives, and double rotor logging helicopters, are special situations requiring site- and situation-specific analysis, and are not covered by the analytical methods provided herein.

Derivation of Harassment Distances

As indicated earlier, available data suggest that harassment occurs when sound levels resulting from project-based sound sources exceed ambient conditions by relatively substantial levels, or when those sound sources exceed a high absolute threshold. Since sound attenuates as a function of the distance from the source (within typical forest habitat, at a rate of approximately 6 dB per doubling of distance from a point source), the analyst can estimate the distance at which various sound sources exceed ambient conditions by anticipated threshold values. We estimated these distances using a spreadsheet model that simulates sound attenuation in typical forest habitats, reasonably accounting for ambient environmental conditions and sound source characteristics. As a means of simplifying the analysis process, we used reasonable median sound values within the above-described categories for both source and ambient sound conditions. Table 1 reports the distances within which elevated, project-generated sound is reasonably expected to exceed ambient conditions to such a degree as to result in harassment of murrelets or owls. The reader is referred to Appendices 1 and 2 and their references for additional, detailed discussion of sound metrics and the model used to derive these distances.

Time of Day Adjustment for the Marbled Murrelet

The disturbance take threshold distances provided in Table 1 are based on a comparison of project generated sound levels with existing (ambient) sound levels, which themselves represent average daytime sound conditions. We recognize, however, that ambient sound level often has a substantial time-of-day component, with nighttime, dawn and dusk ambient sound levels generally 5-10 dB lower than typical midday levels (see Appendix A *in* EPA 1974). It is also known that murrelet flights into nests to feed nestlings and for nest-tending exchanges are concentrated around dawn and dusk (Nelson and Hamer 1995), during the period when ambient noise levels tend to be lower than average daytime levels (EPA 1974).

Therefore, for marbled murrelets, the harassment threshold distances provided in Table 1 apply to noise-generating activities occurring during the midday period, when the risk of harassment is lower. Specifically, for murrelets, the harassment distances in Table 1 apply to noise-generating activities that are not within 2 hours of sunrise or sunset. If proposed activities will occur within 2 hours of sunrise or sunset, and if the ambient sound environment during the dawn and dusk period can reasonably be expected to be 5 dB or more quieter than the midday sound environment, then the estimated harassment distance threshold should be calculated based on an ambient level 10 dB lower (i.e., one row up in the table) compared to the normal ambient rating in Table 1. In some cases, this will result in a larger harassment threshold distance. This time-of-day measure provides a more consistent application of the threshold criteria to the known biology of the murrelet and the anticipated sound environment during dawn and dusk periods.

Similar time-of-day considerations and adjustments are not required for the northern spotted owl.

Application of Harassment Distances to Project Conditions

The following methodology may be used to estimate the approximate distance at which project-generated sound exceeds ambient conditions to such an extent that northern spotted owls or marbled murrelets may be subject to harassment due to sound or visual disturbance.

Step 1: The analyst reviews the environment in the action area to determine the existing ambient sound level. The analyst should include any sound sources occurring in the action area, prior to and not part of the proposed action, that create ambient sound levels higher than the "natural" background. For example, if the proposed action would add a passing lane to a high-use major highway, the ambient condition should include the existing traffic and maintenance on the highway itself, in addition to other sounds native to the adjacent forest environment. As a second example, a proposed action to maintain a remote hiking trail would not include sound sources other than the "natural background" and infrequent human use as part of the existing ambient. Based on this review, the analyst assigns a sound level category to the ambient condition (equivalent to a row of Table 1).

Step 2: The analyst reviews the proposed action to determine the types of equipment, tools, etc., anticipated to be used during the project. Based on the descriptions of sound level categories, above, the analyst assigns a sound level category to the action-generated sound sources (corresponding to the columns in Table 1). Action-generated sound sources should include all major sources necessary to complete the proposed action. When project-specific sound measures are not available, the reader should refer to Table 2 for typical values for equipment, tools, and other sound sources. For projects where distinctly different sound environments (for either ambient or action-generated) may occur within the overall action area, the analyst may complete separate analyses for each distinct sound environment.

Step 3: From Table 1, the analyst finds the cell corresponding to the appropriate row and column for existing ambient sound and action-generated sound, respectively. This cell provides an estimate of the distance within which increased sound level may harass an owl or murrelet. The cell values are generally reported as a distance from the outer edge of the project footprint into occupied or presumed occupied suitable habitat, unless site-specific information indicates sound sources may be more localized within the project footprint (see also "Other Considerations", below).

Step 4: When significant topographic features occur within the sound environment, appropriate consideration may be given to their sound attenuating capabilities. However, the analyst should have a full understanding of the effects of topography on sound attenuation, especially when the species involved typically nests at a substantial distance above the ground. That is, topography may substantially attenuate sound between the source and the receiver (i.e., owl or murrelet nest site) when that topographic barrier is sufficiently high to block line-of-sight transmission between the source and receiver. For species such as owls and murrelets that normally nest high in tall trees, topography or other barriers provide little attenuation unless very close to the sound source, or very high.

Step 5: Consider the potential for human activities within 40 m of nest branches of owls or murrelets. If no known or likely nest tree, or flight path to the nest itself, occurs this close to the visual disturbance sources, there would be no visual disturbance of owls or murrelets anticipated. Otherwise, assume visual harassment for up to 40 m from human activities.

Table 1. Estimated harassment distance due to elevated action-generated sound levels for proposed actions affecting the northern spotted owl and marbled murrelet, by sound level.

Existing (Ambient) Pre-Project Sound Level (dB) [1, 2]	**Anticipated Action-Generated Sound Level (dB)** [2, 3]			
	Moderate (71-80)	**High (81-90)**	**Very High (91-100)**	**Extreme (101-110)**
“Natural Ambient” [4] **(<=50)**	50 (165) [5,6]	150 (500)	400 (1,320)	400 (1,320)
Very Low (51-60)	0 (0)	100 (330)	250 (825)	400 (1,320)
Low (61-70)	0 (0)	50 (165)	250 (825)	400 (1,320)
Moderate (71-80)	0 (0)	50 (165)	100 (330)	400 (1,320)
High (81-90)	0 (0)	50 (165)	50 (165)	150 (500)

[1] Existing (ambient) sound level includes all natural and human-induced sounds occurring at the project site prior to the proposed action, and are not causally related to the proposed action.
[2] See text for full description of sound levels.
[3] Action-generated sound levels are given in decibels (dB) experienced by a receiver, when measured or estimated at 15.2 m (50 ft) from the sound source.
[4] “Natural Ambient” refers to sound levels generally experienced in habitats not substantially influenced by human activities.
[5] All distances are given in meters, with rounded equivalent feet in parentheses.
[6] For murrelets, activities conducted during the dawn and dusk periods have special considerations for ambient sound level. Refer to text for details.

Example Analysis

The following example is provided to assist the reader in understanding the application of this recommended methodology to a hypothetical yet typical project circumstance.

Proposed Project: An agency proposes to construct an informational kiosk, restroom, and six graveled parking slots at an existing, undeveloped, trailhead parking area along a low-speed (<45 mph), paved road closed to large trucks and buses. The footprint of the proposed project is a roughly circular area of approximately 75-foot diameter (about 1/10 acre). The surrounding forest is suitable nesting habitat for marbled murrelets, and the agency proposes to do construction during the nest season. Topography in the action area is low rolling ridges less than 50 feet high. No other sound sources of significance are located nearby. The construction project will not remove any large trees, but requires the use of several pieces of equipment (e.g., backhoe, dump truck), as well as smaller power equipment (e.g., saws, cement mixer, portable generator, small chain saw) and hand tools. No jackhammering, pile driving, or larger diesel equipment is needed. The agency agrees to conduct all on-site activities during the midday time period between 2 hours after sunrise to 2 hours before sunset.

Analysis: The ambient sound level at the proposed kiosk includes the existing passenger vehicle/light truck traffic on a paved surface immediately adjacent to the work area, and existing human presence of hikers. Using the above-described sound level categories, this ambient sound level classifies as "low" (61-70 dB). The large construction equipment (i.e., the backhoe and truck) are the greatest sources of increased sound to be considered here, as they exceed the level of the other tools. From the above-described sound levels, we anticipate that action-generated sound levels will fit into the "high" category (81-90 dB). Choosing the appropriate row (Ambient = Low) and column (Action-generated = High) in Table 1, we estimate that disturbance may rise to the level of harassment over an area within 50 m (165 ft) from the footprint of the project. Since all activities will be conducted during the mid-day period, no further adjustment of the tabled value to account for murrelet activity periods is necessary. This 50-m distance, when used as a buffer around the project footprint, results in an estimate of 2.9 acres (1.2 ha) subject to harassment from auditory disturbance. Large potential nest trees exist immediately adjacent to the work area, so visual harassment may also be a consideration. However, human presence already occurs at the trailhead on a daily basis, and the proposed project will not substantially alter that effect. The topographic features in the action area are unlikely to further attenuate any sound experienced by murrelets, which commonly nest more than 50 feet above ground level. Since construction of the kiosk and restroom would not appreciably change the effects of the existing roadway or parking area, the duration of effects would be for a single breeding season, and would not alter effects already at the site in future years.

Interpretation and Application of the Results

The estimated harassment distance resulting from the analysis of any particular project conditions requires careful interpretation. Although seemingly precise, the reported distance represents a reasonable *approximation* of the distance wherein "the likelihood of injury" occurs, as supported by currently available data. That is, the resultant number estimates the distance within which available disturbance data on owls or murrelets (or surrogate species, as appropriate) show that at least some individuals would demonstrate one or more behaviors indicating harassment as a result of anticipated sound levels or visual detection of human activities near nest sites. Given the many sources of variability in such an analysis, such as differences in individual bird response, variation in actual sound level produced by similar sources, variability in sound transmission during daily weather patterns, and non-standardization in sound metrics reported in the published literature, exact estimates of harassment distances are currently infeasible, and likely will remain so.

It is reasonable to assume that owls or murrelets closer to sources of disturbance have a higher likelihood of suffering significant disruption of normal behavior patterns than those at the outer limits of the estimated harassment distance, due to louder sound levels or a visually closer perceived threat to the nest. Further, not all owls or murrelets, except those in the very closest proximity to the disturbance source, may respond to a degree indicating harassment. Thus, the likelihood of injury for any particular individual would range from some low proportion to a higher value depending on its actual proximity to a particular sound/visual source. It is neither reasonable nor necessary for purposes of analysis and estimation of take to predict that all (or even a high proportion of) owls or murrelets within this distance show harassment behaviors. Conversely, it is also unreasonable to conclude that owls or murrelets beyond this distance would never be harassed. A more supportable interpretation is that currently available information does not support a conclusion that owls or murrelets more distant to the anticipated sound/visual disturbances are likely to suffer a significant disruption of normal behavior patterns.

The reporting of take associated with auditory and visual disturbances is necessary, even if somewhat imprecise. It is appropriate to consider all reasonable means to minimize take including, but not limited to, seasonal restrictions and substitution of equipment type to reduce the likelihood of injury, so long as those means are consistent with the “minor change rule” [50 CFR §402.14 (i)(2)]. When considering measures to reduce the effects of harassment, the analyst should bear in mind not only the spatial extent of the disturbance, but also the timing and duration of the disturbance.

Finally, activities which result in estimated distances of zero meters would be expected to have no effect on either owls or murrelets. Activities resulting in estimates of 50 m or less may, under some circumstances, be considered not likely to adversely affect, due in part to the species preference of nesting high up in large trees. However, the analyst should be prepared to describe and justify reasons for these findings.

Other Considerations

This guidance does not consider the direct effects of predation by corvids (ravens, crows and jays) and other predators as a result of human activities in murrelet and owl habitat. That is, while corvids may increase in number in murrelet and owl habitat in response to human activities, the resulting increased take due to predation (injury) is not addressed here. Distance estimates reported in this guidance reflect only the effects of sound attenuation and visual detection on behaviors appropriately interpreted as harassment. We have considered predation only in the sense that detection of the nest as a result of owl or murrelet harassment behavior (e.g., flushing from the nest) may increase the risk of predation, regardless of density of predators, and thus represents a “likelihood of injury.”

This analytical method addresses most forest habitat conditions that affect the attenuation rate of sound (and thus the level of sound detected by the owl or murrelet at its location). These conditions include dampening effects of forest vegetation, variability in natural ambient sound typically encountered under forest conditions, use of multiple pieces of identical equipment, and the effect of elevated nest sites on sound attenuation. Departure from the tabled values in this guidance to account for special forest conditions is generally inappropriate except under highly unusual circumstances. A factor *not* considered in this methodology is the effect of topography on sound attenuation. Therefore, a site-specific assessment of topography should be considered. Steep slopes, ridges, and designed sound barriers may increase sound attenuation when they form complete barriers to the direct line of sound transmission between source and the location of the receiver (here, the actual location of the potentially harassed animal). In general, small ridges or walls not clearly blocking the sources from a highly elevated nest would provide little or no attenuation. When clearly supported by site-specific information regarding topography, action-generated sound may be reduced by one or two levels in the analysis, when compared to existing ambient sound levels.

For some projects, elevated sound levels may cease following completion of the project. For example, sound level following the completion of timber harvest is likely to return to pre-harvest levels, and so would not result in long-term or permanent sound and visual disturbance to owls and murrelets. On the other hand, actions such as the creation of a new road may result in elevated sound levels both during construction and during future use and maintenance of the road. The analyst should carefully consider both spatial and temporal aspects of noise and visual disturbance for each project.

Activities producing sound levels of 70 dB or less (estimated at 15.2 m from the sources), such as use of hand tools, small hand-held electric tools, or non-motorized recreation, would not generally rise to the level of harassment, except in certain circumstances, such as when used in very close proximity (i.e., <25 m) to an active nest. However, under these circumstances, visual detection of human activities by the species near its nest is assumed to be of more consequence than auditory disturbance, and take should be described in such terms.

Activities producing sound levels greater than 110 dB (estimated at 15.2 m from the sources), such as open-air blasting, aircraft, or impact pile-driving, are not addressed in this analysis, and should be evaluated through a more detailed site-specific analysis.

Table 2. Some Common Sound Levels for Equipment/Activities

Measured Sound Source	Range of Reported dB Values @ Distance Measure *(Distance measured @ 50 ft (15.2 m) unless otherwise indicated)* Reported Decibel Value	"Standardized" Value @ 50 ft [1]	Relative Sound Level [2]
Quiet Whisper	30 @ 3 ft	6	Ambient
Ambient Sound Level - Forest Habitats (low end[3])	25	25	Ambient
Library (ambient sound level)	30 @ ambient	30	Ambient
Conversation (low end)	55 @ 1 m	31	Ambient
Conversation (high end[4])	62 @ 2 ft	34	Ambient
Conversataion	60 @ 3 ft	36	Ambient
Speech (normal)	65 @ 1 m	41	Ambient
Ambient Sound Level - Forest Habitats (high end)	43.8	44	Ambient
Home Vacuum Cleaner	70 @ 1 m	46	Very Low
Loud Singing	75 @ 3 ft	51	Very Low
Generator (light home/recreational, 900-2,800 W)	59 @ 7 m	52	Very Low
Air Conditioner Window Unit	60 @ 25 ft	54	Very Low
Generator (light commercial, 4,000-5,000 W) (low end)	61 @ 7 m	54	Very Low
Pickup Truck (idle) (low end)	55	55	Very Low
Garbage Disposal (low end)	80 @ 1 m	56	Very Low
Garbage Disposal (high end)	80 @ 3 ft	57	Very Low
Generator (light commercial, 4,000-5,000 W) (high end)	65 @ 7 m	58	Very Low
Conversation (indoor)	60	60	Very Low
Chain Saw Running (rain) (low end)	61	61	Low
Food Blender (low end)	85 @ 1 m	61	Low
Generator (heavy home, 3,300-5,500 W) (low end)	68 @ 7 m	61	Low
Generator (light industrial, 2,600-9,500 W) (low end)	68 @ 7 m	61	Low
Milling Machine	83 @ 4 ft	61	Low
Pickup Truck (idle) (high end)	77 @ 8 ft	61	Low
Motorcycle on Trail (620 cc street legal, meter at ground level)	61.9	62	Low
Powerline	50 @ 200 ft	62	Low
Chainsaw (Stihl 025)	46 @ 105 m	63	Low
Generator (economic home, 2,300-4,500 W) (low end)	70 @ 7 m	63	Low
Street Motorcycles < 100 cc (low end)	65	65	Low
Motorcycle on Trail (100 cc, 2-stroke, meter at ground level)	65.7	66	Low
Chainsaw (McCulloch Promac 260, low end)	46.1 @ 150 m	66	Low
Chainsaw (Stihl 025, low end)	53.8 @ 60 m	66	Low
Food Blender (high end)	90 @ 3 ft	66	Low
Motorcycle on Trail (620 cc street legal, meter elevated 15 m)	66.6	67	Low
Generator (welding, 4,000 W)	74 @ 7 m	67	Low
Passenger Car (50 mph)	67	67	Low
Passenger Car (60 kph)	65 @ 20 m	67	Low
Generator (heavy home, 3,300-5,500 W) (high end)	75 @ 7 m	68	Low
Generator (medium commercial, 6,000 W)	75 @ 7 m	68	Low
Power Lawn Mower	92 @ 1 m	68	Low
Motorcycle on Trail (100 cc, 2-stroke, meter elevated 15 m)	68.1	68	Low
Generator (economic home, 2,300-4,500 W) (high end)	76 @ 7 m	69	Low
Chainsaw (McCulloch Promac 260)	59.9 @ 50 m	70	Low
Generator (25 KVA or less)	70	70	Low
Yelling	92 @ 4 ft	70	Low
Pickup Truck (driving)	87 @ 8 ft	71	Moderate
Motorcycle on Trail (300 cc, 2-stroke, meter at ground level)	71.3	71	Moderate
Chainsaw (McCulloch Promac 260)	61.3 @ 50 m	72	Moderate
Gas Lawn Mower	96 @ 1 m	72	Moderate
Mowers, leaf blowers (low end)	72	72	Moderate
Chainsaw (Stihl 025, high end)	60.5 @ 60 m	73	Moderate

Measured Sound Source	Reported Decibel Value	"Standardized" Value @ 50 ft [/1]	Relative Sound Level [/2]
Generator (light industrial, 2,600-9,500 W) (high end)	80 @ 7 m	73	Moderate
Street Motorcycles 350-749 cc (low end)	73	73	Moderate
Welder	73	73	Moderate
Automobile	80 @ 25 ft	74	Moderate
Jackhammer (muffled)	74	74	Moderate
Pile Driving (1999 ODOT Study, low end)	74	74	Moderate
Roller (low end)	74	74	Moderate
Street Motorcycles >= 750 cc (low end)	74	74	Moderate
Chain saws (low end)	75	75	Moderate
Off-Road Motorcycles < 100 cc (low end)	75	75	Moderate
RVs (small) (low end)	75	75	Moderate
Concrete Vibrator	76	76	Moderate
Passenger Cars/Light Trucks (65 mph) (low end)	76	76	Moderate
Flatbed Pickup Truck	93 @ 8 ft	77	Moderate
Log Truck	67 @ 46 m	77	Moderate
Pump (low end)	77	77	Moderate
Street Motorcycles 170-349 cc (low end)	77	77	Moderate
BPA Powerline	66 @ 200 ft	78	Moderate
Generator (low end)	78	78	Moderate
Off-Road Motorcycles 100-169 cc (low end)	78	78	Moderate
Street Motorcycles 100-169 cc (low end)	78	78	Moderate
Backhoe	69 @ 46 m	79	Moderate
Off-Road Motorcycles 170-349 cc (low end)	79	79	Moderate
Motorcycle on Trail (300 cc, 2-stroke, meter elevated 15 m)	79.6	80	Moderate
Backhoe (low end)	80	80	Moderate
Boat motors (low end)	80	80	Moderate
Cat Skidder	70 @ 46 m	80	Moderate
Chainsaw (McCulloch Promac 260, high end)	59.5 @ 150 m	80	Moderate
Compressor (low end)	80	80	Moderate
Concrete Mixer (low end)	80	80	Moderate
Front-end Loader (low end)	80	80	Moderate
Ground Compactor (low end)	80	80	Moderate
Horizontal Boring Hydraulic Jack	80	80	Moderate
Medium Construction (low end)	80	80	Moderate
Medium Trucks & Sport Vehicles (65 mph) (low end)	80	80	Moderate
Paver (low end)	80	80	Moderate
Rock Drill and Diesel Generator (low end)	58 @ 200 m	80	Moderate
Roller (high end)	80	80	Moderate
Vacuum Street Sweeper	80	80	Moderate
Cat Skidder	59 @ 200 m	81	High
Concrete Truck (low end)	81	81	High
Off-Road Motorcycles < 100 cc (high end)	81	81	High
Pumps, generators, compressors (low end)	81	81	High
Concrete Pump	82	82	High
Dump Truck Dumping Rock	72 @ 46 m	82	High
Ground Compactor (high end)	82	82	High
Rock Drills and Jackhammers (low end)	82	82	High
Slurry Machine (low end)	82	82	High
Street Motorcycles < 100 cc (high end)	82	82	High
Train	90 @ 20 ft	82	High
Chainsaw, large	73 @ 46 m	83	High
Chainsaw, large	61 @ 200 m	83	High
Concrete Batch Plant	83	83	High
Dump Truck Dumping Rock	54 @ 400 m	83	High
General construction (low end)	83	83	High

Measured Sound Source	Reported Decibel Value	"Standardized" Value @ 50 ft [/1]	Relative Sound Level [/2]
Highway Traffic (uphill, discontinuous traffic, wet)	61 @ 200 m	83	High
Log Loader	73 @ 46 m	83	High
Power Mower	107 @ 3 ft	83	High
Road Grader (low end)	83	83	High
Backhoe (high end)	84	84	High
Dozer (low end)	84	84	High
Dump Truck	84	84	High
Flat Bed Truck	84	84	High
Generator (high end)	84	84	High
Heavy Construction (low end)	84	84	High
Large Truck (low end)	84	84	High
Motorcycle	88 @ 30 ft	84	High
Motorcycle Enduro Event	62.3 @ 180 m	84	High
Pile Driving (1987 WDOT Study, low end)	84	84	High
Rock Drill and Diesel Generator (low end)	55 @ 400 m	84	High
Motorcycle on Trail (200 cc, 2-stroke, meter at ground level)	84.5	85	High
5 Motorcycles	67 @ 120 m	85	High
Auger Drill Rig	85	85	High
Concrete Mixer (high end)	85	85	High
Concrete Truck (high end)	85	85	High
Crane (low end)	85	85	High
Diesel Truck (40 mph)	85	85	High
Drill Rig (low end)	85	85	High
Dump Truck	63 @ 200 m	85	High
Equipment > 5 horsepower	85	85	High
Gradall (low end)	85	85	High
Highway Traffic (uphill, discontinuous traffic, wet)	75 @ 46 m	85	High
Impact Wrench	85	85	High
Large Tree Falling	63 @ 200 m	85	High
Log Loader	63 @ 200 m	85	High
Mounted Impact Hammer Hoe-Ram (low end)	85	85	High
Mowers, leaf blowers (high end)	85	85	High
Passenger Cars/Light Trucks (65 mph) (high end)	85	85	High
Pump (high end)	85	85	High
Road Grader (high end)	85	85	High
Rock Drill (low end)	85	85	High
RVs (large) (low end)	85	85	High
RVs (small) (high end)	85	85	High
Scraper (low end)	85	85	High
23 ft Detonation Cord, on surface (low end)	80 @ 100 ft	86	High
Chain saws (high end)	86	86	High
Chainsaw (Cantor, one chainsaw running)	86	86	High
Dump Truck Dumping Rock	64 @ 200 m	86	High
Gradall (high end)	86	86	High
Large Diesel Engine	100 @ 10 ft	86	High
Motorcycle Enduro Event	68.4 @ 120 m	86	High
Pneumatic wrenches, rock drills (low end)	86	86	High
Rock Drill and Diesel Generator (high end)	64 @ 200 m	86	High
12 ft Detonation Cord, buried (low end)	66 @ 580 ft	87	High
Diesel Truck (50 kph)	85 @ 20 m	87	High
Front-end Loader (high end)	87	87	High
Hydromulcher (low end)	71 @ 300 ft	87	High
Pumps, generators, compressors (high end)	87	87	High
Crane (high end)	88	88	High
Dozer (high end)	88	88	High

Measured Sound Source	Reported Decibel Value	"Standardized" Value @ 50 ft [/1]	Relative Sound Level [/2]
Drill Rig (high end)	88	88	High
Off-Road Motorcycles 350-750 cc (low end)	88	88	High
Street Motorcycles 100-169 cc (high end)	88	88	High
Motorcycle on Trail (200 cc, 2-stroke, meter elevated 15 m)	88.2	88	High
5 Motorcycles	55 @ 760 m	89	High
Chainsaw (Cantor, two chainsaws running)	89	89	High
General construction (high end)	89	89	High
Jackhammer	89	89	High
Large Truck (high end)	89	89	High
Medium Construction (high end)	89	89	High
Medium Trucks & Sport Vehicles (65 mph) (high end)	89	89	High
Motorcycle Enduro Event	73.3 @ 90 m	89	High
Paver (high end)	89	89	High
Scraper (high end)	89	89	High
Street Motorcycles 350-749 cc (high end)	89	89	High
Chain Saw Running (rain) (high end)	80 @ 150 ft	90	High
Compressor (high end)	90	90	High
Concrete Saw	90	90	High
Heavy Trucks and Buses (low end)	90	90	High
Hydra Break Ram	90	90	High
Mounted Impact Hammer Hoe-Ram (high end)	90	90	High
Circular Saw (hand held)	115 @ 1 meter	91	Very High
Highway Traffic (downhill, discontinuous traffic, wet)	81 @ 46 m	91	Very High
Motorcycle Enduro Event	78.8 @ 60 m	91	Very High
Pneumatic Chipper (low end)	115 @ 1 m	91	Very High
Pneumatic Riveter	115 @ 3 ft	91	Very High
Slurry Machine (high end)	91	91	Very High
Track Hoe (low end)	75 @ 300 ft	91	Very High
Highway Traffic (downhill, discontinuous traffic, wet)	70 @ 200 m	92	Very High
Large Tree Falling	82 @ 46 m	92	Very High
Motorcycle Enduro Event	85.8 @ 30 m	92	Very High
Chainsaw	117 @ 3 ft	93	Very High
Clam Shovel	93	93	Very High
Railroad (low end)	93	93	Very High
Street Motorcycles >= 750 cc (high end)	93	93	Very High
Explosives (low end)	94	94	Very High
Hydromulcher (high end)	88 @ 100 ft	94	Very High
Jake Brake on Truck	110 @ 8 ft	94	Very High
Boat motors (high end)	95	95	Very High
Guardrail Installation and Pile Driving (low end)	95	95	Very High
Heavy Trucks and Buses (high end)	95	95	Very High
Impact Pile Driver (low end)	95	95	Very High
Off-Road Motorcycles 350-750 cc (high end)	95	95	Very High
Pneumatic Chipper (high end)	115 @ 5 ft	95	Very High
RVs (large) (high end)	95	95	Very High
Vibratory (Sonic) Pile Driver (low end)	95	95	Very High
Diesel Truck	100 @ 30 ft	96	Very High
Heavy Construction (high end)	96	96	Very High
Jet Overflight (low end)	80 @ 300 ft	96	Very High
Vibratory (Sonic) Pile Driver (high end)	96	96	Very High
Logging Truck	97	97	Very High
Pneumatic wrenches, rock drills (high end)	97	97	Very High
Rock Drills and Jackhammers (high end)	97	97	Very High
Street Motorcycles 170-349 cc (high end)	97	97	Very High
Door Slamming	98	98	Very High

Measured Sound Source	Reported Decibel Value	"Standardized" Value @ 50 ft [1]	Relative Sound Level [2]
Dump Truck	88 @ 46 m	98	Very High
Pile Driving (1999 ODOT Study, low end)	98	98	Very High
Railroad (high end)	98	98	Very High
Rock Drill (high end)	98	98	Very High
Helicopter S-61 (large, single rotor, loaded) (low end)	79 @ 500 ft	99	Very High
Rock Drill and Diesel Generator (high end)	70 @ 400 m	99	Very High
Off-Road Motorcycles 100-169 cc (high end)	100	100	Very High
Off-Road Motorcycles 170-349 cc (high end)	100	100	Very High
Rock Drill and Diesel Generator	90 @ 46 m	100	Very High
Exterior Cone Blast w/ sand bags (low end)	72 @ 0.25 mi	101	Extreme
Helicopter S-61 (low end)	77 @ 800 ft	101	Extreme
Impact Pile Driver (high end)	101	101	Extreme
Pneumatic tools, jackhammers & pile driver (low end)	101	101	Extreme
Amplified Rock and Roll	120 @ 6 ft	102	Extreme
Helicopter S-61 (large, single rotor, loaded) (high end)	82 @ 500 ft	102	Extreme
Pile Driving (1987 WDOT Study, high end)	103	103	Extreme
Truck Horn	120 @ 8 ft	104	Extreme
Guardrail Installation and Pile Driving (high end)	105	105	Extreme
23 ft Detonation Cord, on surface (high end)	85 @ 580 ft	106	Extreme
Impact Pile Driving	106	106	Extreme
Track Hoe (high end)	96 @ 150 ft	106	Extreme
Columbia double rotor logging helicopter (reading from road)	79 @ 400 m	108	Extreme
Pave Hawk Military Helicopter	92 @ 105 m	109	Extreme
Columbia double rotor logging helicopter (read in forest)	100 @ 46 m	110	Extreme
Pneumatic tools, jackhammers & pile driver (high end)	110	110	Extreme
12 ft Detonation Cord, buried (high end)	92 @ 500 ft	112	Extreme
Helicopter S-61 (high end)	106 @ 100 ft	112	Extreme
Rock Blast	91 @ 575 ft	112	Extreme
Columbia double rotor logging helicopter (reading from road)	84 @ 400 m	113	Extreme
Engine Exhaust (no muffler)	140 @ 3 ft	116	Extreme
Military Flight (low end)	98 @ 500 ft	118	Extreme
Exterior Cone Blast w/ sand bags (high end)	100 @ 500 ft	120	Extreme
Treetop Blast (low end)	110 @ 200 ft	122	Extreme
Columbia double rotor logging helicopter (read at clearing)	101 @ 200 m	123	Extreme
Jet Overflight (high end)	86 @ 4,000 ft	124	Extreme
Exterior Cone Blast (obstructed)	107 @ 500 ft	127	Extreme
Jet takeoff	120 @ 200 ft	132	Extreme
50 HP Siren	130 @ 100 ft	136	Extreme
Jet Plane	130 @ 100 ft	136	Extreme
Treetop Blast (high end)	116 @ 0.1 mi	137	Extreme
Military Flight (high end)	120 @ 600 ft	142	Extreme
Explosives (high end)	145 @ 330 ft	162	Extreme

[1] "Standardized" values are sound levels converted to 50-foot equivalents (i.e., as though measured at 50 feet distance from source). For comparison purposes.

[2] Relative Sound Level: a general, subjective ranking of relative noise levels created by the sources considered here,when used for analysis of relative noise effects on species.

[3] "Low end" indicates the lower value when a range of values is reported for a sound source.

[4] "High end" indicates the higher value when a range of values is reported for a sound source.

Literature Cited

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APPENDIX A FOR APPENDIX 2

USFWS Memorandum: July 31, 2006

Marbled Murrelet Sound and Visual Harrasssment Decision Support Tool

Available Upon Request from LACO

APPENDIX B FOR APPENDIX 2

USFWS Memorandum: July 31, 2006

Northern Spotted Owl Sound and visual Harassment Decision Support Tools

Available Upon Request from LACO

APPENDIX 3

RNSP Guidelines: May, 2007

Redwood National and State Parks Auditory Disturbance Guidelines for Projects in Suitable Spotted Owl and Marbled Murrelet Nesting Habitat During the Breeding Season

(Adapted from "Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California". U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, July 26, 2006)

May 2007

Harassment

"Harassment" (a form of "take" under the Endangered Species Act [ESA]) is defined as "… an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering" [50 CFR §17.3]. Activities that create elevated sound levels or result in close visual proximity of human activities at sensitive locations (e.g., nest trees), have the potential to significantly disrupt normal behavior patterns. These behaviors may occur when spotted owls or marbled murrelets are subjected to elevated sound levels or visual disturbance associated with human activities near their active nests or dependent offspring.

Behaviors indicating harassment may manifest when: (a) the action-generated sound level substantially exceeds (i.e., by 20-25 dB or more as experienced by the animal) ambient conditions existing prior to the project; (b) when the total sound level, including the combined existing ambient and action-generated sound, is very high (i.e., exceeds 90 dB, as experienced by the animal); or (c) when visual proximity of human activities occurs close to (i.e., within 150 ft [45 m] of) an active nest site. Sound levels of lesser amplitude or human presence at farther distances from active nests have the potential to disturb owls and murrelets, but have not been clearly shown to cause behaviors that meet the definition of harassment.

Sound Level Categories

The criteria for auditory and visual disturbance rely on a simple comparison of the sound level(s) generated by project sources (e.g., chainsaws, dozers, trucks, power tools, etc.) against ambient sound conditions prevalent in the project area prior to implementing the project. The sound level that a nesting owl or murrelet is likely to be subject to as a result of implementing a proposed action is compared to the sound levels that the species may be exposed to under existing, pre-project conditions.

Note that in this guidance "ambient" sound level is defined as sounds in existence prior to implementation of the project, and may include any and all human-generated sound sources when they constitute a long-term presence in the habitat being analyzed. Temporary, short-term sources, even if in effect during or immediately prior to the proposed action would generally not be considered ambient but would instead be considered as a separate effect, or considered in combination with the sources from the proposed action. "Natural ambient" includes sound sources native to the forested habitat being considered, such as wind in trees, bird calls, and distant water flow. Human-generated "white noise", such as from a distant highway, may also be considered natural ambient if (a) distant to the area being considered, (b) relatively low in volume (i.e., <50 dB), and (c) relatively uniform in sound level over the area of consideration. Ambient sound should be estimated based on typical sources experienced on a daily or more frequent basis.

Natural Ambient: Refers to ambient sound levels (generally < 50 dB) typically experienced in owl or murrelet habitat not substantially influenced by human activities, and includes sounds native to forest habitats that would be encountered on a mild weather day. Human-generated "white noise", such as from a *distant* highway, may apply when < 50 dB and the sound is relatively uniform across the action area.

Very Low: Typically 50-60 dB, and generally limited to circumstances where human-generated sound would never include amplified or motorized sources. Includes sounds in forest habitats close to natural sources such as rapids along large streams, windy areas or wind tunnels, or quiet human activities associated with nature trails, walk-in picnic areas, and low-use trails.

Essentially the above two categories can be considered as occurring away from everything "developed".

Low: Typically 61-70 dB, and generally limited to sound from small power tools, light vehicular traffic at slow speeds on paved surfaces, non-gas-powered recreational activities, such as those associated with smaller park facilities. Includes most hand tools, small battery operated hand-held tools, administrative roads, and smaller facilities.

Moderate: Typically 71-80 dB, generally characterized by the presence of passenger vehicles and street-legal motorcycles, small trail cycles (not racing), small gas-powered engines (e.g., lawn mowers, *small* chain saws, portable generators, weed eaters), and high-tension power lines. Includes electric hand tools (except circular saws, impact wrenches and similar devices). Large campgrounds outside the visitor season would fall into this category.

High: Typically 81-90 dB, and would include medium- and large-sized construction equipment such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, drill rigs, and other moderate to large diesel engines. Would include high speed highway traffic including RVs, large trucks and buses, large street legal and trail (not racing) motorcycles, power saws, large chainsaws, pneumatic drills and impact wrenches, large gasoline-powered tools, circular saws, and hammering. Watershed restoration activities would fall in this category, as long as back-up beepers in use by heavy equipment operators are muffled to 90 dB or less.

Also included are the large campgrounds between Memorial and Labor Day, and public roads (Newton B. Drury Parkway, Hwy 101, Hwy 199, and Lower Bald Hills Road (west of Gans Prairie).

Very High: Typically 91-100 dB, generally characterized by impacting devices, jackhammers, racing or Enduro-type motorcycles, compression (“jake”) brakes on large trucks, and trains. This category includes both vibratory and impact pile drivers (smaller steel or wood piles) such as used to install piles and guard rails, and large pneumatic tools such as chipping machines. It may also include the largest diesel and gasoline engines, especially if in concert with other impacting devices. Felling of large trees (dominant or subdominant trees in mature forests), truck horns, yarding tower whistles, and muffled or underground explosives are also included. This would include activities associated with logging (e.g., second-growth management), and could include heavy equipment normally associated with lower dB levels if back-up beepers are in this range.

Extreme: Typically 101-110 dB. Generally includes use of ground-level, unmuffled explosives, pile driving of large steel piles, low-level over flights or hovering of helicopters, and heavily amplified music. This may include some back-up beepers on heavy equipment that would otherwise be at a lower dB level.

Sound Levels Exceeding 110 dB: These sound levels are typified by sources such as jet engines and military over-flights, large sirens, open air (e.g., treetop) explosives, and double rotor logging helicopters. They are special situations requiring site- and situation-specific analysis, and are not covered by the guidelines in this document.

Derivation of Harassment Distances

As indicated earlier, available data suggest that harassment occurs when sound levels resulting from project-based sound sources exceed ambient conditions by relatively substantial levels, or when the sound sources combined exceed a high absolute threshold. Since sound attenuates as a function of the distance from the source, distances at which various sound sources exceed ambient conditions may be calculated. Table 1 reports the distances within which elevated, project-generated sound is reasonably expected to exceed ambient conditions to such a degree as to result in harassment of murrelets or owls.

Time of Day Adjustment for the Marbled Murrelet

The disturbance take threshold distances provided in Table 1 are based on a comparison of project generated sound levels with existing (ambient) sound levels, which themselves represent average daytime sound conditions. It’s recognized, however, that ambient sound level often has a substantial time-of-day component, with nighttime, dawn and dusk ambient sound levels generally 5-10 dB lower than typical midday levels. It is also known that murrelet flights into nests to feed nestlings and for nest-tending exchanges are concentrated around dawn and dusk, during the period when ambient noise levels tend to be lower than average daytime levels.

For marbled murrelets, the harassment threshold distances provided in Table 1 apply to noise-generating activities occurring during the midday period. If proposed activities will occur within 2 hours of sunrise or sunset, and if the ambient sound environment during the dawn and dusk period can reasonably be expected to be quieter than the midday sound environment, then the estimated harassment distance threshold should be calculated based on an ambient level 10 dB lower (i.e., one row up in the table) compared to the normal ambient rating in Table 1. Similar time-of-day considerations and adjustments are not required for the northern spotted owl.

Application of Harassment Distances to Project Conditions

The following methods may be used to estimate the approximate distance at which project generated sound exceeds ambient conditions to such an extent that northern spotted owls or marbled murrelets may be subject to harassment due to sound or visual disturbance.

Step 1: Assess the environment in the action area to determine the existing ambient sound level. Include any sound sources occurring in the action area, prior to and not part of the proposed action, that create ambient sound levels higher than the “natural” background. Based on this review, assign a sound level category to the ambient condition (equivalent to a row of Table 1).

Step 2: Review the proposed action to determine the types of equipment, tools, etc., anticipated to be used during the project. Based on the descriptions of sound level categories above, assign a sound level category to the action-generated sound sources (corresponding to the columns in Table 1). Action-generated sounds should include all sources necessary to complete the proposed action.

Step 3: The cell corresponding to the appropriate row and column for existing ambient sound and action-generated sound, respectively, provides the distance within which increased sound level may harass an owl or murrelet. The cell values are generally reported as a distance from the outer edge of the project footprint into occupied or presumed occupied suitable habitat.

Step 4: When significant topographic features occur within the sound environment, appropriate consideration may be given to their sound attenuating capabilities. However, understanding the effects of topography on sound attenuation, especially when the species involved typically nests at a substantial distance above the ground, may be problematic. That is, topography may substantially attenuate sound between the source and the receiver (i.e., owl or murrelet nest site) when that topographic barrier is sufficiently high to block line-of-sight transmission between the source and receiver. Topography or other barriers may provide little attenuation unless very close to the sound source or very high in elevation.

Step 5: Consider the potential for human activities to occur within 150 ft (45 m) of potential nest sites of owls or murrelets. In the park, to date visual disturbance guidelines have been applied only to roads and trails. This distance may be adjusted based on visual screening of a potential nest site by surrounding vegetation.

Table 1. Estimated harassment distance, in feet (m), due to elevated action-generated sound levels for proposed actions affecting the northern spotted owl and marbled murrelet, by sound level.

Existing (Ambient) Pre-Project Sound Level (dB)[1]	Anticipated Action-Generated Sound Level (dB)[1] [2]			
	Moderate (71-80)	**High (81-90)**	**Very High (91-100)**	**Extreme (101-110)**
Natural Ambient (<=50) and Very Low (51-60)	165 (50)	500 (150)	1,320 (400)	1,320 (400)
Low (61- 70)	0 (0)	165 (50)	825 (250)	1,320 (400)
Moderate (71-80)	0 (0)	165 (50)	100 (330)	1,320 (400)
High (81-90)	0 (0)	165 (50)*	165 (50)	500 (150)

1 See text for full description of sound levels.

2 Action-generated sound levels are given in decibels (dB) experienced by a receiver, when measured or estimated at 50 ft (15.2 m) from the sound source.

* For standard noise-generating work-related activities in the three large campgrounds between Memorial and Labor Day, and along public roads (Newton B. Drury Parkway, Hwy 101, Hwy 199, and Lower Bald Hills Road) no additional harassment or noise disturbance buffer would apply.

Other Considerations

This guidance does not consider the direct effects of predation by corvids (ravens, crows and jays) and other predators as a result of human activities in murrelet and owl habitat. That is, while corvids may increase in number in murrelet and owl habitat in response to human activities, the resulting increased take due to predation (injury) is not addressed here. Distance estimates reported in this guidance reflect only sound attenuation and visual disturbance that may result in harassment. Predation is considered only in the sense that owl or murrelet harassment may increase the risk of predation due to flushing from the nest, and thus represents a "likelihood of injury."

Forest habitat conditions that affect the attenuation rate of sound (thus the level of sound detected by the owl or murrelet at its location) include dampening effects of forest vegetation, variability in natural ambient sound typically encountered under forest conditions, and the effect of elevated nest sites on sound attenuation. Departure from the tabled values in this guidance due to special forest conditions is generally inappropriate except under highly unusual circumstances. A factor *not* considered in the guidance is the effect of topography on sound attenuation. Steep slopes, ridges, and designed sound barriers may increase sound attenuation when they form complete barriers to the direct line of sound transmission between source and the location of the receiver (here, the actual location of the potentially harassed animal). In general, small ridges or walls not clearly blocking the sources from a highly elevated nest would provide little or no attenuation. When clearly supported by site-specific information regarding topography, action-generated sound may be reduced by one or two levels, when compared to existing ambient sound levels.

Activities producing sound levels greater than 110 dB (estimated at 15.2 m from the sources), such as open-air blasting, aircraft, or impact pile-driving, are not addressed in this guidance, and should be evaluated through a more detailed site-specific analysis.

Appendix F – Invasive Plant Management Plan, GHD 2019d

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Invasive Plant Management Plan for Redwood National and State Park Visitor Center and Restoration Project

Save the Redwoods League

November 2019

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Table Index

Attachment Index

1. Introduction

Construction of the Prairie Creek restoration project and the Redwood National and State Park visitor's center is expected to occur over three years beginning in spring of 2021 and continuing through 2024. A secondary goal of the Prairie Creek restoration project is to remove invasive plants and discourage future re-establishment before, during, and after construction (McBain and Associates 2019). Invasive species mapping and treatment should begin in the spring of 2020 and should continue through each phase of construction and following construction. This will ensure that the restoration project is a success and that criteria for target invasive species are met as outlined in the Habitat Mitigation and Monitoring Plan.

This invasive species management plan was written with the Best Management Practices (BMPs) followed by Redwood National Park (RNP) for controlling invasive species in mind. These Best Management Practices are included in the Invasive Plant Management Plan and Environmental Assessment for Redwood National Park and Santa Monica Mountains National Recreation Area (USDOI 2017). It is recommended Redwood National Park's BMPs are implemented into components of design, construction, planting, and invasive species management.

While the project area remains under ownership of Save the Redwoods League the Mitigation Measures included in the Initial Study/Mitigated Negative Declaration (IS/MND) for the project will apply (GHD 2019). In addition, a General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (SWRCB 2013) will be obtained for application of herbicides in the project area. The specific conditions of this permit are not known as this time. It is anticipated that the project area will be transferred to Redwood National Park after the mitigation monitoring period is completed. At this time, the Invasive Plant Management Plan and Environmental Assessment for the Park will govern the management of invasive plant species.

This Invasive Plant Management Plan includes recommendations for treating invasive plant species using mechanical/manual and chemical treatments. Chemical treatments recommended in this Plan include direct treatment of individual plants with herbicides that are approved by the Environmental Protection Agency (EPA) for use in aquatic environments for all work being performed in wetland or riparian areas. Consistent with the ISMND mitigation measures for this project, chemical treatment of invasive species will not occur in or over water, but chemical treatment may occur in wetlands during the dry season when no surface water is present. Chemicals approved for aquatic use may be used to spot treat reed canary grass (*Phalaris arundinacea*) and manna grass (*Glyceria fluitans* or *Glyceria* x *occidentalis*) within creek channels during the dry season where no water is present. Chemical treatment may also be utilized to control Himalayan blackberry (*Rubus armeniacus*) post construction, through direct application to stumps.

The constraints on chemical treatment within wetlands and riparian areas are also consistent with the constraints for chemical control of invasive plant species outlined in the Park's Invasive Plant Management Plan and Environmental Assessment. The Park's Environmental Assessment included a detailed analysis of impacts to the environment from the use of chemicals to control invasive plant species, and thus it is recommended that treatment of invasive plant species in the project area follow the same constraints and methods.

In addition to the Park's BMPs that should be referenced for herbicide use (USDOI 2017), it is recommended that the Spill Response Plan should be followed in the case of any herbicide spills. The Spill Response Plan is included in Attachment C of this plan. The plan was taken almost entirely from Redwood National Park's Spill Response Plan, but was modified slightly to reflect current ownership and chain of command for reporting spills.

1.1 Invasive Species known from Project Area

Information on invasive species occurrences within the project area was taken from several sources, and compiled into a single figure (Attachment A; Figure 1). The invasive species locations presented in Figure 1 are not comprehensive given that no comprehensive fine scale mapping specifically for invasive plant species has occurred. McBain and Associates produced a map of vegetation cover types within the project area based on the dominant species. The mapping units used were generally larger than 10 ft by 10 ft (McBain and Associates 2019). This mapping methodology allowed for mapping large patches of Himalyan blackberry, but was not at a fine enough scale for mapping small patches or individual occurrences of invasive species.

Invasive plant species location information was also obtained from Redwood National Park. The Park's mapping and treatment of invasive species within the project area has been limited, as the project area is not within the Park. The Park has successfully treated bamboo (*Phyllostachys* sp.) that was formerly planted within the project area near the proposed Ceremonial Brush Dance site, and Himalayan knotweed (*Persicaria wallichii*) also near this area. Both species are presumed to be eradicated (Stassia Samuels, RNP Plant Ecologist, personal communication, May 23, 2019). The park does not have spatial data for the treated Himalayan knotweed location, however, the location where the bamboo formerly occurred is shown in Figure 1.

Based on vegetation mapping performed by McBain and Associates, Himalayan blackberry covers 4.3% acres of the project area, which includes 3.8 acres where Himalayan blackberry is the dominant cover type, and 0.5 acres where Himalayan blackberry and slough sedge are both dominant. A small, 0.1 acre area, was identified by McBain and Associates where western manna grass (*Glyceria* x *occidentalis*) is the dominant cover type. There is some uncertainty regarding the species of manna grass (*Glyceria* sp.), which is discussed further in Section 3. However, Park staff consider the manna grass that is present to be a non-native, invasive species with the potential to form dense aquatic mats that may be detrimental to the project objectives (Stassia Samuels, personal communication, May 23, 2019).

McBain and Associates observed reed canary grass within other cover types, but their minimum mapping unit precluded mapping of this species. The park has mapped dense reed canary grass infestations along Prairie Creek (Attachment A; Figure 1). Reed canary grass is also known to occur along the drainage ditch that spans the wetlands fed by Libby Creek to Prairie Creek. Additionally, McBain and Associates observed reed canary grass scattered throughout the current pasture although the pasture is generally composed of other, more dominate species (McBain and Associates 2019).

2. Prioritization of Invasive Plant Species Treatment

Reed canary grass and manna grass are currently considered the most problematic species for the restoration project. Himalyan blackberry is also of concern, and other invasive species are known within the project area. The Park is aware of English ivy (*Hedera helix*) within forested areas on the east side of the project area (Figure 1), and other invasive species such as Scotch broom (*Cytisus scoparius*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirisum vulgare*), and others, have been observed on the site in small numbers.

Table 2.2 contains a list of target invasive species for the project. Included are invasive species that are known within the project area, and the source of this information which is helpful for understanding if they may still occur. Redwood National Park staff have performed some invasive species control within the project area, and not all of the species identified by LACO in 2012, may still be present. Many of the species identified by Redwood National Park staff have been treated and controlled to various extents and are shown as “eradicated” or “treated” on Figure 1. Also included in this Table are other invasive species with potential to occur that are priority for treatment within Redwood National Park as identified in the Park’s Environmental Assessment (USDI 2017). Updated mapping of invasive species should occur prior to construction and throughout the construction and monitoring period for efficient and thorough treatment of invasive species.

Table 2.2 also includes the wetland indicator status for each species, which is helpful in understanding the environments where each species may thrive within the project area. The standard reference for plant wetlands indicators was utilized: *State of California 2016 Wetland Plant List* (Lichvar et al. 2016). Plants are classified based on the probability that they would be found in wetlands (USACE 1987), ranging from Obligate (almost always in wetlands) [OBL], Facultative/wet (67% to 99% in wetlands) [FACW], Facultative (34% to 66% in wetlands) [FAC], Facultative/up (1% to 33% in wetlands) [FACU], or Uplands (less than 1% in wetlands) [UP]. Plants not listed in the manual are considered to be in the upland category (Lichvar et al. 2016).

Table 2.1 List of Target Invasive Species

Scientific Name	Common Name	Wetland Indicator	HMMP Priority	Known in Project Area/Source of Info*
Acacia dealbata	Silver wattle	UPL	1	No
Allium triquetrum	Threecorner leek	UPL	1	No
Buddleja davidii	Butterfly bush	FACU	2	RNP (known near project, not treated)
Cirsium arvense	Canada thistle	FAC	1	LACO, GHD
Cirsium vulgare	Bull thislte	FACU	1	LACO, GHD
Cortaderia jubata	Andean pampas grass	FACU	1	LACO, RNP (Treated by RNP along Bald Hills Road)
Centaurea solstitialis	Yellow starthistle	UPL	1	No
Cotoneaster spp.	Cotoneaster species	UPL	2	LACO, GHD
Crocosmia x crocosmiiflora	Monbretia	FAC	2	RNP (Not treated)
Cytisus scoparius	Scotch broom	UPL	1	GHD, RNP (Not treated)
Delairea odorata	Cape ivy	UPL	1	No
Digitalis purpurea	foxglove	FACU	2	LACO, GHD
Dipsacus fullonum	Fuller’s teasel	FAC	2	No
Fallopia sachalinensis	Giant knotweed	UPL	1	No
Foeniculum vulgare	Sweet fennel	UPL	1	No
Genista monspessulana	French broom	UPL	1	No
Geranium lucidum	Shining geranium	UPL	1	No
Geranium robertianum	Herb robert	FACU	1	No
Glyceria fluitans or Glyceria x occidentalis	water manna grass	OBL	1	GHD, RNP
Hedera helix	English Ivy	FACU	1	LACO, GHD, RNP
Ilex aquifolium	English holly	FACU	1	LACO
Leucanthemum vulgare	Ox-eye daisy	FACU	2	GHD
Persicaria wallichii	Himalayan knotweed	FAC	1	Eradicated by RNP from brush dance location (not displayed on Figure 1)
Phalaris aquatica	Harding grass	FACU	1	No
Phalaris arundinacea	reed canary grass	FACW	1	X GHD, RNP, McBain and Associates
Phyllostachys sp.	Bamboo species	UPL	1	Eradicated by RNP
Rubus armeniacus	Himalayan blackberry	FAC	1	X LACO,GHD, RNP, McBain and Associates
Senecios jacobaea	Tansy-ragwort	UPL	1	GHD
Vinca major	periwinkle	UPL	1	LACO

*Source of information on presence in project area comes from Botanical Memo by LACO (2012), Botanical Memo by GHD (2019), vegetation mapping by McBain and Assocaites (2019), and spatial data from Redwood National Park.

3. Species Specific Treatment Information

Detailed species specific treatment information is provided below for several of the high priority species known from the project area and of particular concern to the project. Treatment of other species not detailed below should follow best available treatment information, such as that provided by the California Invasive Plant Council (Cal-IPC) in their "Weed Reports" (DiTomaso et al. 2013) which detail treatment options and methods for individual species, and which can be accessed through the Cal-IPC's Inventory (Cal-IPC 2019).

3.1 Reed canary grass (*Phalaris arundinacea*)

Reed canary grass is a high priority species for treatment within the restoration project. Reed canary grass occurs along Prairie Creek currently, but in the creek's present condition this species is not choking the channel. The restoration project design includes shallowing out the Prairie Creek channel and creating additional side channels. These activities come with the risk of spreading reed canary grass. If not actively managed prior to and during construction, reed canary grass could negatively affect the rehabilitation outcome and long term project goals (McBain and Associates 2019). Reed canary grass is a perennial species with a vigorous network of rhizomes, capable of forming dense monocultures, and causing adverse impacts in aquatic and wetland ecosystems. Reed canary grass can alter hydrology by trapping silt and constricting stream channels, and it can also limit tree regeneration by shading and crowding out seedlings (Wisconsin Reed Canary Grass Management Working Group 2009). Both manna grass and reed canary grass are believed to create extremely low summer dissolved oxygen levels due to organic decomposition where they invade streams (Michael Love and Associates 2012).

3.1.1 Species Biology

Reed canary grass has been widely cultivated for forage and seed production and planted for erosion control (Wisconsin Reed Canary Grass Management Working Group 2009). Although this species is currently considered native in California (Jepson Flora Project 2019), much of the literature about this species presumes that current populations may include non-native strains or hybrids between native and non-native strains as a result of the widespread cultivation of this species (Waggy 2010; Tu 2010).

Reed canary grass can quickly invade disturbed areas, and is capable of reproduction by rhizome, seed, or stem fragments. The spread of reed canary grass is intensified along waterways where vegetative fragments and seeds may be carried by water (Wisconsin Reed Canary Grass Management Working Group 2009). Humans and animals are additional seed vectors and seeds can adhered easily to clothing, tools, or equipment (Wisconsin Reed Canary Grass Management Working Group 2009).

Reed canary grass is one of the first plants to emerge in the spring enabling it to shade out native species that emerge later in the growing season (Wisconsin Reed Canary Grass Management Working Group 2009). The growth and productivity of this species peak twice during the growing season, with leaf and inflorescence growth occurring in spring and stem and rhizome growth occurring during late summer (Wisconsin Reed Canary Grass Management Working Group 2009).

Rapid clonal growth is enhanced by both high nutrient and light availability. (Wisconsin Reed Canary Grass Management Working Group 2009). Rhizomes form dense mats in the upper soil, and rhizomes and dead stems are capable of forming a sod layer that is over 0.5 meters thick (Tu 2010). Culms of reed canary grass can reaches heights of five to seven feet. Mitch Farro of Pacific Coast Fish, Wildlife, and Wetlands Restoration Association has observed reed canary grass rhizomes to be as deep as 4 to 5 ft where this species grows within water (Mitch Farro, personal email, October 2, 2019).

Reed canary grass has bimodal seed germination, and seed production occurs between March-May and again during June-July (Wisconsin Reed Canary Grass Management Working Group 2009). One plant can produce several hundred seeds (Wisconsin Reed Canary Grass Management Working Group 2009). Seeds of reed canary grass germinate immediately after ripening and have no dormancy requirements (Apfelbaum and Sams 1987). Seeds may remain viable in the soil for several years (Wisconsin Reed Canary Grass Management Working Group 2009).

Although mature reed canary grass plants are tolerant of both drought and flood, seedlings are vulnerable to both, and also to inter-specific competition until they become well-established. New seedlings use most of their growth to establish underground reserves and develop tillers during the first growing season, and generally only need a single growing season to become well established (Wisconsin Reed Canary Grass Management Working Group 2009). Reed canary grass is biennial with respect to flowering (Wisconsin Reed Canary Grass Management Working Group 2009).

3.1.2 Species Control

Reed canary grass is best managed by using a long term, integrated approach. There is no immediate one-year treatment for reed canary grass, but the Nature Conservancy states that much can be accomplished within two to three years (Tu 2010). Although according to the Nature Conservancy, continued monitoring and follow up treatments will be required for up to five to ten years to prevent reinvasion (Tu 2010). A brief summary of treatment techniques for reed canary grass follows, as well as a recommended approach for management at the project site.

3.1.2.1 Manual:

Small infestations of reed canary grass can be manually dug out. This approach may be feasible for areas where reed canary grass is scattered, or where seedlings are establishing. Plants should be dug out when soil is still moist. All roots and rhizomes must be removed. Stems and rhizomes both can develop new roots if inundated, or if left in contact with moist ground (Tu 2010). All plant material should be bagged in thick plastic contractor bags and removed from the site.

3.1.2.2 Mowing/Weed Whacking:

Mowing does not eradicate reed canary grass as this species reproduces from rhizomes, and tillers as well as a residual seedbank. Mowing may also stimulate stem production (Tu 2010). However, mowing or weed whacking may be useful for reducing biomass prior to herbicide treatment (Tu 2010).

3.1.2.3 Solarization/Tarping:

Covering with black plastic, or thick geotextile shade cloth, and solarizing small occurrences can be a viable control option in some situations, if monitoring of potential re-sprouts from rhizomes occurs, and/or if this treatment is part of an integrated control method, such as mowing (Tu 2010). Tarping reed canary grass may also be utilized in a combined treatment approach with herbicide (Stassia Samuels, personal communication, May 7, 2019).

3.1.2.4 Flooding:

Seedlings are susceptible to drought and flooding, but mature plants can withstand flooding due to possession of anoxia tolerant rhizomes (Apfelbaum and Sams 1987). Established populations can survive prolonged drought and can survive over one year of flooding, especially if the entire plant is not completely submerged (Tu 2010).

3.1.2.5 Excavation:

Heavy equipment can be utilized to remove reed canary grass. Reed canary grass can grow back quickly from any remaining rhizomes so care should be taken to excavate deep enough to remove entire root systems. Plant material must be buried to a depth of at least six feet or removed properly to prevent re-sprouting which can occur from rhizomes or stem fragments. Buried plant material should be contained in an excavated pit and then covered with woven geotextile (Cal-IPC 2012), then covered with a minimum of six feet of uncontaminated fill material. Reed canary grass can re-establish after excavation from seeds remaining in the soil.

3.1.2.6 Chemical:

Herbicides can be applied to reed canary grass by manually spraying plants to reduce or eliminate seed development, and to allow release of native vegetation to compete with re-growth, and drain the carbohydrate reserves of rhizomes (Tu 2010). Infestations must be treated every year for multiple years. Generally a site must be treated for a minimum of three to five years (Wisconsin Reed Canary Grass Management Working Group 2009). An aquatically approved formulation of Glyphosate, such as Rodeo or Aquamaster applied in a 2% solution with a nonionic surfactant is recommended by The Nature Conservancy (Tu 2010). The “Weed Report” for this species, also recommends an aquatically approved formulation of glyphosate for treating Reed Canary grass (DiTomaso et al. 2013). Glyphosate is a non-selective herbicide and can be applied to individual reed canary grass plants using a backpack sprayer. In the Pacific Northwest it is recommended that herbicide be applied in mid-summer, prior to summer dormancy, or in late fall (just prior to frost and wintertime dieback) (Tu 2010). In late fall, plants are most actively translocating carbohydrates along with herbicide down to the root system (Tu 2010). Combination treatment can be beneficial, such as cutting reed canary grass with a weed whacker or mowing, then allowing the grass stems and leaves to regrow to boot height before spraying. This combined treatment helps for getting better herbicide coverage and reduces total herbicide use (Tu 2010).

3.1.2.7 Recommended Treatment Plan:

Due to the extent of reed canary grass within the project area, and the ability of this species to negatively affect the rehabilitation outcome and long term project goals of the restoration project, a combination of excavation and herbicide treatment is recommended for this species. Pre-construction treatment of reed canary grass should focus on excavation because only having one (or possibly two years depending of schedule) of herbicide treatment will not be effective on large and/or well established populations (Stassia Samuels, personal communication, May 23, 2019).

Management of reed canary grass should begin one or two years before project construction, as treatment of reed canary grass is a multi-year effort. All population occurrences should be inventoried with a GPS unit to ensure that all occurrences have been identified and a comprehensive map of all occurrences should be made for efficiency when treating. During construction ground disturbance should be minimized to the extent feasible within the project area to help minimize spread (McBain and Associates 2019).

Pre-construction treatment of reed canary grass should consist of excavation and burial of plants or excavation of plants and removal of all plant material from the site. As this species is capable of re-sprouting from root or stem fragments, removing and disposing of the entire plant is critical for control. Where reed canary grass has not established a dense monoculture, (i.e. in areas where it is present throughout the pasture) small clumps could be dug out when feasible. New reed canary grass plants reestablish quickly from the seed bank when chemical or mechanical control treatments are used. Excavation and removal of reed canary grass with the root systems included plus soil, may also help reduce the amount of reed canary grass seed that may spread downstream during construction.

Post construction, a multi-year plan for treatment with herbicide is recommended. A combination of treatments may be beneficial in some areas, i.e. weed whacking or tarping to reduce biomass, then spraying. Targeted herbicide treatment, utilizing an aquatically approved formulation of glyphosate, has been successful for the management of the invasive species harding grass, (*Phalaris aquatica*), within the neighboring Bald Hills in Redwood National Park (USDI 2017). Repeated herbicide treatments over multiple years have been necessary to treat the large and well established infestations of harding grass, and many infestations have been successfully controlled after three to five years of treatment (USDI 2017).

Post excavation, disturbed areas should be planted densely and seeded with competitive native species. Reed canary grass does not germinate under dense shade (Tu 2010). It is also intolerant of year round shade, so planting fast growing shrubs and native evergreen trees is a good strategy for continuing to control this species. As reed canary grass can survive under deciduous canopy, conifers are recommend where appropriate. According to the Nature Conservancy, unless you are planting at a very high density, a reasonable goal is be to reach a closed canopy by year five (Tu 2010). Planting along backwater or side channels will also be critical for control of reed canary grass (Stassia Samuels, personal communication, May 7, 2019).

To minimize the spread of reed canary grass during construction it will be necessary to clean clothes, equipment and footwear when working at the site. An adaptive management process must be employed for the successful treatment of reed canary grass with treatment and monitoring results evaluated annually and adapted as needed.

3.2 Manna grass (*Glyceria sp.*)

Western manna grass (*Glyceria* x *occidentalis*) was mapped by McBain and Associates over a 0.1 acre area (McBain and Associates 2019), Figure 1. It is possible that the species of manna grass within the project area may have been misidentified, and may be water manna grass (*Glyceria fluitans*). A large infestation of water manna grass occurs nearby, where Strawberry Creek (a tributary to Redwood Creek), was realigned to its original channel, causing an invasion of water manna grass and reed canary grass that became detrimental to the project's restoration objectives (Stassia Samuels, personal communication, May 7, 2019).

The identification of the manna grass species at Strawberry Creek was confirmed by Gordon Leppig, author of the manna grass key in the Jepson Manual (Leppig 2012). The species description of western manna grass states that genetic evidence suggests it may be a hybrid of narrow manna grass (*Glyceria leptostachya*) and water manna grass. The botanical memorandum written by LACO notes the presence of the native species boreal manna grass (*Glyceria borealis*) within the project area. Given the elevation range of this species (800-2200 m), it is likely the identification of the Glyceria as a native species by LACO was a mistake. The manna grass within the project area occurs at a high density with a prostrate habit, and is presumed to be western manna grass or water manna grass.

3.2.1 Species Biology

Both water manna grass and western manna grass are non-native, invasive perennial grasses that are capable of forming dense floating mats. Little information has been published on control of invasive manna grass species, and the most available information is for waxy mana grass (*Glyceria declinata*). Seeds of waxy manna grass are dispersed by floating on water, or attaching to waterfowl or grazing animals. Waterfowl have been observed to feed on the mature seeds of waxy manna grass, and they are thought to be the primary long distance seed disperser (DiTomaso et al. 2013).

3.2.2 Ecological Impact

Like reed canary grass, invasive manna grass is capable of having detrimental effects on aquatic and wetland ecosystems. After the realignment of the Strawberry Creek channel, the channel delta and the west fork tributary became choked with floating mats of water manna grass that blocked flow conveyance in Strawberry Creek and inhibited fish access (Michael Love and Associates, 2012). The mats of floating vegetation were two to four feet thick (Seney 2019). As stated previously, both manna grass and reed canary grass are believed to create extremely low summer dissolved oxygen levels where they invade streams due to organic decomposition (Michael Love and Associates, 2012). In the case of Strawberry Creek the invasion of manna grass and reed canary grass was exacerbated by sediment accumulating in the creek channel, a shallow seasonal water table and the presence of bare soil (Seney 2019).

3.2.3 Species Control

3.2.3.1 Manual:

At Strawberry Creek crews of workers have cut blocks of floating manna grass mats and raked out the clumps and transported the material by tarp where it has been composted in planting areas. The Strawberry creek restoration work occurred in 2014 and since that time crews have performed manual removal of manna grass mats twice annually, in both the summer and winter. The treatments have been intensive, with five people working on the mats for four weeks after the initial invasion (Stassia Samuels, personal communication, May 23, 2019). Repeated hand pulling before plants produce seeds may be effective for this species, although it may take several years to defeat the seed bank.

3.2.3.2 Solarization/Tarping:

At Strawberry Creek black plastic tarps have been utilized to aid in the suppression of manna grass on creek banks.

3.2.3.3 Chemical:

An aquatically approved formulation of Glyphosate, such as Rodeo or Aquamaster may be effective on manna grass for spot applications (DiTomaso et al. 2013). Combination treatments of tarping or cutting then spraying may be considered to reduce herbicide use.

3.2.3.4 Recommended Treatment Plan:

Given the extent of invasion by this species at Strawberry Creek it is recommended that the manna grass is treated with extremely high importance, as it has the ability to impede restoration objectives and necessitate extensive treatment if not initially controlled properly. Currently there is only one mapped location of manna grass covering a 0.1 acre area, however it should be noted that smaller populations may occur elsewhere that were too small to be included in the vegetation mapping performed by McBain and Associates. Prior to construction wetland habitats should be surveyed for additional occurrences of manna grass and all populations should be mapped. It is recommended that the manna grass is excavated or dug out prior to construction and that plant material is buried or removed from the site along with the reed canary grass. Post construction treatments may include a combination of the methods presented above as appropriate. Annual inventory and mapping of this species should occur and an early detection/rapid response mindset should guide its treatment. Plant material should be removed from the site, burned, or tarped and composted.

3.3 Himalayan blackberry (*Rubus armeniacus*)

Himalayan blackberry shrubland stands were mapped on 3.8 acres of the project area (Figure 1). Additionally, slough sedge swards with Himalayan blackberry were mapped on an additional 0.5 acres (Figure 1). The extent of Himalayan blackberry in the pasture of the project area was likely kept in check by cattle grazing prior to the removal of cattle in 2016 (Stassia Samuels, personal communication, May 23, 2019).

3.3.1 Species Biology

Himalayan blackberry is an evergreen shrub that grows in dense thickets, containing vine-like branches (canes) with thorns. The stem is boxy and thick and leaves are dark green and have spines on their undersides. Himalayan blackberry is capable of asexual reproduction (fertilization is not required) by seed, and vegetatively by root or stem suckers (USFS 2017). Cane tips are able to root and produce new plants, and canes are also capable of rooting at nodes (USFS 2017). The plant flowers from May through July and fruits are produced from July through September. Himalayan blackberry occurs along streams, in riparian areas, roadsides, pastures, fence lines, and disturbed areas. Himalayan blackberry is equally likely to occur in wetlands as it is in uplands. Himalyan blackberry is difficult to control because of its extensive root system. Roots occur primarily in the top 20 inches of soil, but may grow much deeper (to a depth of seven feet) in loose soil (DiTomaso et al. 2013). The roots are capable of sprouting new shoots from root buds, and root fragments can sprout a new plant in good conditions (DiTomaso et al. 2013). Seeds are thought to survive for only a few years in the soil (DiTomaso et al. 2013).

3.3.2 Ecological Impacts

Himalayan blackberry is tolerant of flooding allowing it to invade and harm aquatic ecosystems. The dense thickets preclude light to understory plants making it a good competitor and limiting species diversity. If not controlled, this plant can dominate pasture areas quickly. However Himalyan blackberry is not very tolerant of shade.

3.3.3 Species Control

3.3.3.1 Manual:

Manual control is feasible for small infestations. Using thick gloves and protective clothing the above ground biomass can be cut, using loppers. The root ball should be dug up and removed with a shovel to the extent possible. Pulling of roots may be challenging as this plant produces lengthy deep roots.

3.3.3.2 Mechanical:

After flowering and prior to fruiting, a brush cutter, or mower can be used to remove the blackberry canes. Cutting will stimulate the growth of root sprouts and this treatment should be combined with hand removal or excavation of the root crown, or with a cut stump chemical application (USFS 2017).

3.3.3.3 Chemical:

There are several chemicals that can be used to control Himalayan blackberry. It is recommended that the aboveground biomass of the blackberry shrubs are cut and removed from the site before chemical application to stems to reduce herbicide use. Options for chemical treatment can be found in the “Weed Report” for this species (DiTomaso et al. 2013) which can be accessed through the Cal-IPC’s Inventory (Cal-IPC 2019), or in the USFS publication, “*Field Guide for Managing Himalyan Blackberry in the Southwest*” (USFS 2017).

3.3.3.4 Recommended Treatment Plan:

It is recommended that this species be inventoried along with the other high priority invasive species pre-construction to ensure all small occurrences and individuals have been identified. The easiest way to control the large extent of Himalayan blackberry within the project area will be to mow, and then remove the shrub's root systems with a back hoe or excavator. Plant material should be removed from the site, burned, or tarped and or composted. It is recommended that chemical treatment be utilized to control Himalayan blackberry post construction through direct application to stumps.

3.4 English ivy (*Hedera helix*)

Redwood National Park is aware of several populations of English ivy occurring in the forest bordering the project area and some populations within the project area (Figure 1). According to data obtained from the Park, Save the Redwoods League has been treating some of these populations. Occurrences of English ivy that have been treated are designated separately on Figure 1 from those that have not been treated. Follow up monitoring and continued treatment as needed, is recommended for areas that have been previously treated. Control of this species is most efficient using a strict adherence to the early detection rapid response principle, as removal of a few young sprouts by hand is much easier than a well-established population.

3.4.1 Species Biology

English ivy was brought to the United States from Europe, and is commonly used in landscaping or gardens as an ornamental. It has quickly become naturalized in the United States. English ivy is a fast growing perennial vine that is capable of developing dense cover that out competes native vegetation. This species requires year round moisture, and tolerates deep shade, but thrives where plants receive some summer shade and winter light (DiTomaso et al. 2013). Flowers develop in the fall and are greenish-white. Fruits from this species mature in the spring and are consumed and primarily dispersed by birds. English ivy is also capable of vegetative reproduction. Stem fragments of juvenile and adult plants left in contact with moist soil can regenerate into new plants. English ivy plants may live for 100 years (DiTomaso et al. 2013).

3.4.2 Ecological Impacts

English ivy grows over native vegetation and climbs up trees. It is capable of killing native vegetation by shading out other species with its dense foliage and can also be harmful to trees which become more susceptible to wind damage when heavily invaded by English ivy vines (DiTomaso et al. 2013).

3.4.3 Species Control

3.4.3.1 Manual/Mechanical:

Where English ivy carpets the forest floor, individual stems can readily be pulled off the ground especially in the winter when the soil is moist. It is important to remove ivy stems entirely as stem fragments that break off and are left in contact with the soil will resprout. Follow up treatment and monitoring is critical for controlling this species. It is ideal to remove plants from the site and properly dispose of the material. If it is not possible to remove the plants, they can be hung from tree branches to dry out, but there is inherent risk in this, as any plant material that falls and makes contact with the ground may re-sprout. Gloves should be worn when working with English ivy as the sap from this plant may cause some individuals rashes.

3.4.3.2 Manual/Chemical:

Immediately control English ivy that is growing up trees by cutting the vines. Loosen or pry the vine from trees and cut the vine, removing the vine from its origin in the soil, to where it was cut. Large vines may require cutting with a saw. Cut vines left in the trees will eventually fall from the tree and die. If the English ivy vine is large or imbedded in the tree trunk, and cannot be removed by hand, strip the bark and notch the exposed section of the vine. Paint on an undiluted herbicide such as glyphosate. Details on possible chemical controls can be found on the Cal-IPC website, in the "Weed Report" (DiTomaso et al. 2013) which can be accessed through Cal-IPC's Inventory (Cal-IPC 2019).

3.5 Treatment of Other Invasive Species

Of additional concern to the project, but not addressed in detail in this report, are Scotch broom and Canada thistle, which are addressed briefly below. Redwood National Park has also been treating Pampas grass manually, along Bald Hills Road since 2005. Should Pampas grass grow within the project area it should be treated immediately as this species is easiest to control when the plants are young and easy to control using manual methods.

3.5.1 Scotch broom (*Cytisus scoparius*)

A few scattered Scotch broom plants have been identified within the project area and have not been treated (Figure 1). Scotch broom grows in upland habitats and is not predicted to be a problem for the restoration project. However, due to the very long lived seed bank of this species, it may sprout in upland locations. Small populations of Scotch broom are easily controlled by hand removal or by removal with tools such as a Pullerbear, Extractigator, Uprooter, or weed wrench when the soil is moist (winter or early spring). Ideally plants should be removed when the ground is wet and before the flowers mature. Flowering time is March through May (Calflora 2019). It is important to remove the entire root system of Scotch broom, or this species will resprout from a more vigorous taproot and become more difficult to remove in the future. If the stem breaks during removal, attempts should be made to dig out the tap root with a Pulaski or similar tool while the plant is still small. Scotch broom plant material may be left on site. If mature seed pods are present the plants should be bagged, removed from the site, and disposed of properly.

3.5.2 Canada thistle (*Cirsium arvense*)

Canada thistle has been observed within the project area but the locations of this species have not been mapped. Canada thistle is a perennial species that reproduces by seeds and also from adventitious root buds. It has an extensive creeping root system that can reach depths of six to fifteen feet making eradication very difficult. Canada thistle is equally likely to occur in wetlands as it is in uplands. If this species becomes well established within the project area control by herbicide should be considered following methodology described on the Cal-IPC website, in the “Weed Report” (DiTomaso et al. 2013) which can be accessed through Cal-IPC’s Inventory (Cal-IPC 2019).

4. Chemical Treatment of Invasive Species

4.1 Overview of Herbicides

Thirteen herbicides have been approved for use in Redwood National Park and information on these herbicides is presented in the Park’s Invasive Plant Management Plan and Environmental Assessment (USDOI 2017). The approved herbicides have been evaluated through consultations with the USFWS and NMFS and are allowed under the park's 2017 Invasive Plant Management Plan (USDOI 2017). Individual projects must be approved by the US NPS Pesticide Use Proposal System (PUPS). BMPs related to herbicide use from the Park’s Invasive Plant Management Plan and Environmental Assessment (2017) should be followed to reduce environmental impacts. In addition, mitigation measures listed in the CEQA document for this project related to herbicide use must be followed (GHD 2019). Mitigation measures from the project’s ISMND are listed in Attachment B. Conditions of the NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (SWRCB 2013), must also be followed. The approved herbicides from the Park’s Invasive Plant Management Plan and Environmental Assessment are provided in Table 4.1, along with the US EPA signal words which are listed in parenthesis. Definitions for the US EPA signal words are taken directly from the Park’s Environmental Assessment and are provided in the footnote to Table 4.1 (USDOI 2017).

Table 4.1 Approved Herbicides from Park’s Invasive Plant Management Plan and Environmental Assessment

Approved Herbicides with US EPA Signal Words[1]
Aminopyralid (CAUTION)
Clopyralid (CAUTION)
Chlorsulfuron (CAUTION)
Fluroxypyr (WARNING)
Fluazifop (CAUTION)
Glyphosate (CAUTION/WARNING)
Imazamox (CAUTION)
Imazapyr (WARNING)
Rimsulfuron (CAUTION)
Sethoxydim (CAUTION)
Sulfometuron (CAUTION)
Triclopyr ester (Triclopyr “BEE”; CAUTION)
Triclopyr amine (DANGER)
[1] Signal words are found on pesticide product labels, and they describe the acute (short-term) toxicity of the formulated pesticide product. The signal word can be either: DANGER, WARNING, or CAUTION. DANGER means that the pesticide product is highly toxic by at least one route of exposure. It may be corrosive, causing irreversible damage to the skin or eyes. Alternatively, it may be highly toxic if eaten,

Table 4.1 Approved Herbicides from Park's Invasive Plant Management Plan and Environmental Assessment

Approved Herbicides with US EPA Signal Words[1]
absorbed through the skin, or inhaled. If this is the case, then the word "POISON" must also be included in red letters on the front panel of the product label. WARNING indicates the pesticide product is moderately toxic if eaten, absorbed through the skin, or inhaled or that it causes moderate eye or skin irritation. CAUTION means the pesticide product is slightly toxic if eaten, absorbed through the skin, or inhaled or that it causes slight eye or skin irritation (USDOI 2017).

The Park’s Invasive Plant Management Plan and Environmental Assessment includes a table detailing the mobility in the environment for each of these chemicals as well as the degradation characteristics (USDOI 2017). Chemicals that are more mobile in the environment would have greater potential to enter aquatic systems (USDOI 2017). The Park’s Invasive Plant Management Plan and Environmental Assessment states that selection of a chemical approach for weed treatment should be made with review of information from US Forest Service herbicide ecological risk assessments, including risk assessment spreadsheets and toxicity reference values for sensitive receptors (USDOI 2017).

4.2 Aquatically Approved Herbicides

Four of the chemicals listed above have been approved by the EPA for aquatic use. In compliance with CEQA mitigation measures, no herbicides shall be applied in or over water. Additionally, only herbicides approved by the EPA shall be utilized within riparian areas or wetlands. These four herbicides include: some formulations of Glyphosate, Imazamox, Imazapyr, and some formulations of Triclopyramine (Triclopyr TEA). The toxicity of each of these chemicals is explained in the Park’s Invasive Plant Management Plan and Environmental Assessment (USDOI 2017). The Environmental Assessment should be referenced when considering which herbicides to use.

4.3 Best Management Practices

The use of chemical herbicides and their adjuvants has the potential to impact riparian habitats supporting special status fish species, should a chemical spill occur into surface water in a riparian area (USDOI 2017). To minimize risk to Prairie Creek the CEQA mitigation measures for use of herbicides must be followed (Attachment B). In addition, it is recommended that the Best Management Practices included in the Invasive Plant Management Plan and Environmental Assessment for Redwood National Park (USDOI 2017) are followed. A Spill Response Plan, slightly modified from the plan presented in the Park’s Invasive Plant Management Plan and Environmental Assessment (with Save the Redwoods League as contacts instead of Park staff) is included in Attachment C.

5. Adaptive Management Plan

The approaches recommended in this plan shodul be continuously evaluated throughout the construction and monitoring periods. It is important to realize that management strategies that have been recommended may need to be modified, or that other invasive species not described above may become problematic.

Updated mapping of invasive species populations prior to construction and careful treatment and inventory of these populations will be critical for the success of the restoration project. Follow up monitoring of treated populations and an assessment of the effectiveness of treatment techniques will also be critical.

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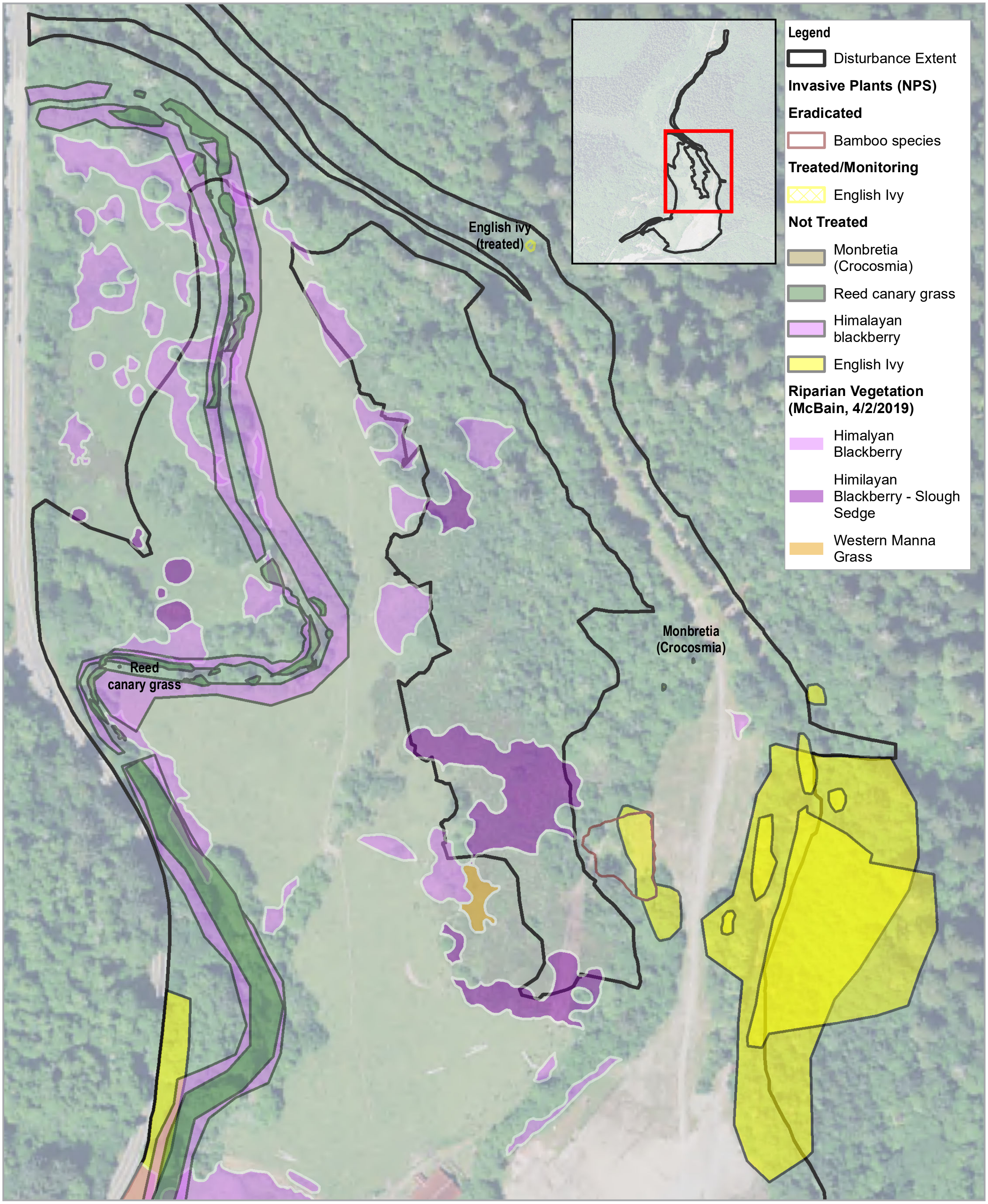
Attachment A- Figures



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GHD

Save the Redwoods League
RNSP Visitor Center and Restoration Project

Invasive Species Management Plan

Project No. **11187543**
Revision No. **-**
Date **03 Oct 2019**

FIGURE 1

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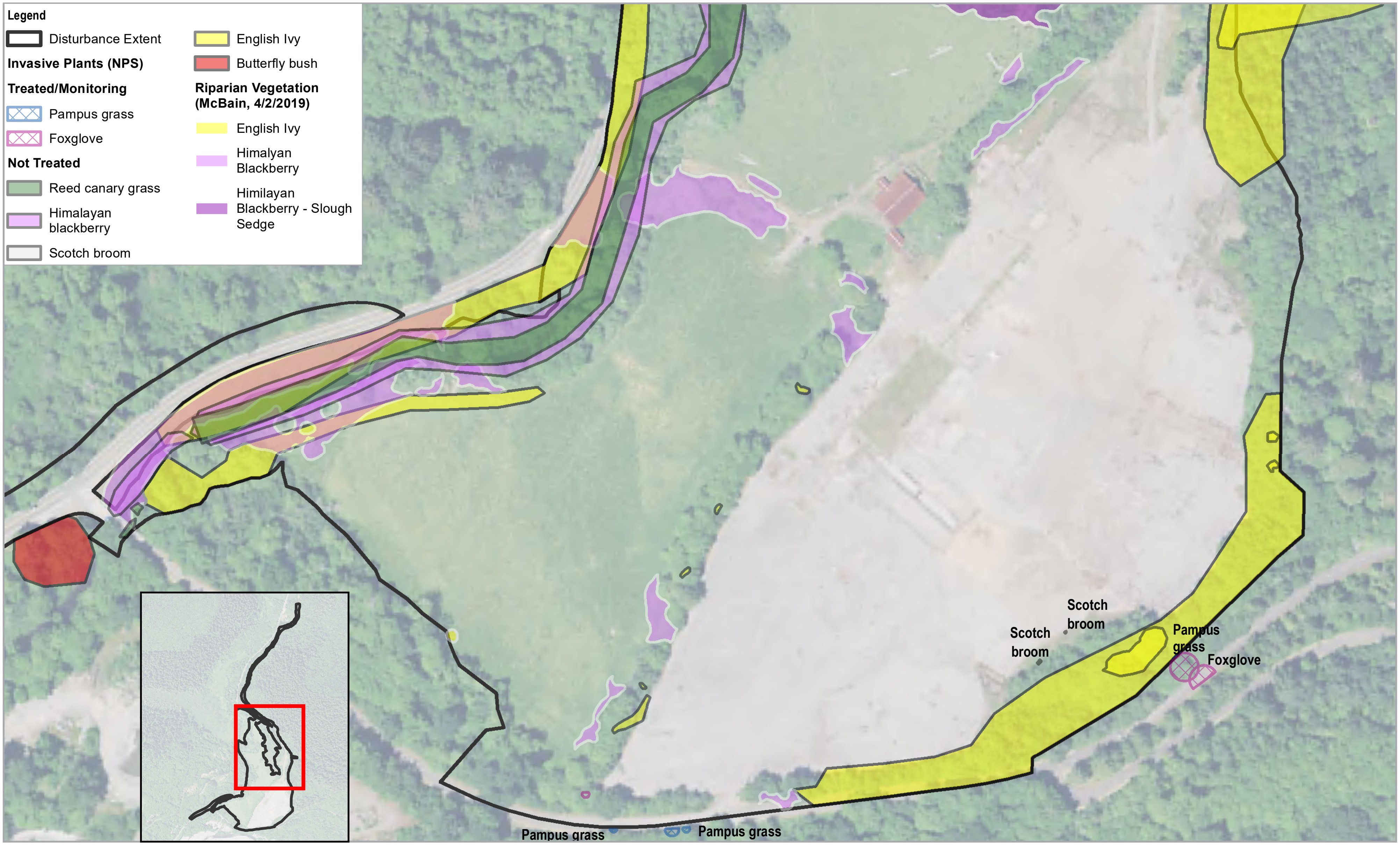

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Save the Redwoods League
RNSP Visitor Center and Restoration Project

Invasive Species Management Plan

Project No. **11187543**
Revision No. **-**
Date **03 Oct 2019**

FIGURE 2

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Attachment B- Mitigation Measures

Mitigation Measures for Invasive Species Control

Mitigation Measure BIO-1: Worker Environmental Awareness Program (WEAP)

All supervisors, competent individuals, and team leaders performing demolition, construction, grading, operations or other work that could potentially affect biological resources shall receive training regarding the environmental sensitivity of the site and the need to minimize impacts through a Worker Environmental Awareness Program (WEAP). The WEAP shall be conducted by a qualified biologist for all Project workers prior to the initiation of work. The WEAP training shall include visual aids and the following:

- A description of sensitive habitats throughout the Project Area,
- A description of special-status species that may be encountered in each sensitive habitat area,
- A discussion of Roosevelt Elk and caution workers against close approach, especially during rutting season,
- Environmental laws,
- Permit requirements,
- Avoidance measures to prevent spill of hazardous materials, including equipment refuelling guidelines and spill response requirements,
- Safety topics, including the requirement that construction traffic shall not exceed 15 mph, and
- Training in implementation of stormwater BMPs for protection of water quality.
- Trash removal and proper storage of trash.
- Selected contractors shall sign a document stating that they have read, understand, and agree to the required resource avoidance measures, and shall have construction/maintenance crews participate in a training session on sensitive resources.

Mitigation Measure BIO-13: Pre-construction Mapping and Treatment of Invasive Species

Prior to construction, the extent of reed canary grass, invasive manna grass, and Himalayan blackberry shall be mapped with a global positioning system (GPS) unit to create treatment maps using geographical information systems (GIS) software. Pre-construction treatment of these invasive species shall follow methodology outlined in the Invasive Species Management Plan (GHD 2019d, Appendix F of this ISMND) and may include a combination of chemical, mechanical, and manual methods. Other target invasive species identified in the Invasive Species Management Plan, and found within the Project Area, shall be treated according to the Invasive Species Management Plan.

Mitigation Measure BIO-14: Treatment of Invasive Species During Construction

During each phase of construction reed canary grass, invasive manna grass, and Himalayan blackberry will be mechanically excavated to a depth adequate to remove the entire root systems of these species including the extensive rhizomes of reed canary grass. Invasive species will be buried on site as feasible, to a depth to prevent re-sprouting as specified in the Invasive Species Management Plan. Invasive plant material that cannot be buried on site shall be contained and disposed of at an appropriate off-site location, such as a landfill, outside of the Coastal Zone. Invasive plant material shall be disposed of in a manner that prevents the spread of invasive species. Areas of disturbance from invasive plant removal shall be minimized to the extent feasible and revegetated with native seed and/or container stock following removal.

A survey to map the extent of reed canary grass, invasive manna grass, and Himalayan blackberry shall take place prior to each year of construction and the identified populations shall be treated during construction and/or in the growing season in accordance with the Invasive Species Management Plan. Other target invasive species identified in the Invasive Species Management Plan, and found within the Project Area, shall be treated according to the Invasive Species Management Plan.

Mitigation Measure BIO-15: Managed Herbicide Control and Minimize Spill Risk

Herbicides shall be applied in accordance with application guidelines and manufacturer labels. The invasive species control program shall obtain coverage under the statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (SWRCB 2013). The specific measures that will be required are not known as this time. Herbicides shall be applied by or under the direct supervision of trained, certified, or licensed applicators. Herbicide mixtures shall be prepared by or under the direct supervision of trained, certified, or licensed applicators.

Whenever feasible, vegetation biomass shall be reduced by mowing, cutting, or grubbing before applying herbicide to reduce the amount of herbicide needed. In wetlands or riparian areas herbicides shall only be applied during the dry season (summer or fall). Herbicides shall not be applied directly to water, over water, or on to saturated soils. Only aquatically approved herbicides shall be applied through direct injection into the plant or by spot application, targeting individual plants. Herbicides shall not be applied within 48 hours of forecasted rain, or when the forecasted chance of rain is greater than 10 percent. Herbicide shall not be applied when wind exceeds 10 mph. Herbicide shall be sprayed between gusts when prevailing winds are below 10 mph, and work shall be performed from downwind toward upwind. Herbicides shall not be applied when vegetation is wet from rain or fog.

Mitigation Measure BIO-16: Accidents Associated with Release of Chemicals and Motor Fuel

Contractors and equipment operators on site during treatment activities shall be required to have emergency spill cleanup kits immediately accessible. The Spill Prevention and Response Plan which is included in the Invasive Species Management Plan, shall be followed in case of a spill. Training for herbicide applicators shall include familiarization with the Spill Response Plan.

Mitigation Measure BIO-25: Treatment of Invasive Species Post Construction

Following construction, invasive plants that remain within the Project Area shall be mapped and treated by a combination of chemical, mechanical, or manual methods. If mechanical methods are used, a field screening for wildlife in the area of impact will be conducted. If wildlife species are present, the species will be allowed to move out of the area of impact on their own for up to three hours. Following three hours, the species will be relocated by the field worker. If mechanical methods are used, invasive plants shall be excavated to a depth adequate to remove the entire root systems of these species including the extensive rhizomes of reed canary grass. Invasive plants will be buried on site as feasible to a depth adequate to prevent re-sprouting that is specified in the Invasive Species Management Plan depending on the species (Appendix F of this ISMND). Invasive plant material that cannot be buried on site shall be contained and disposed of at an off-site location. Invasive plant material shall be disposed of in a manner that prevents the spread of invasive species. Areas of disturbance from invasive plant removal shall be minimized to the extent feasible and revegetated with native seed and/or container stock following invasive species removal.

Mapping to determine the extent of reed canary grass, invasive manna grass, and Himalayan blackberry shall continue post construction, and the identified populations shall be treated. Other target invasive species identified in the Invasive Species Management Plan shall be treated according to the Plan.

Attachment C- Spill Response Plan

Spill Response Plan

Rule of Thumb: Report a spill if there is any potential for harm to human health or the environment, or if the spill occurs in an area frequented by the public. A spill is not reportable when it does not result in a threat to the environment (i.e., it can be removed with proper spill cleanup procedures, or if occurs below the levels listed in the material safety data sheet for that herbicide). For small spills that are not reportable, but may be highly visible or otherwise of concern to parks, contact Save the Redwoods League.

Most importantly, it is essential that you wear protective clothing to handle a spill. Do not endanger yourself to control a spill. Call for assistance if needed. **Never leave a spill site unattended until it has been properly cleaned up and decontaminated, unless it presents an unacceptable safety risk to do so.**

Remember the 3C's

- **Control**—Take immediate steps to control the release of the products being spilled.
- **Contain**—Contain the spilled material in as small an area as possible. If possible this should be done while you are controlling the spill. It is important not to let chemicals enter any body of water, including storm sewers and tile lines. Do not hose down the area.
- **Clean up—**Remove the spilled herbicide, petroleum product, or other spilled substance, decontaminate the spill area, and clean contaminated equipment. Cleanup will vary depending on the nature of the spill and substance spilled

Personal Safety is the first priority in the event of an herbicide spill

Personal protective equipment must be worn at all times.

Secure the site and make sure that it is safe for clean up operations.

If emergency personnel or additional resources are needed call the National Response Center at 202-267-2675. The NRC operates 24 hours a day, 7 days a week, 365 days a year.

Once the site has been secured:

Control the spill at the source

- Place leaking container into a spill tray, larger container or plastic bag
- Immediately shut down all pumps to prevent further release of herbicide or other spilled substance
- If possible seal or repair the source of the spill

Contain the spill

- Use spill kits and earthen dikes to prevent the spill from spreading
- Soak up spilled herbicide or other substance with absorbent materials

Clean up of Site

- All materials used in controlling and containing the spill, including contaminated soil should be treated as hazardous; they must be collected in heavy duty plastic bags, labeled, and stored correctly according to the label.
- These materials will be disposed of according to state regulations.

If a spill cannot be controlled or contained, call 911.

If Save the Redwood League personnel cannot be reached or additional support is needed (i.e., emergency personnel), call your park dispatch and state you have an emergency situation. Be brief and to the point (human risk, environmental risk, and status of situation).

Prevent the spill from spreading! Methods for stopping/containing spills include:

- Prevent additional spillage first
- If the spill is contained (e.g., it has occurred in a pick-up bed, boat, or secondary container) use absorbent material to soak up the liquid
- If the spill is not contained (e.g., if it occurs on the ground or in a parking lot) use the shovel to scrape the earth or use absorbent material to form dikes to contain the liquid

Flag the area of the spill to indicate perimeters

As soon as the spill is contained, contact a supervisor. He or she will determine whether the spill is minor and can be handled using readily available equipment and materials, or major, requiring notification of your local Agricultural Extension Agent with the Department of Agriculture (http://ucanr.org/County_Offices/).

Methods for collection of spilled pesticides and other materials

If the material **is not in contact with soil**, collect spilled liquids with absorbent material, put contaminated material into heavy plastic bags or empty containers, and tag the container to indicate the contents.

If the spilled material **is in contact with the soil**, collect liquids with absorbent material; gather all material, including soil that came into contact with the spilled herbicides, and put it into empty containers; and tag the container to indicate the contents.

Plan for storage, handling, and disposal of spilled pesticides and materials:

All material will be handled as hazardous material if required by the label and stored in secondary containment in herbicide storage cabinets and will be disposed of according to instructions from the California Division of Emergency Management (800-852-7550).

Spill Chain of Communication

If it is unclear whether or not a spill is reportable contact the emergency number for chemical spills of the state you are in. They will help you determine if a spill is reportable and give you chemical specific cleanup procedures.

Reportable spills

First, if people were injured call EMS before doing anything else. However, you should initiate the 3 C’s as soon as possible.

If it is unclear if the spill is reportable call the emergency number for chemical spills.

If it is deemed that the spill is a reportable spill contact the emergency number for chemical spills of the state you are in immediately (**California Division of Emergency Management 800-852-7550). CDEM may ask you to report it to the National Response Center 800-424-8802**

The CDEM or NRC will advise you on the correct response to a spill.

Next, if you do not know what number you should call, call CHEMTREC at 800- 424-9300 or you should consult the product’s material safety data sheet. This will help guide you through reporting and cleanup procedures.

Then, contact Save the Redwoods League, your park contact, park Chief of Natural Resources, park Superintendent, and safety officer.

Non-reportable spills

Begin the 3 C’s then contact your immediate supervisor as soon as possible.

Next, your supervisor and safety officer should be notified of a chemical spill no matter how big or small.

If you are unsure of how to clean up a spill, consult the spilled product’s material safety data sheet for chemical specific contact and cleanup procedures.

Emergency Numbers for Chemical Spills, At a Glance

If you or anyone else is seriously ill, call 911 for help. In less serious cases, call your doctor or the Poison Control Center, 1-800-222-1222.

Be sure to tell emergency responders or your doctor that you may have been exposed to an herbicide.

If you or anyone else is being exposed to herbicide drift, move away from any area where you can smell herbicides.

Maintain a list of emergency phone numbers.

Contact information for EMS and nearest hospital should be located next to each spill response kit.

Emergency Contacts	
National Response Center	**800-424-8802**
California Division of Emergency Management	**800-852-7550**
EPA Pesticide Spill Hotline	**206-526-6317**
Poison Control Center	**800-876-4766**
NOAA (if in ocean)	**206-526-6317**
US Coast Guard (if in ocean)	**800-424-8802**

Appendix G – Updated Special Status Plant and Sensitive Natural Communities Survey 2018 and 2019 Technical Memorandum for the Prairie Creek Restoration Project, Humboldt County, CA, GHD 2019e

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Memorandum

4 October 2019

To:	Petra Unger, Save the Redwoods League	Ref. No.:	11159100.120.1
From:	Amy Livingston, GHD Botanist	Tel:	707-443-8326
CC:	Misha Schwarz (GHD Project Manager)		

Subject: **Updated Special Status Plant and Sensitive Natural Communities Survey 2018 and 2019 Technical Memorandum for the Prairie Creek Restoration Project, Humboldt County, CA.**

1 Introduction

This Technical Memorandum reports results of the 2018 and 2019 special status plant and sensitive natural communities surveys, and the supporting plant surveys conducted to date, in the area of the Prairie Creek Restoration Project in Humboldt County, CA (Figure 1, Attachment 1). The area covered by the surveys is presented in Figure 2. The special status plant surveys in 2018 were performed by GHD botanist Amy Livingston, on behalf of Save the Redwoods League on June 5 and August 6, 2018. Attachment 2 contains a scoping list of special-status plants that may occur in the Project Study Boundary (BPS) as described in Section 3.2, as well as a list of species observed within the BPS. Previous special status plant surveys were performed in this area in 2012 by Gary Lester of LACO. The technical memorandum presenting the results of the 2012 LACO survey is included in Attachment 3. A map identifying the vegetation communities that occur within the PSB was completed by McBain and Associates and is included in their report, “Redwood National and State Park Visitor Center and Restoration Project Basis of Revegetation Design Report” (McBain and Associates, May 2019). Amy Livingston, and Sunny Loya from McBain and Associates surveyed the project area, on July 25, 2019 to document typical stands of Sensitive Natural Communities that will be impacted by project related activities per the CDFW protocol for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (CDFW 2018). Field data collected for Sensitive Natural Communities is included in Attachment 4, and photos of the communities are included in Attachment 5.

1.1 Purpose

The purpose of this evaluation was to conduct seasonally appropriate surveys for state, federal, and other sensitive listed plant species in the proposed project area. The surveys attempted to identify all vascular plants within the study area to the taxonomic level necessary to determine rarity and listing status, and to document the presence of special status plants within the project footprint, immediately adjacent, and within temporary construction impact areas. The results may be used for planning, design, to avoid or mitigate impacts associated with project construction, and to guide future management decisions.

1.2 Location

The PSB for the Prairie Creek Restoration Project includes the lower reach of Prairie Creek, above the confluence with Redwood Creek. The PSB extends to U.S. Highway 101 on the west, and continues beyond an old logging road to the north. The PSB includes a portion of the former Orick mill site on the southeast side, and the southern portion of the PSB extends to Bald Hills Road (Figure 2).

1.3 Environmental Setting

A description of the environmental setting is provided by LACO in their 2012 botanical memo (Attachment 3). Detailed information regarding the vegetation communities that occur within the Project Study Boundary is presented in the “Redwood National and State Park Visitor Center and Restoration Project Basis of Revegetation Design Report” (McBain and Associates 2019). The report includes a figure showing the location of vegetation communities that are present as well as a table showing the acreage of each community (McBain and Associates 2019). Sensitive Natural Communities were documented using the Combined Vegetation Rapid Assessment and Relevè Field Form (CDFW 2018), and are included in Attachment 4.

2 Regulatory Setting

2.1.1 State Listed Species

Special status plant species under State jurisdiction include those listed as endangered, threatened, or as candidate species by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act (CESA). Plant species on California Native Plant Society’s (CNPS) California Rare Plant Ranking (CRPR) Lists 1A, 1B and 2 are considered eligible for state listing as Endangered or Threatened pursuant to the California Fish and Game Code and CDFW has oversite of these special status plant species as a trustee agency. As part of the CEQA process, such species should be considered as they meet the definition of Threatened or Endangered under Sections 2062 and 2067 of the California Fish and Game Code. CRPR List 3 and 4 plants do not have formal protection under CEQA. CDFW publishes and periodically updates lists of special status species which include, for the most part, the above categories. Additionally, there are 64 plant species designated as “rare” which is a special designation created before plants were rolled into CESA in the 1980s (CDFW 2018). A project is required to have a “Scientific, Educational, or Management Permit” from CDFW for activities that would result in “take,” possession, import, or export of state-listed plant species including research, seed banking, reintroduction efforts, habitat restoration, and other activities relating to any plant designated SE (State endangered), ST (State threatened), SR (State rare), or SC (State candidate for listing).

2.2 Sensitive Natural Communities

CDFW provides oversight of habitats (i.e. plant communities) listed as Sensitive in the California Natural Diversity Database (CNDDB) and on the California Sensitive Natural Communities List, based on global and state rarity rankings. The natural communities are broken down to alliance and association level for vegetation types affiliated with ecological sections in California. The list and alliances coincide with A Manual of California Vegetation (Sawyer et al. 2009). CDFW considers alliances and associations with a S1 to S3 rank to be Sensitive (CDFW 2019b).

2.3 Federal Jurisdiction

2.3.1 Federal Listed Species

Special status plant species under Federal jurisdiction include those listed as endangered, threatened, or as candidate species by the Fish and Wildlife Service (USFWS) under the U.S. Endangered Species Act (ESA).

2.3.2 Critical Habitat

Critical Habitat is defined by the ESA as a specific geographic area containing features essential for the conservation of an endangered or threatened species. The ESA requires consultation with USFWS by federal lead agencies for activities they carry out, authorize, or fund. Under Section 7 of the ESA, critical habitat federally designated for a listed or proposed species that may be present in project Action Area should be evaluated.

3 Methods

3.1 Project Study Boundary / Action Area

Prior to conducting environmental fieldwork, the project scientist worked in coordination with the project manager and the applicant to develop the limits of the project study boundary (PSB). The PSB is a terminology adopted from definitions and permit procedures promulgated by the U.S. Army Corps of Engineers (USACE). The PSB is designated on a project specific basis, and as feasible, to take into consideration potential alternate layouts of project, fill/cut slopes, temporary impact areas and/or adjacent areas if feasible, access, new or modified utilities and right of ways, and adjacent areas that may be feasibly included in the study. The PSB for the Prairie Creek Project is shown in Figures 1 and 2.

3.2 Pre-Survey Investigations

Prior to field surveys, a scoping list of CRPR plant species and habitats with recorded occurrences in the project vicinity was compiled by consulting the *California Natural Diversity Database* (CNDDB) [CDFW 2018], the CNPS *Inventory of Rare and Endangered Vascular Plants* (CNPS 2018), and the list of Federally listed plant species maintained by the U.S. Fish and Wildlife Service (USFWS 2018). The CNDDB database was consulted for rare plant occurrences documented in the project vicinity. In addition, LACO's 2012 Special Status Plant Survey Technical Memorandum was reviewed (Attachment 3).

The scoping list includes special-status plants that occur in habitat similar to the project area with documented occurrences on the Orick USGS quadrangle or adjacent quadrangles. CDFW and CNPS recommend the assessment area be a minimum of nine USGS quadrangles with the survey area located in the central quad. The scoping list also contains other taxa that may occur in the project area whose habitat is suitable if the project is within or near the known range of the species. Due to the proximity of the Orick quadrangle to the coast, the assessment area was defined as the five USGS 7.5’ minute quadrangles centered around the Orick quadrangle (Fern Canyon, Ah Pah Ridge, Holter Ridge, Rodger’s Peak, and Bald Hills USGS 7.5’ quadrangles). The queries yielded 50 sensitive species previously documented in the assessment area. Of these, seven plant species have a high probability of occurring within the study area, and 21 species have a moderate probability of occurring within the study area (Table 1, Attachment 2). Within the assessment area, two sensitive plant communities are documented according to the CNDDB (2018).

3.3 Survey Procedures and Mapping Methods

Surveys to determine the presence of special status plant species (listed as rare, threatened, endangered, or candidate under the State or Federal Endangered Species Acts, CNPS, or species of local importance) were timed to coordinate with the blooming period for the majority of the species thought to have moderate to high potential to occur within the project area. After a review of the scoping list it was determined that two surveys, an early season survey and a late season survey, would be necessary to capture the blooming period for target species (species thought to have moderate or high potential to occur within the project area).

The surveys were floristic in nature following *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* by the California Natural Resource Agency (CDFW 2018) and *General Rare Plant Survey Guidelines by the Endangered Species Recovery Program* (USFWS 2002). An intuitively controlled survey was conducted that sampled and identified potential habitat(s). Plants were identified to the lowest taxonomic level (genus or species) necessary for rare plant identification. Nomenclature follows *The Jepson Manual* (Baldwin et al 2012). Species surveys were conducted by walking the site looking for the presence of target species and habitats identified on the scoping list, as well as presence of any other incidental sensitive-listed plant species. Approximately 13.5 field person hours were spent surveying the PSB for special status plants. A complete list of vascular plant species observed within the PSB is included as Table 2 in Attachment 2.

A map of vegetation communities occurring within the PSB has been produced by McBain and Associates (2019). In order to describe the Sensitive Natural Communities occurring within the PSB, a total of two additional field days (one day each for two botanists) were spent documenting representative stands within the Sensitive Natural Communities that are present. This work was in addition to the 13.5 field person hours spend surveying specifically for special status plants mentioned above.

4 Results

On June 5 and August 6, 2018 the PSB was surveyed in an effort to identify if federal, state and/or CNPS listed plant species are present. The site was also surveyed on July 25, 2019 to document Sensitive Natural Communities. One special status plant species was found within the PSB. Seaside bittercress (*Cardamine angulata*) occurs along Libby Creek primarily above the impoundment that is proposed for removal. Plants were found on the immediate banks of Libby Creek and within the creek channel. The rhizomatous nature of this species made it difficult to estimate the number of individuals. On June 5, 2018, when the population was first observed, seven individuals were seen that were flowering and beginning to fruit. The population was revisited on July 25, 2019 for a more thorough estimation of the area occupied. The plants were found to occupy an area that extended approximately 125’ upstream of the Libby Creek impoundment. Three individuals occur below the impoundment.

No special status species were observed by LACO during the 2012 surveys within the project study boundary, (although the location where the seaside bittercress occurs was outside of the LACO 2012 PSB). Within the current PSB, two sensitive plant communities are documented according to the CNDDB, Coastal and Valley Freshwater Marsh and Sitka Spruce Forest (CNDDB 2018). Coastal Freshwater Marsh, or freshwater palustrine emergent wetlands, occur within the PSB and are addressed in a separate wetland delineation report. Impacts to Sitka spruce from this project are anticipated. The Sensitive Natural Communities present in the PSB and potential impacts to these communities are described below.

4.1 Sensitive Natural Communities

Vegetation community mapping results are detailed in the “Redwood National and State Park Visitor Center and Restoration Project Basis of Revegetation Design Report” (McBain and Associates 2019). Table 2 within the report provides a cross walk between cover types as mapped by McBain and Associates and Vegetation Alliances per the Manual of California Vegetation (Sawyer et al. 2009). The five Sensitive Natural Communities that occur within the project area were visited and documented using the Combined Vegetation Rapid Assessment and Relevè Field Form (CDFW 2018). The forms used to document these communities are included in Attachment 4. Photographs documenting Sensitive Natural Communities are included in Attachment 5. As the project is still in design stage, all impacts to Sensitive Natural Communities are not currently known. A brief discussion of the five Sensitive Natural Communities occurring within the PSB follows. Individual trees mapped by McBain and Associates (2019) that do not constitute communities by themselves, are also noted below.

Arroyo willow thickets alliance

The arroyo willow (*Salix lasiolepis*) thicket shrubland alliance contains several associations that are considered Sensitive (CDFW 2019) including the arroyo willow association. A Rapid Assessment was completed to document this community which would most accurately fit the arroyo willow association. Plot locations where Rapid Assessments were performed are shown on Figure 2.

Black cottonwood

Individual black cottonwood (*Populus trichocarpa*) trees occur on the south side of the PSB. However, the individuals trees do not constitute a community.

Slough sedge swards alliance

The slough sedge (*Carex obnupta*) herbaceous alliance is considered Sensitive by CDFW (2019). A Rapid Assessment was completed, and where the Rapid Assessment was performed, the alliance would best fit the *Carex obnupta* association which is also considered Sensitive. The vegetation map divides the Slough Sedge Swards alliance into three categories based on three dominant cover categories: slough sedge, or

Himalayan blackberry (*Rubus armeniacus*) and slough sedge, and a small area mapped as tall fescue-slough sedge. Where it is a dominant cover type, the non-native, invasive shrub Himalayan blackberry lowers the quality of the slough sedge community. Likewise, the non-native tall fescue (*Festuca californica*) also lowers the quality of the slough sedge community.

Coastal willow

Two coastal willow (*Salix hookeriana*) trees occur near the norwestern edge of the paved portion of the PSB. A photograph is included in Attachment 5. These two individuals do not constitute a community.

Bishop pine- Monterey pine forest alliance

A small area (0.02 acres) was mapped within the PSB as having Monterey pine (*Pinus radiata*) as the dominant cover type. Monterey pine is not native to Humboldt County. This cover category is shown in the cross walk table as corresponding to the Bishop pine- Monterey pine forest alliance (McBain and Associates 2019). The Bishop pine- Monterey pine forest alliance is considered sensitive by CDFW (2019), and is determined by the percent relative cover of the native Bishop pine (*Pinus muricata*) in the overstory canopy. As no impacts are anticipated to this community, it was not documented with a Rapid Assessment form.

Pacific willow woodland alliance

The Pacific willow (*Salix lasiandra* var. *lasiandra*) woodland alliance (also known as shining willow groves) is considered Sensitive (CDFW 2019). A Rapid Assessment was completed for this community. The plot locations where the Rapid Assessments was performed is shown on Figure 2.

Redwood forest alliance

The redwood (*Sequoia sempervirens*) forest alliance is considered Sensitive (CDFW 2019). A Rapid Assessment was completed to document this community in second growth redwood forest. Plot locations where Rapid Assessments were performed are shown on Figure 2. The Rapid Assessment performed for the redwood forest is not representative of all redwood forest locations within the PSB. Notably, an old growth redwood tree, known as the Centennial Tree, occurs within the PSB and is the central focus of the proposed canopy walkway. Other old growth redwood trees occur outside of the PSB. No old growth redwood trees will be removed as a result of the project. Redwood trees are proposed for removal within the redwood forest alliance, all of which are second growth with diameters at breast height (dbh) of 8 to 16 inches.

Sitka spruce forest alliance

The Sitka spruce (*Picea sitchensis*) forest alliance is considered Sensitive (CDFW 2019). A Rapid Assessment was completed to document this community, the locations is shown on Figure 2. The Rapid Assessment was performed in a second growth stand of upland Sitka spruce forest. The Rapid Assessment performed for the Sitka spruce forest is not representative of all Sitka spruce forest locations within the project area. A palustrine forested wetland with large Sitka spruce trees and diverse understory, shrub, and herbaceous vegetation occurs on the northeast side of the PSB fed by tributaries originating from the adjacent hillside. This subset of the Sitka spruce forest alliance is planned for limited excavation.

Sitka willow

A Sitka willow (*Salix sitchensis*) tree occurs along the southern edge of the PSP. A photograph is included in Attachment 5. The one Sitka willow tree does not constitute a community

4.2 Sensitive Natural Community Impacts

Table Two within The Redwood National and State Park Visitor Center and Restoration Project Basis of Revegetation Design Report includes a table of all vegetation communities occurring within the PBS and the acreage occupied by each (McBain and Associates 2019). McBain and Associates are preparing a revegetation plan to mitigate for impacts to the natural communities present within the project area.

4.3 Invasive Species

It is notable that the invasive species, reed canary grass, (*Phalaris arundinacea*) was present in stream channels throughout the PSB. The previous botanical report by LACO identified Carolina canary-grass (*Phalaris caroliniana*) within the PSB. During GHD's botanical survey careful attention was paid to this genus and all *Phalaris* species observed were identified as reed canary grass. Further discussion of invasive species within the PSB will be included in the Invasive Species Management Plan and the Mitigation and Monitoring Plan.

5 Conclusion

The purpose of this survey was to identify and map special status plants within the project study boundary, and provide documentation to support the mapping of Sensitive Natural Communities per CDFW protocol. One special status plant population occurs within the PSB. Several Sensitive Natural Communities occur within the PSB. No Critical Habitat for plants occurs within the project study boundary.

6 References

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USFWS 2018. *U.S. Fish and Wildlife Service IPaC Resources List.* Arcata Field Station, U. S. Fish and Wildlife Service (USFWS). Accessed: August 8, 2018.

Attachments

1. **Figures**

   Figure 1: Regional and Location Map

   Figure 2: Special Status Plant Survey Results

2. **Tables**

   Table 1: Special status plant species with potential to occur in the PSB

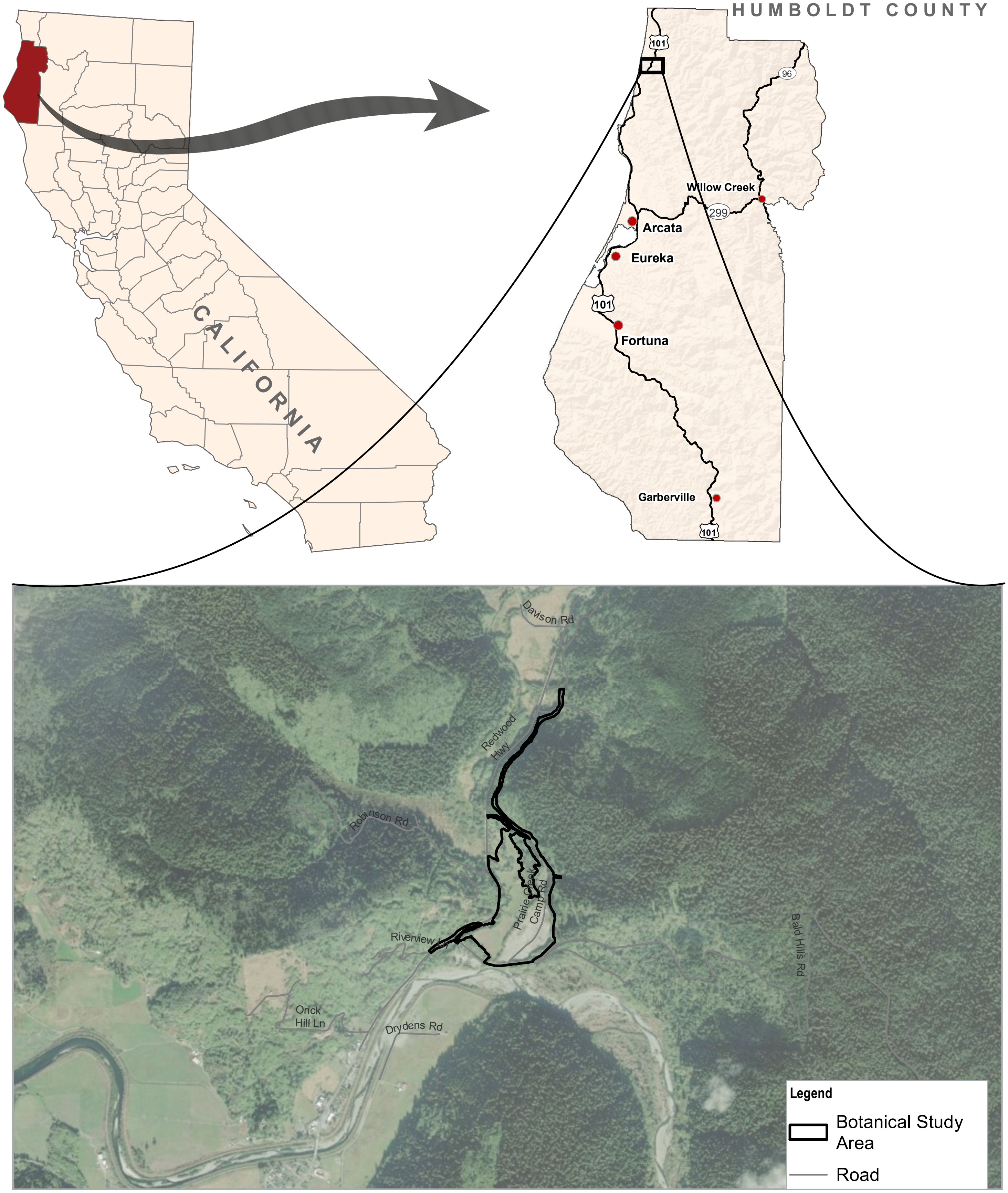
   Table 2: Species list of plants observed within the PSB

3. **LACO 2012 Technical Memorandum**

4. **Rapid Assessment Forms**

5. **Natural Community Photos**

Attachment 1- Figures



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Save the Redwoods League
Prairie Creek Restoration Project

Project No.	**11159100**
Revision No.	**-**
Date	**19 Sep 2019**

Vicinity

FIGURE 1

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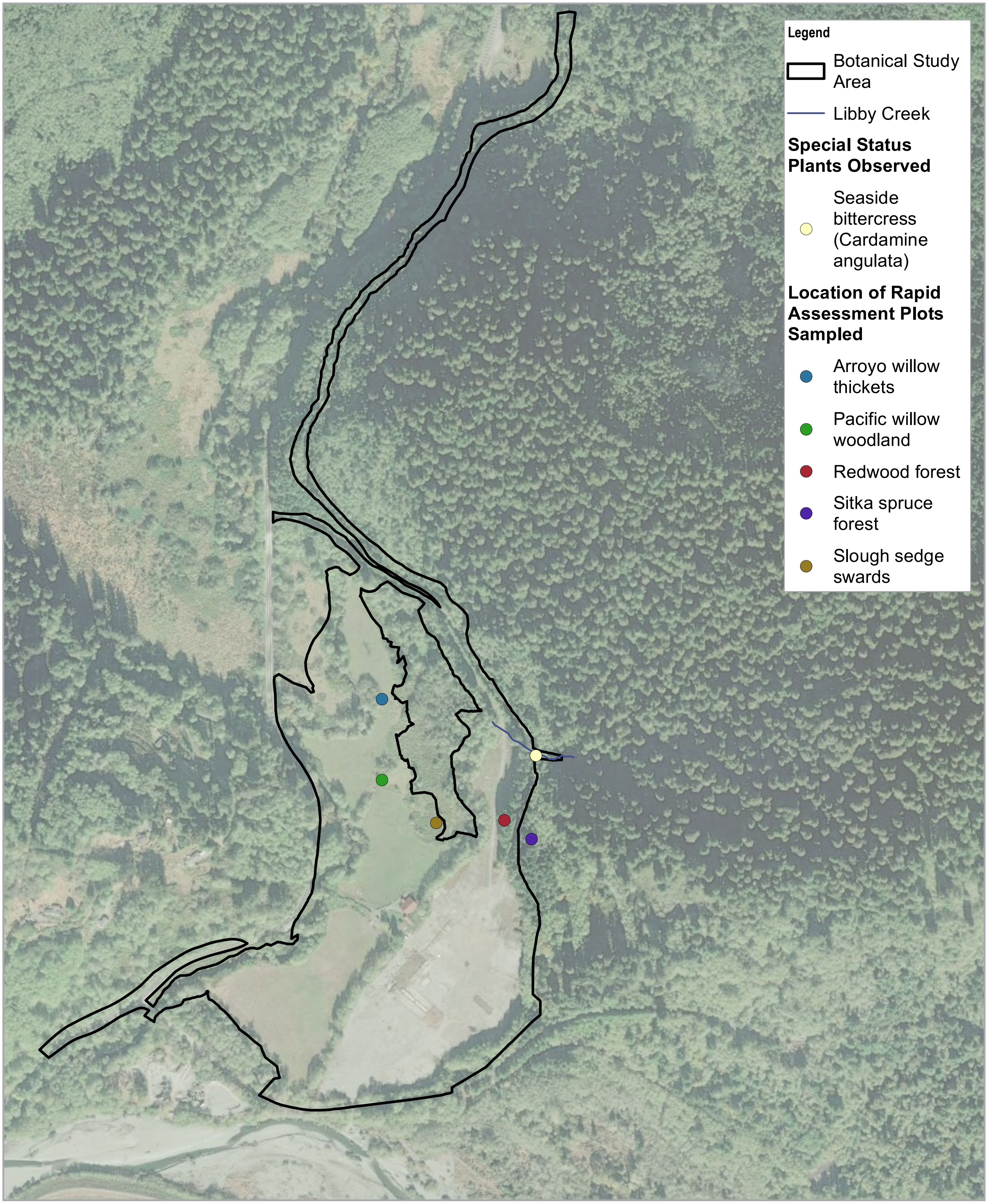
Data source: Botanical Survey Boundary, GHD, 6/4/2018; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Sources: Esri, USGS, NOAA. Created by: jclark2



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GHD

Save the Redwoods League
RNSP Visitor Center and Restoration Project

Special Status Plant and Sensitive Natural Communities Survey

Project No. 11159100
Revision No. -
Date 20 Sep 2019

FIGURE 2

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Data source: Disturbance Extent, 5/06/2019; NHE Librry Creek alignment; GHD botanical survey, 6/05/2018; McBain botanical survey, 7/25/2019; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Attachment 2 – Tables

Table 1 Special status plant species with potential to occur in the PSB

Taxa	Common Name	Listing Status	Typical Habitat	Likelihood of Occurrence
Abronia umbellata var. *breviflora*	pink sand-verbena	1B.1	Coastal dunes	No Potential
Angelica lucida	sea-watch	4.2	Coastal bluff scrub, coastal dunes, coastal scrub, marshes and swamps (coastal salt)	Low Potential
Astragalus umbraticus	Bald Mountain milk-vetch	2B.3	Cismontane woodland | Lower montane coniferous forest	No Potential
Calamagrostis bolanderi	Bolander's reed grass	4.2	Bogs and fens, Broadleafed upland forest, Closed-cone coniferous forest, Coastal scrub, Meadows and seeps (mesic), Marshes and swamps (freshwater), North Coast coniferous forest	Moderate Potential
Calamagrostis crassiglumis	Thurber's reed grass	2B.1	Coastal scrub | Freshwater marsh | Marsh & swamp | Wetland	High Potential
Cardamine angulata	seaside bittercress	2B.1	Lower montane & North coast (NC) coniferous forest | Wetland	**Present**, below and above Libby Creek dam
Carex buxbaumii	Buxbaum's sedge	4.2	Bogs and fens, Meadows and seeps (mesic), Marshes and swamps	Moderate Potential
Carex lenticularis var. limnophila	lagoon sedge	2B.2	Bog & fen | Marsh & swamp | North coast coniferous forest	Moderate Potential
Carex leptalea	bristle-stalked sedge	2B.2	Bog, fen, freshwater marsh, Wetland, swamp, Meadow & seep	Moderate Potential
Carex praticola	northern meadow sedge	2B.2	Meadow & seep | Wetland	High Potential
Carex saliniformis	deceiving sedge	1B.2	Coastal prairie | Coastal scrub | Marsh & swamp | Meadow & seep | Wetland	Moderate Potential

Taxa	Common Name	Listing Status	Typical Habitat	Likelihood of Occurrence
Carex viridula ssp. viridula	green yellow sedge	2B.3	Bog & fen | Marsh & swamp | North coast coniferous forest | Wetland	Moderate Potential
Castilleja ambigua var. *humboldtiensis*	Humboldt Bay owl's-clover	1B.2	Marsh & swamp | Salt marsh | Wetland	No Potential
Castilleja littoralis	Oregon coast paintbrush	2B.2	Coastal bluff scrub | Coastal dunes | Coastal scrub	No Potential
Chrysosplenium glechomifolium	Pacific golden saxifrage	4.3	Streambanks, sometimes seeps, sometimes roadsides. NC coniferous forest. Riparian forest	High Potential
Coptis laciniata	Oregon goldthread	4.2	Meadow & seep | North coast coniferous forest | Wetland	High Potential
Darlingtonia californica	California pitcherplant	4.2	Bogs and fens, Meadows and seeps, generally serpentine seeps	No Potential
Erythronium revolutum	coast fawn lily	2B.2	Bog & fen | broadleaved upland forest | North Coast coniferous | Wetland	Low Potential
Glehnia littoralis ssp. leiocarpa	American glehnia	4.2	Coastal dunes	No Potential
Iliamna latibracteata	California globe mallow	1B.2	Chaparral | Lower montane coniferous forest | North coast coniferous forest | Riparian scrub	Moderate Potential
Kopsiopsis hookeri	small groundcone	2B.3	North coast coniferous forest	Moderate Potential
Lathyrus japonicus	seaside pea	2B.1	Coastal dunes	No Potential
Lathyrus palustris	marsh pea	2B.2	Bog, fen, marsh, swamp | coastal prairie & scrub | lower montane & NC coniferous forest	Moderate Potential
Layia carnosa	beach layia	FE, SE, 1B.1	Coastal dunes | coastal scrub	No Potential

Taxa	Common Name	Listing Status	Typical Habitat	Likelihood of Occurrence
Lilium bolanderi	Bolander's lily	4.2	Chaparral, Lower montane coniferous forest, serpentinite	No Potential
Listera cordata	heart-leaved twayblade	4.2	Bogs and fens | lower montane & NC coniferous forest	High Potential
Lycopodium clavatum	running-pine	4.1	Lower montane & NC coniferous forest | marsh & swamp	Moderate Potential
Lycopodiella inundata	inundated bog club-moss	2B.2	Bogs and fens (coastal), Lower montane coniferous forest (mesic), Marshes and swamps (lake margins)	Low Potential
Micranthes marshallii	Marshall's saxifrage	4.3	Riparian forest, rocky streambanks	Low Potential
Mitellastra caulescens	leafy-stemmed mitrewort	4.2	Broadleaved upland forest | lower montane & NC coniferous forest | meadow & seep	High Potential
Moneses uniflora	woodnymph	2B.2	Broadleaved upland forest | North coast coniferous forest	Moderate Potential
Monotropa uniflora	ghost-pipe	2B.2	Broadleaved upland forest | NC coniferous forest	Low Potential
Montia howellii	Howell's montia	2B.2	Meadow, seep, wetland & vernal pool | NC coniferous	Moderate Potential
Oenothera wolfii	Wolf's evening-primrose	1B.1	Coastal bluff scrub | coastal dunes | coastal prairie	Moderate Potential
Piperia candida	white-flowered rein orchid	1B.2	Broadleaved upland forest | Lower montane coniferous forest | North coast coniferous forest | Ultramafic	Low Potential
Pityopus californicus	California pinefoot	4.2	Mesic. Broadleafed upland forest. Lower montane/Upper montane / NC coniferous forest	Low Potential
Pleuropogon refractus	nodding semaphore grass	4.2	Mesic. Lower montane & NC coniferous forest. Meadows and seeps. Riparian	Moderate Potential

Taxa	Common Name	Listing Status	Typical Habitat	Likelihood of Occurrence
Polemonium carneum	Oregon polemonium	2B.2	Coastal prairie, Coastal scrub, Lower montane coniferous forest	Low Potential
Ribes laxiflorum	trailing black currant	4.3	Sometimes roadside. NC coniferous forest	Moderate Potential
Sidalcea malachroides	maple-leaved checkerbloom	4.2	Broadleaved upland forest | coastal prairie & scrub | NC coniferous & riparian forest	Moderate Potential
Sidalcea malviflora ssp. *patula*	Siskiyou checkerbloom	1B.2	Coastal bluff scrub | Coastal prairie | North coast coniferous forest	Moderate Potential
Silene scouleri ssp. scouleri	Scouler's catchfly	2B.2	Coastal bluff scrub | Coastal prairie | Valley & foothill grassland	Low Potential
Thermopsis gracilis	slender false lupine	4.3	Chaparral, Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, North Coast coniferous forest	No Potential
Thermopsis robusta	Robust false lupine	1B.2	Broadleaved upland forest | North coast coniferous forest | Ultramafic	No Potential
Tiarella trifoliata var. trifoliata	trifoliate laceflower	3.2	Lower montane coniferous forest, North Coast coniferous forest	Moderate Potential
Viola palustris	alpine marsh violet	2B.2	Bog & fen | coastal scrub | wetland	Low Potential
Non-vascular plants				
Bryoria pseudocapillaris	false gray horsehair lichen	3.2	Conifers | coastal dunes (SLO Co.) | NC coniferous forest (immediate coast)	Moderate Potential
Fissidens pauperculus	minute pocket moss	1B.2	NC coniferous forest | redwood	Moderate Potential
Trichodon cylindricus	cylindrical trichodon	2B.2	Broadleaved upland forest | upper montane coniferous forest	No Potential
Usnea longissima	long-beard lichen	4.2	Broadleaved upland forest | north coast coniferous forest | old growth | redwood	Moderate Potential

Taxa	Common Name	Listing Status	Typical Habitat	Likelihood of Occurrence
Terrestrial Communities				
Coastal and Valley Freshwater Marsh		None	Marsh & swamp | wetland	Present
Sitka Spruce Forest		None	Coastal forests	Large Sitka spruce trees occur at northeast edge of project boundary

Source: CNDDB and CNPS accessed 8/8/18. Assessment area consists of USGS 7.5 minute quadrangles: Orick, Fern Canyon, Ah Pah Ridge, Holter Ridge, Rodger’s Peak, Bald Hills

Note: small font size in table above denotes List 3 or 4 plant species which are provided herein for informational purposes

FEDERAL--U.S. Fish and Wildlife Service (USFWS)
FE - Federal Endangered
FT - Federal Threatened
FC - Federal Candidate for listing
FSC - United States Fish and Wildlife Service Federal Species of Special Concern
STATE--California Department of Fish and Wildlife (CDFW)
SE - State Endangered
ST - State Threatened
SR – State Rare
CSC - CDFW Species of Special Concern
SLC - Species of Local Concern
CFP - California Fully Protected Species
California Native Plant Society Rare Plant Ranks (CRPR)
1A- Presumed Extirpated in California and either Rare or extinct elsewhere
1B - Rare, Threatened, or Endangered in California and elsewhere
2 - Rare, Threatened or Endangered in California, but more common elsewhere
2A- Plants Presumed Extirpated in California, but more common elsewhere
2B- Plants Rare, Threatened, or Endangered in California, but more common elsewhere
3 - Review List (more information needed)
4 - Watch List (limited distribution in California)
Threat Ranks:
_0.1 Seriously threatened in California
_0.2 Moderately threatened in California
0.3 Not very threatened in California

POTENTIAL TO OCCUR

No Potential	Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime)
Low Potential	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.

Taxa	Common Name	Listing Status	Typical Habitat	Likelihood of Occurrence
High Potential	All of 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.			

Table 2 Species list of plants observed within the PSB by GHD

Scientific Name	Common Name
Acer macrophyllum	bigleaf maple
Acmispon americanus var. americanus	spanish lotus
Agrostis stolonifera	creeping bent
Aira caryophyllea	silver European hairgrass
Alnus rubra	red alder
Anthoxanthum odoratum	sweet vernal grass
Artemisia douglasiana	mugwort
Asarum caudatum	creeping wild ginger
Athyrium filix-femina	common ladyfern
Baccharis pilularis	coyote brush
Bellis perennis	English daisey
Blechnum spicant	deer fern
Briza minor	annual quacking grass
Bromus diandrus	ripgut brome
Bromus hordeaceus	soft chess brome
Bromus inermis	smooth brome
Cardamine angulata[1]	Seaside bittercress
Cardamine oligosperma	bitter-cress
Carex hendersonii	Henderson's sedge
Carex leptopoda	slender-footed sedge
Carex obnupta	slough sedge
Cerastium glomeratum	mouse-eared chickweed
Cirsium arvense	canada thistle
Cirsium vulgare	bull thistle
Claytonia perfoliata	miner's lettuce
Claytonia sibirica	candy flower
Conium maculatum	poison hemlock
Corylus cornuta var. californica	California hazelnut
Cotoneaster sp.	contoneaster
Cynosurus echinatus	hedgehog dogtail
Cyperus eragrostis	tall nutsedge
Cytisus scoparius	scotch broom
Dactylis glomerata	orchard grass
Daucus carota	queen ann's lace
Dicentra formosa	pacific bleeding heart

Scientific Name	Common Name
Digitalis purpurea	foxglove
Eleocharis sp.	spikerush
Epilobium ciliatum	
Equisetum arvense	common horsetail
Erodium sp.	
Euonymus occidentalis	western burning bush
Festuca arundinacea	tall fescue
Festuca myuros	rattail grass
Festuca perennis	meadow fescue
Frangula purshiana subsp. purshiana	cascara
Galium aparine	goose grass
Galium triflorum	sweet-scented bedstraw
Geranium dissectum	
Glyceria sp.[2]	manna grass
Hedera helix	English ivy
Holcus lanatus	velvet grass
Hordeum sp.	
Hypericum perforatum	Klamathweed
Hypochaeris radicata	rough cats-ear
Juncus bolanderi	Bolander's rush
Juncus bufonius	toad rush
Juncus effusus	common rush
Juncus patens	spreading rush
Lapsana communis	common nipplewort
Leucanthemum vulgare	ox-eye daisy
Linum bienne	
Lonicera involucrata	twinberry
Lotus corniculatus	bird's-foot trefoil
Lupinus sp.	lupine
Luzula parviflora	hairy wood rush
Lysichiton americanus	yelllow skunk cabbage
Lysimachia arvensis	scarlet pimpernel
Marah oregana	coast manroot
Matricaria discoidea	pineapple weed
Melilotus sp.	sweetclover
Mentha pulegium	pennyroyal

Scientific Name	Common Name
Nasturtium officinale	water cress
Oenanthe sarmentosa	
Osmorhiza bertolii	mountain sweet-cicely
Oxalis oregana	redwood sorrel
Parentucellia viscosa	yellow glandweed
Persicaria maculata	Lady's thumb
Phalaris arundinacea	reed canarygrass
Picea sitchensis	Sitka spruce
Plantago lanceolata	English plantain
Plantago major	common plantain
Poa annua	annual blue grass
Poa pratensis ssp. pratensis	Kentucky blue grass
Polypodium sp.	polypody
Polypogon monspeliensis	rabbitfoot grass
Polystichum munitum	western sword fern
Populus trichocarpa	black cottonwood
Potentilla anserina	pacific silverweed
Prunella vulgare	selfheal
Prunus sp. (cultivar)	
Pseudotsuga menziesii var. menziesii	Douglas-fir
Pteridium aquilinum var. pubescens	bracken fern
Ranunculus repens	creeping buttercup
Raphanus sativus	radish
Rhododendron macrophyllum	rhododendron
Rubus armeniacus	Himalayan blackberry
Rubus parviflorus	thimbleberry
Rubus spectabilis	salmon berry
Rubus ursinus	California blackberry
Rubus ursinus	California blackberry
Rumex acetosella	common sheep sorrel
Rumex crispus	curly dock
Salix hookeriana	Hooker’s willow
Salix lasiandra var. lasiandra	Pacific willow
Salix lasiolepis	arroyo willow
Salix sitchensis	Sitka willow
Salix sp.	willow

Scientific Name	Common Name
Sambucus racemosa	red elderberry
Scirpus microcarpus	bulrush
Senecio jacobaea	tansy ragwort
Senecio minimus	coastal burnweed
Sequoia sempervirens	redwood
Sonchus asper subsp. asper	prickly sow thistle
Stachys ajugoides	hedge-nettle
Stachys chamissonis	
Taraxacum officinale	common dandelion
Tellima grandiflora	fringe cups
Tolmiea menziesii	pig a back plant
Trifolium pratense	red clover
Trifolium repens	white clover
Trisetum sp.	
Urtica dioica	stinging nettle
Vaccinium ovatum	California huckleberry
Vaccinium parvifolium	California red huckleberry
Veronica americana	American brooklime
Vicia sativa	
Whipplea modesta	modesty

Source: Prairie Creek botanical survey dates – June 5, 2018, August 6, 2018 (GHD botanist Amy Livingston), and July 25, 2019 Amy Livingston and Sunny Lloya. 1. Seaside bittercress is a CRPR list 2B.2 Special status plant species. Identification of the *Glyceria* sp. is uncertain but is most likely either *Glyceria x occidentalis* or *Glyceria fluitans*. Both are invasive species.

Attachment 3 – LACO 2012 Technical Memorandum

LACO

TECHNICAL MEMORANDUM

Special Status Plant Survey Results
Redwood Parks Lodge Project / Orick Mill Site
Assessor's Parcel Numbers 519-231-018 & 520-012-013

Date:	December 3, 2012
Project No.:	7291.08
Prepared For:	Green Diamond Resource Company
Prepared By:	Gary S. Lester, Senior Botanist Gary S. Lester
Attachments:	Attachment 1: Plant Species Encountered During Field Survey of the Redwood Parks Lodge Project Area

1.0 INTRODUCTION

On May 1 and July 29, 2012, LACO Associates Senior Botanist Gary Lester conducted special status plant surveys for the proposed Redwood Parks Lodge project area at the Green Diamond Resource Company Orick Mill Site (Figure 1). The scope of this work was based on Contract Work Authorization No. 8, Task 2440, Biological Assessment and Wetland Delineation, signed on October 5, 2011. The surveys were conducted off Highway 101 in the northwestern portion of Humboldt County (T11N, R1E, portions of Sec. 27 and 34, HBM) near Orick, California. The surveys were conducted to determine the possible presence of special status plant species in the project area. The botanical surveys did not detect any recognized special status plant species occurring in project area.

2.0 ENVIRONMENTAL SETTING

The proposed Redwood Parks Lodge project area consists of approximately 30 acres, and lies immediately east of Highway 101 and north of Bald Hills Road. Project area elevations range between approximately 30 and 40 feet above mean sea level. The project area features a broad asphalt-covered clearing (mill site), riparian corridors (Prairie Creek and adjacent tributaries), open grazing lands, and scattered, isolated vegetation on compacted gravel fill and berm features. Soils are mapped by the Humboldt County Soils Survey as being gravel fill from residential, commercial and/or industrial setting and flood alluvial deposits (McLaughlin and Harradine, 1965).

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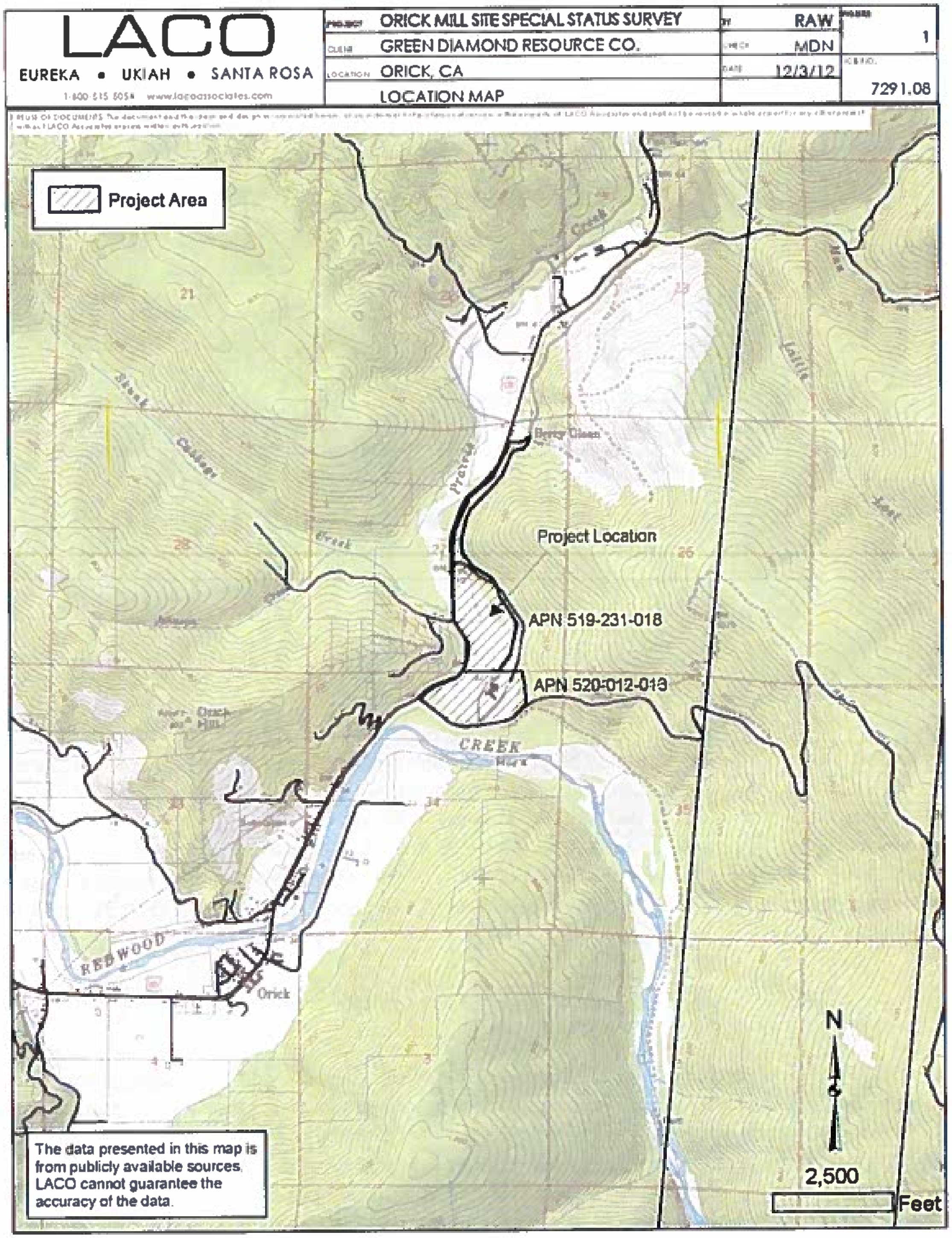
Figure 1. Orick Mill Site Location



The Prairie Creek stream channel and associated riparian vegetation occurs adjacent to the northwestern flank of the property, dominated by red alder (*Alnus rubra*) with Douglas-fir (*Pseudotsuga menziesii*), coast redwood (*Sequoia sempervirens*), Sitka spruce (*Picea sitchensis*), Pacific willow (*Salix lasiandra* var. lasiandra), and big-leaf maple (*Acer macrophyllum*) canopy, with an understory of salmon berry (*Rubus spectabilis*), cascara (*Frangula purshiana*), thimbleberry (*Rubus parviflorus*), and ground cover including western sweet colt's foot (*Petasites frigidus* var. palmatus), sword fern (*Polystichum munitum*), and creeping buttercup (*Ranunculus repens*). Similarly-composed vegetation occurs along the Bald Hills Road frontage along a ditch/drainage that receives flow from upslope above the mill site, which includes canopy trees of black cottonwood (*Populus trichocarpa*). Vegetation along the riparian edges is composed of Himalaya blackberry (*Rubus armenicus*) and a variety of native and non-native grasses and herbs. An adjacent pasture that lies between Prairie Creek and the mill site is dominated by sweet vernal grass (*Anthoxanthum oderatum*), English daisy (*Bellis perennis*), velvet grass (*Holcus lanatus*), perennial ryegrass (*Festuca perennis*), perennial bluegrass (*Poa pratensis*), and white clover (*Trifolium repens*). Scattered seasonal wetlands also occur at the site, dominated by herbaceous cover of slough sedge (*Carex obnupta*), silverweed (*Potentilla anserina*), Carolina canary-grass (*Phalaris caroliniana*), soft rush (*Juncus effusus*), hedge nettle (*Stachys ajugoides*), and boreal manna grass (*Glyceria borealis*).

3.0 METHODS

Seasonally-appropriate botanical survey site visits to the project area were conducted on May 1 and June 29, 2010, with a total of approximately 16 person-hours of survey time. LACO Associates Senior Botanist Gary Lester conducted these surveys. Mr. Lester is qualified to conduct plant surveys. He has an undergraduate degree in Botany and has received training in recognition of the local flora, plant identification, and survey protocol.

The USGS 7.5 minute Orick quadrangle topographic map, aerial photography, and the Orick Quad California Department of Fish and Game Natural Diversity Data Base (DFG, 2012) for the project vicinity were consulted prior to and during the botanical survey to determine potential areas of sensitive plant species occurrence.

The surveys were conducted following protocol developed by the California Department of Fish and Game (DFG, 2009). An intuitively-controlled, seasonally-appropriate survey was conducted that sampled the identified potential habitat at a moderate to high coverage (60-100%). Some areas of the project site were surveyed at the highest coverage because the gravel dominated areas and scattered seasonal wetlands represented potential habitat for the diminutive Howell's montia (*Montia howellii*). Because the riparian interiors have more limited visual access, the surveys in these habitats concentrated on the most suitable sensitive species habitat within the stand. Plants were identified to the lowest taxonomic level (genus or species) necessary for rare plant identification, following the scientific nomenclature of the Jepson Manual (Baldwin, et. al., 2012).

4.0 SPECIAL STATUS PLANT SPECIES ANALYSIS

4.1 Special Status Plant Species Historically Reported Nearby

The California Natural Diversity Database (CNDDB) lists historical observations for the following nine species (see also Table 1 below) within the USGS 7.5 minute Orick quadrangle (excluding salt and brackish marsh, coastal bluffs and dune species):

1) Northern meadow sedge (*Carex praticola*) was reported in 1936 near Gans Prairie.
2) Deceiving sedge (*Carex saliniformis*) was reported in 1921 near Orick at Stone Lagoon.
3) Minute pocket moss (*Fissidens pauperculus*) was reported from Prairie Creek State Park on the James Irving Trail.
4) California globe mallow (*Iliamna latibracteata*) was reported in 1937 in nearby Davison Ranch on Prairie Creek.
5) Running pine (*Lycopodium clavatum*) has been reported in 2002 near Gans Prairie.
6) Ghost pipe (*Monotropa uniflora*) was reported from near Gans Prairie, Redwood National Park.
7) Howell's montia (*Montia howellii*), is reported from an undated collection from nearby Berry Glen.
8) Wolf's evening primrose (*Oenothera wolfii*) is known from coastal bluffs near Freshwater Lagoon and is found on disturbed roadsides.
9) Siskiyou checkerbloom (*Sidalcea malviflora* ssp. patula) was reported from near Gans Prairie in 1927.

TABLE 1: SENSITIVE SPECIES POTENTIALLY PRESENT IN THE REDWOOD PARKS LODGE PROJECT AREA

Species	Common Name	CNPS List	Preferred Habitat
Carex praticola	Northern meadow sedge	2.2	Moist to wet meadows, stream banks,moist woods in coastal prairie to forest; flowers May – July
Carex saliniformis	Deceiving sedge	1B.2	Coastal prairie and swamps; flowers May-July
Fissidens pauperculus	Minute pocket moss	1B.2	Forest soils on coast; 10-100 meters.
Iliamna latibracteata	California globe mallow	1B.2	Forest edges, and seeps, 500-2,000 meters; flowers June – July
Lycopodium clavatum	Running pine	4.1	Moist openings in redwood forest on trunks, branches, dirt roads, exposed soil (variable habitat); identifiable year-round
Monotropa uniflora	Ghost pipe	2.2	Shady, damp woods (coniferous to mixed evergreen) mycorrhizal associate with Douglas-fir; flowers June-July
Montia howellii	Howell's montia	2.2	Wet openings in forest on compacted Soils; flowers April-May
Oenothera wolfii	Wolf's evening-primrose	2.2	Clearings and road edges on disturbed Soils; flowers June-August
Sidalcea malviflora ssp. patula	Siskiyou checkerbloom	1B.2	Openings in redwood forest, coast scrub and prairie; flowers late May-June

4.2 Potential Special Status Plant Species Present

All species included on List 1-4, California Rare Plant Ranking (CRPR) of the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Vascular Plants of California (CNPS, 2012) were reviewed to determine their potential presence in the vicinity of the project area. The CNPS inventory includes all species listed as rare or endangered by the Federal and State governments. Based on the species identified in the CNDDB and CNPS records, the range of habitats present, and the geographical range of the various sensitive species, the species considered most likely to occur in the vicinity of the Redwood Parks Lodge project area are presented in Table 1. No special habitats (such as coastal bluffs, dunes or coastal marshes) are present at the project area, eliminating sensitive species specific to those types of habitats. The following summaries identify the sensitive plant species that have the potential to occur in the project area based on habitat:

1) Northern meadow sedge occurs in moist forests and moist to wet meadows in the North Coast Range and Sierra Nevada. Minimal habitat for this species occurs on the project area. California Rare Plant Ranking (CRPR) of 2.2, defined as rare, threatened or endangered in California, but more common elsewhere and a moderate number of the California populations are seriously threatened.
2) Deceiving sedge occurs in coastal prairies, marshes, and wet meadows in coastal habitats. CRPR of 1B.2, defined as rare, threatened or endangered in California and elsewhere and the majority of the California populations are seriously threatened.
3) Minute pocket moss is known from historical collections in Prairie Creek Redwoods State Park. The known occurrences are from bare, moist, clay-enriched soil habitats. This species may occur in nearby clearings, but little such clay dominated soil habitats were seen in the project area. CRPR of 1B.2, defined as rare, threatened or endangered in California and elsewhere and the majority of the California populations are seriously threatened.
4) Running pine occurs in moist, moderately open redwood or mixed evergreen forests, often on northern aspects or ridge tops, occasionally at the edge of exposed old dirt roads, habitats which occur within the project area. Running pine is evergreen, non-flowering, and visible throughout the year. CRPR of 4.1, defined as California plant of limited distribution and a high number of the California populations are threatened.
5) California globe mallow is a perennial, sub-shrub member of the mallow family. Historical records indicate the California globe mallow is limited to a historical collection on the Davison Ranch. Of the non-coastal sites listed in the CNDDB, there is a close association with past disturbance or canopy removal. CRPR of 1B.2, defined as rare, threatened or endangered in California and elsewhere and the majority of the California populations are seriously threatened.
6) Ghost pipe is a non-photosynthetic plant that obtains nutrition from a host plant, typically Douglas-fir, via a mycorrhizal association with fungi (Yang & Pfister, 2006). Its known distribution ranges from the north coast of California to British Columbia, in both coniferous and mixed evergreen forests. The preferred microsite conditions are typically shady and moist with a deep humus layer of topsoil. Known populations occur in adjacent Redwood National Park (CNDDB, 2012, pers. obs.). Ghost pipe was not considered potentially present due to the low presence of on-site mature coniferous forest in the project area. CRPR of 2.2, defined as rare, threatened or endangered in California, but more common elsewhere and a moderate number of the California populations are threatened.
7) The nearest known occurrence of Howell's montia is at Berry Glen approximately ¼ mile south of the project site. This species occupies exposed, recently impacted haul or skid roads and turnouts that remain seasonally moist through May. A CRPR of 2.2, defined as rare, threatened or endangered in California, but more common elsewhere and a moderate number of the California populations are threatened.

8) Wolf's evening primrose is reported from Freshwater Lagoon and along nearby roadsides and disturbed areas. CRPR of 1B.2, defined as rare, threatened or endangered in California and elsewhere and the majority of the California populations are seriously threatened.
9) The nearest known occurrence of Siskiyou checkerbloom is approximately 3.5 miles southeast of the project area. Suitable habitat for the Siskiyou checkerbloom includes relatively mesic roadsides, meadows, slumping hillsides and cutslopes, with native soils largely intact. CRPR of 1B.2, defined as rare, threatened or endangered in California and elsewhere and the majority of the California populations are seriously threatened.

5.0 RESULTS

Seasonally-appropriate surveys were conducted for all special status plant species potentially occurring in the project area. The focused botanical survey of the Redwood Parks Lodge project area detected no sensitive plant species. A complete species list of those plants found in the Redwood Parks Lodge project area is provided in Table 2 (Attachment 1).

The Carex species found in the project area were collected and identified. This was done to ensure the differentiation of the possible occurrence of meadow, or deceiving, sedge. Olney's hairy sedge (*Carex gynodynama*), short-scaled sedge (*Carex leptopoda*), torrent sedge (*Carex nudata*), and slough sedge (*Carex obnupta*) were the only sedges identified in the project area. There are scattered isolated/seasonal potential wetland habitats in the project area, with some dominated by slough sedge groundcover. Streamside habitats are dominated primarily by riparian red alder with scattered Sitka spruce with scattered individuals of Olney's hairy sedge and short-scaled sedge. The torrent sedge was found in the flowing waters of Prairie Creek.

6.0 REFERENCES

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ATTACHMENT 1

Plant Species Encountered During Field Survey of the Redwood Parks Lodge Project Area

Table 2 – Plant Species Encountered During Field Survey of the Redwood Parks Lodge Project Area

Species	Common Name	Fed/State List	Native / Non-Native
Acer circinatum	Vine Maple	None	Native
Acer macrophyllum	Big-leaf Maple	None	Native
Achillea millefolium	Common Yarrow	None	Native
Agrostis stolonifera	Creeping Bent Grass	None	Non-Native
Aira caryophyllea	Annual Hair Grass	None	Non-Native
Alnus rubra	Red Alder	None	Native
Alopecurus genticulatus	Meadow Foxtail	None	Native
Amaranthus hybridus	Green Amaranth	None	Non-Native
Anagallis arvensis	Scarlet Pimpernel	None	Non-Native
Anaphalis margaritacea	Pearly Everlasting	None	Native
Anthoxanthum odoratum	Sweet Vernal Grass	None	Non-Native
Asarum caudatum	Wild Ginger	None	Native
Athyrium filix-femina	Lady Fern	None	Native
Avena barbata	Slender Oat Grass	None	Non-Native
Baccharis pilularis	Coyote Brush	None	Native
Bellis perennis	English Daisy	None	Non-Native
Blechnum spicant	Deer Fern	None	Native
Briza maxima	Large Quaking Grass	None	Non-Native
Briza minor	Small Quaking Grass	None	Non-Native
Bromus catharticus	Rescue Grass	None	Non-Native
Bromus diandrus	Ripgut Grass	None	Non-Native
Bromus hordeaceus	Soft Brome	None	Non-Native
Callitriche marginata	California Water-Starwort	None	Native
Cardamine californica	California Toothwort	None	Native
Cardamine oligosperma	Western Bittercress	None	Native
Carex gynodynama	Olney's Hairy Sedge	None	Native
Carex leptopoda	Slender-footed Sedge	None	Native
Carex nudata	Torrent Sedge	None	Native
Carex obnupta	Slough Sedge	None	Native
Cerastium glomeratum	Common Chickweed	None	Non-Native
Cirsium arvense	Canadian Thistle	None	Non-Native
Cirsium vulgare	Bull Thistle	None	Non-Native
Claytonia perfoliata	Miner's Lettuce	None	Native
Claytonia siberica	Spring Beauty	None	Native
Conium maculatum	Poison Hemlock	None	Non-Native
Cortaderia jubata	Jubata Grass	None	Non-Nativ
Cotoneaster pannosa	Cotoneaster	None	Non-Native
Cynosurus enchinatus	Annual Dogtail	None	Non-Native
Dactylis glomerata	Orchard Grass	None	Non-Native
Daucus carota	Queen Anne's Lace	None	Non-Native
Dicentra formosa	Pacific Bleeding Heart	None	Native

Digitalis purpurea	Foxglove	None	Non-Native
Dryopteris expansa	Wood Fern	None	Native
Epilobium ciliatum	Northern Willowherb	None	Native
Festuca subulata	Bearded Fescue	None	Native
Festuca perennis	Perennial Ryegrass	None	Non-Native
Frangula purshiana	Cascara	None	Native
Gaultheria shallon	Salal	None	Native
Geum macrophyllum	Large-leaved Avens	None	Native
Hedera helix	English Ivy	None	Non-Native
Holcus lanatus	Velvet Grass	None	Non-Native
Humulus lupulus	European Hop	None	Non-Native
Hydrophyllum tenuipes	Pacific Waterleaf	None	Native
Hypochaeris radicata	Perennial Cat's Ear	None	Non-Native
Ilex aquifolium	English Holly	None	Non-Native
Iris douglasiana	Douglas Iris	None	Native
Lapsana communis	Nipplewort	None	Non-Native
Leucanthemum vulgare	Ox-eye Daisy	None	Non-Native
Lonicera involucrata	Twinberry	None	Native
Maianthemum dilatatum	False Lily-of-the-valley	None	Native
Marah oregana	Wild Cucumber	None	Native
Mimulus guttatus	Common Monkey Flower	None	Native
Notholithocarpus densiflorus	Tan-oak	None	Native
Oemleria cerasiformis	Oso Berry	None	Native
Oxalis oregana	Redwood Sorrel	None	Native
Petasites frigidus var. palmatus	Western Sweet Coltsfoot	None	Native
Phalaris caroliniana	Carolina Canary-Grass	None	Non-Native
Picea sitchensis	Sitka Spruce	None	Native
Plantago lanceolata	English Plantain	None	Non-Native
Poa pratensis	Kentucky Bluegrass	None	Non-Native
Polystichum munitum	Sword Fern	None	Native
Pseudotsuga menziesii	Douglas-fir	None	Native
Pteridium aquilinum	Bracken Fern	None	Native
Ranunculus repens	Creeping Buttercup	None	Non-Native
Ranunculus uncinatus	Little Buttercup	None	Native
Ribes bracteosum	Stink Currant	None	Native
Ribes menziesii	Canyon Gooseberry	None	Native
Ribes sanguineum	Red-flowering Currant	None	Native
Rubus armenicus	Himalaya Berry	None	Non-Native
Rubus parviflorus	Thimbleberry	None	Native
Rubus spectabilis	Salmonberry	None	Native
Rubus ursinus	California Blackberry	None	Native
Rumex acetocella	Sheep Sorrel	None	Non-Native
Rumex crispus	Curly Dock	None	Non-Native
Salix lasiandra var. lasiandra	Pacific Willow	None	Native
Salix scouleriana	Scouler's Willow	None	Native
Sambucus racemosa var. racemosa	Red Elderberry	None	Native

Scirpus microcarpus	Small-flowered Bulrush	None	Native
Senecio minimus	Coastal Burnweed	None	Non-Native
Senecio vulgaris	Common Groundsel	None	Non-Native
Sequoia sempervirens	Coast Redwood	None	Native
Sonchus oleraceus	Sow Thistle	None	Non-Native
Stachys ajugioides	Hedge Nettle	None	Native
Symphyotrichum chilensis	California Aster	None	Native
Taraxacum officinale	Common Dandelion	None	Non-Native
Tellima grandiflora	Fringe Cups	None	Native
Tolmiea diplomenziesii	Youth-on-age	None	Native
Trientalis latifolium	Pacific Starflower	None	Native
Trifolium pratense	Red Clover	None	Non-Native
Trifolium repens	White Clover	None	Non-Native
Trifolium subterraneum	Subterranean Clover	None	Non-Native
Umbellularia californica	California Bay	None	Native
Urtica dioica	Stinging Nettle	None	Native
Vaccinium ovatum	Evergreen Huckleberry	None	Native
Vaccinium parviflorum	Red Huckleberry	None	Native
Veronica americana	American Brooklime	None	Native
Vicia hirsuta	Hairy Vetch	None	Non-Native
Vinca major	Greater Periwinkle	None	Non-Native
Viola sempervirens	Redwood Violet	None	Native

Attachment 4 – Rapid Assessment Forms

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use: | **Final database #:** | **Final vegetation type:** **Alliance** Carex obnupta Herbaceous Alliance

Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

circle: Relevé or [✓ RA]

Database #:

Date: 7/25/19

Name of recorder: Sunny Loya

Other surveyors: Amy Livingston ☐

UID:

Location Name: slough sedge plot ☐

GPS name: Trimble Geo7X   For Relevé only: Bearing°, left axis at ID point____ of Long / Short side ☐

UTME ______________ UTMN ______________ Zone: 11 NAD83 GPS error: ft./ m./ PDOP 22 inch

Decimal degrees: LAT ___.__________ LONG ____.__________

GPS within stand? [✓ Yes] / No If No, cite from GPS to stand: distance (m)____ bearing °____ inclination °____ ☐

and record: Base point ID ____________ Projected UTMs: UTME ____________ UTMN ____________ ☐

Camera Name: Amy's phone **Cardinal photos at ID point:** ☐

Other photos:

Stand Size (acres): [✓ <1] 1-5, >5 | **Plot Area (m²):** [✓ 100]/ ______ | **Plot Dimensions** ____ x ____ m | **RA Radius** ____ m ☐

Exposure, Actual °: ______ NE NW SE SW [✓ Flat] Variable | **Steepness, Actual °:** ______ [✓ 0°] 1-5° >5-25° >25 ☐

Topography: Macro: top upper mid lower [✓ bottom] | **Micro:** convex flat concave [✓ undulating] ☐

Geology code: ____________ **Soil Texture code:** ____________ | Upland or [✓ Wetland]/Riparian (circle one) ☐

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H₂0: 0 **BA Stems:** 3 **Litter:** 96 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 0 **Fines:** 1 =100% ☐

% Current year bioturbation 0 **Past bioturbation present?** Yes / [✓ No] | **% Hoof punch** ≤5% ☐

Fire evidence: Yes / [✓ No] (circle one) If yes, describe in Site history section, including date of fire, if known. ☐

Site history, stand age, comments: ☐

slough sedge dominant, w/emergent reed canary grass & tall fescue. Patches of CA blackberry & lady fern interspersed. Scattered individual red alders along plot periphery, not included in sample. A few animal trails cross through interior of patch. Elk & horses are known to use adjacent areas. Elk scat w/in plot.

Tall fescue not well-represented in plot but occurs in slough sedge swards elsewhere on the site.

Disturbance code / Intensity (L,M,H): L /___ ___/___ ___/___ ___/___ ___/___ "Other" ____________/___ ☐

II. HABITAT DESCRIPTION

Tree DBH : **T1** (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), **T4** (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover) ☐

Shrub: **S1** seedling (<3 yr. old), **S2** young (<1% dead), [✓ **S3**] mature (1-25% dead), **S4** decadent (>25% dead) ☐

Herbaceous: **H1** (<12" plant ht.), [✓ **H2**] (>12" ht.) ☐

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Carex obnupta Herbaceous Alliance ☐

Field-assessed Association name (optional): ________________ ☐

Adjacent Alliances/direction: see veg map /________, ________________/________ ☐

Confidence in Alliance identification: L M [✓ H] **Explain:** Carex obnupta dominant ☐

Phenology (E,P,L): Herb L **Shrub** L **Tree** N/A **Other identification or mapping information:** ☐

Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised March 27, 2018)
SPECIES SHEET

Database #: ____________

IV. VEGETATION DESCRIPTION

% NonVasc cover: 0 **Total % Vasc Veg cover:** 0

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% Cover - **Conifer tree / Hardwood tree:** 0 / 0 **Regenerating Tree:** 0 **Shrub:** 1% **Herbaceous:** 99%

Height Class - **Conifer tree / Hardwood tree:** — / — **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 3

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular
% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Ruh cal	<1		
H	Carex obnupta	>75% →		→ 76%
H	Phal arund	5-15% →		→ 10%
H	Ranunc rep	r		
H	Lysich amer	1-5% →		→ 2%
H	Fest arun	<1		
H	Glyceria frut	1-5% →		→ 3%
H	Persicaria	<1		
H	Veronica amer	<1		
H	Athyr fel-fem	<1		
S	Rub arm	<1		

Unusual species: ______________________________

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use: | **Final database #:** | **Final vegetation type:** **Alliance** Salix lasiandra var. lasiandra Woodland Alliance
Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

circle: Relevé or [✓ RA]

Database #:
Date: 7/25/19
UID:
Name of recorder: SL
Other surveyors: AL ☐
Location Name: Shiny/Pacific willow plot ☐

GPS name: Trimble Geo7x   For Relevé only: Bearing°, left axis at ID point____ of Long / Short side ☐
UTME ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___   Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____
Decimal degrees: LAT ___ ___ . ___ ___ ___ ___ ___ ___ LONG ___ ___ ___ . ___ ___ ___ ___ ___ ___

GPS within stand? [✓ Yes] / No   If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____ ☐
and record: Base point ID ______________ Projected UTMs: UTME ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ ☐

Camera Name: Amy's phone **Cardinal photos at ID point:** ☐
Other photos:

Stand Size (acres): [✓ <1], 1-5, >5 | **Plot Area (m²):** 100 / _____ | **Plot Dimensions** 40ft x 90ft ____ x ____ m | **RA Radius** ____ m ☐
Exposure, Actual °: ______ NE NW SE SW [✓ Flat] Variable | **Steepness, Actual °:** [✓ 0°] 1-5° >5-25° >25 ☐

Topography: Macro: top upper mid lower [✓ bottom] | Micro: convex [✓ flat] concave undulating ☐
Geology code: ___________ **Soil Texture code:** ___________ | Upland or [✓ Wetland/Riparian] (circle one) ☐

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)
H₂0: 0 **BA Stems:** 1% **Litter:** 54 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 0 **Fines:** 45 =100% ☐

% Current year bioturbation 0% **Past bioturbation present?** Yes / [✓ No] | **% Hoof punch** 1% ☐
Fire evidence: Yes / [✓ No] (circle one) If yes, describe in Site history section, including date of fire, if known. ☐

Site history, stand age, comments: ☐

Shiny willow occurs in 2 main cohorts: trees >24" dbh, of which there 2-3 individuals, and trees 6-11" dbh, of which there are many. The overall canopy height is homogenous (both cohorts same height). The stand is situated on a tributary to Prairie Creek - tributary is currently dry. What appear to be elk bedding sites occur w/in & adjacent to stand. Elk scat present.

Understory is host to Himalayan blackberry & Canadian thistle. Grassland species from adjacent cover types creep into the understory. Epiphytic lichens & some mosses present on some willows, especially lower branches of S. Sitcha

Disturbance code / Intensity (L,M,H): L /___ ___/___ ___/___ ___/___ ___/___ "Other" ___________/___ ☐

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), [✓ T4] (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover) ☐
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), [✓ S3] mature (1-25% dead), S4 decadent (>25% dead) ☐
Herbaceous: H1 (<12" plant ht.), [✓ H2] (>12" ht.) ☐
Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)
Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Salix lasiandra Woodland alliance ☐
Field-assessed Association name (optional): ______________________ ☐
Adjacent Alliances/direction: See veg map ______/______, ______________/______ ☐
Confidence in Alliance identification: L M [✓ H] **Explain:** Salix lasiandra dominant ☐
Phenology (E,P,L): Herb L Shrub P Tree L **Other identification or mapping information:** ☐

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

SPECIES SHEET

Database #: ___________

IV. VEGETATION DESCRIPTION

% NonVasc cover: 0 **Total % Vasc Veg cover:** 6

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% Cover - Conifer tree / [✓ Hardwood tree] 80 / **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 17

Height Class - Conifer tree / [✓ Hardwood tree] 6 / **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 2

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Rub arm	45%		
T	Sal lasian	65%		
T	Sal sitch	20%		
T	Aln rub	8%		
H	Fest arun	4%		
H	Car obn	10%		
H	Holc lan	<1		
H	Ran rep	5%		not more than 5%
H	Poa prat	3%		
H	Athy fil-fem	<1		
H	Cirs arv	<1		

Unusual species: ___________

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use: | **Final database #:** | **Final vegetation type:** **Alliance** Salix lasiolepis Shrubland Alliance **Association**

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

circle: Relevé or [✓ RA]

Database #:

Date: 7/25/19

Name of recorder: SL

Other surveyors: AL ☐

UID:

Location Name: Arroyo willow ☐

GPS name: Trimble Geo 7x

For Relevé only: Bearing°, left axis at ID point____ of Long / Short side ☐

UTME ___ **UTMN** ___ **Zone: 11 NAD83** GPS error: ft./ m./ PDOP 23 inches

Decimal degrees: LAT ___ . ___ **LONG** ___ . ___

GPS within stand? [✓ Yes] / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____ ☐

and record: Base point ID ________ **Projected UTMs: UTME** ________ **UTMN** ________ ☐

Camera Name: Amy's phone **Cardinal photos at ID point:** ☐

Other photos:

Stand Size (acres): [✓ <1] 1-5, >5 | **Plot Area (m²):** 100 / ____ | **Plot Dimensions** 60 x 60 ft | **RA Radius** ____ m ☐

Exposure, Actual °: ____ NE NW SE SW [✓ Flat] Variable | **Steepness, Actual °:** ____ [✓ 0°] 1-5° > 5-25° > 25 ☐

Topography: Macro: top upper mid lower [✓ bottom] | **Micro:** convex [✓ flat] concave undulating ☐

Geology code: ________ **Soil Texture code:** ________ | Upland or [✓ Wetland/Riparian] (circle one) ☐

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H₂0: 0 **BA Stems:** 1% **Litter:** 14 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 0 **Fines:** 85 =100% ☐

% Current year bioturbation 0 **Past bioturbation present?** Yes / [✓ No] | **% Hoof punch** 0 ☐

Fire evidence: Yes / [✓ No] (circle one) If yes, describe in Site history section, including date of fire, if known. ☐

Site history, stand age, comments: ☐

Plot occurs on left bank of Prairie Creek. Red alder component in the canopy has led to uncertainty of alliance name. Will check MCV requirements for RA alliance to confirm plot designation.

Disturbance code / Intensity (L,M,H): L / ___ ___/___ ___/___ ___/___ ___/___ "Other" ________/___ ☐

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), [✓ T4] (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover) ☐

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), [✓ S3] mature (1-25% dead), S4 decadent (>25% dead) ☐

Herbaceous: H1 (<12" plant ht.), [✓ H2] (>12" ht.) ☐

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Salix lasiolepis shrubland alliance ☐

Field-assessed Association name (optional): ________ ☐

Adjacent Alliances/direction: See veg map / ____, ____ / ☐

Confidence in Alliance identification: L [✓ M] H **Explain:** need to confirm stand characteristics - could have been mapped as ☐

Phenology (E,P,L): Herb P **Shrub** P **Tree** L **Other identification or mapping information:** Aln rub/Sal lasio alliance ☐

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

SPECIES SHEET

Database #: ______

IV. VEGETATION DESCRIPTION

% NonVasc cover:____ **Total % Vasc Veg cover:**____ ☐

% Cover - **Conifer tree / Hardwood tree:** — / 91 **Regenerating Tree:** — **Shrub:** 6 **Herbaceous:** 3 ☐

Height Class - **Conifer tree / Hardwood tree:** — / 6 **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 2 ☐

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
T	Sal lasio	74%		
T	Aln rubr	30%		
S	Rub armen	80%		
H	Poa prat	1%		
H	Urt dio	1%		
H	Ran rep	<1		
	Cirsium vulgare not officially in plot but directly adjacent to it.			
	Two bodacious plants, flowering & fruiting.			

Unusual species: Sequoia sempervirens in the understory, 1 tree

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use: | **Final database #:** | **Final vegetation type:** **Alliance** Sequoia Sempervirens Forest Alliance **Association**

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

circle: Relevé or RA

Database #:
Date: 7/25/19
UID:
Name of recorder: SL
Other surveyors: AL ☐
Location Name: redwood ☐

GPS name: Trimble Geo 7x   For Relevé only: Bearing°, left axis at ID point____ of Long / Short side ☐
UTME _______ UTMN _______ Zone: 11 NAD83 GPS error: ft./ m./ PDOP 32 inches
Decimal degrees: LAT ___.______ LONG ___.______

GPS within stand? [✓ Yes] No   If No, cite from GPS to stand: distance (m)____ bearing °____ inclination °____ ☐
and record: Base point ID ________ Projected UTMs: UTME _______ UTMN _______ ☐

Camera Name: Amy's phone **Cardinal photos at ID point:** ☐
Other photos:

Stand Size (acres): [✓ <1] 1-5, >5 | **Plot Area (m²):** 100 / ____ | **Plot Dimensions** 50 x 100 ~~m~~ ft | **RA Radius**____ m ☐
Exposure, Actual °: 270° NE [✓ W] NW SE SW Flat Variable | **Steepness, Actual °:** 15° 0° 1-5° >5-25° >25 ☐

Topography: Macro: top upper mid [✓ lower] bottom | **Micro:** convex [✓ flat] concave undulating ☐
Geology code: ______ **Soil Texture code:** ______ | [✓ Upland] or Wetland/Riparian (circle one) ☐

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)
H₂0: 0 **BA Stems:** <1 **Litter:** 98 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 0 **Fines:** 2 =100% ☐

% Current year bioturbation 0 **Past bioturbation present?** Yes / [✓ No] | **% Hoof punch** 0 ☐
Fire evidence: Yes / No (circle one) If yes, describe in Site history section, including date of fire, if known. ☐

Site history, stand age, comments: ☐

Small remnant stand of redwoods w/some Douglas-fir. Saplings (redwood) present but not dense enough to qualify as multi-layered canopy. Potential bear trail along top portion of plot, and potential bear scat present.

Disturbance code / Intensity (L,M,H): L / __ __/__ __/__ __/__ __/__ "Other" ______ /__ ☐

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh) [✓ **T4**] (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover) ☐
Shrub: S1 seedling (<3 yr. old), **S2** young (<1% dead), **S3** mature (1-25% dead), **S4** decadent (>25% dead) no shrub layer ☐
Herbaceous: [✓ **H1**] (<12" plant ht.), **H2** (>12" ht.) ☐
Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)
Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Sequoia sempervirens Forest Alliance ☐
Field-assessed Association name (optional): ______ ☐
Adjacent Alliances/direction: see Veg map /____, ____/____ ☐
Confidence in Alliance identification: L M [✓ H] **Explain:** Sequoia sempervirens dominant ☐
Phenology (E,P,L): Herb P **Shrub** — **Tree** __ **Other identification or mapping information:** ☐

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

SPECIES SHEET

Database #: ________

IV. VEGETATION DESCRIPTION

% NonVasc cover: <1 **Total % Vasc Veg cover:** <1 ☐

% Cover - **Conifer tree / Hardwood tree:** 98 / — **Regenerating Tree:** ____ **Shrub:** 0 **Herbaceous:** 2 ☐

Height Class - **Conifer tree / Hardwood tree:** 9 / — **Regenerating Tree:** ____ **Shrub:** — **Herbaceous:** 1 ☐

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
T	Seq semp	60		
T	Pseud men	55		
T	Picea sitch	15		
H	Polyst. mun	2		

Unusual species: ____________________

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	**Final database #:**	**Final vegetation type:** **Alliance** Picea sitchensis Forest Alliance **Association**

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

circle: Relevé or RA

Database #:	**Date:** 7/25/19	**Name of recorder:** AL
		Other surveyors: SL ☐
	UID:	**Location Name:** ☐

GPS name: Trimble Geo 7X For Relevé only: **Bearing°, left axis at ID point**____ **of Long / Short side** ☐

UTME __ __ __ __ __ __ __ **UTMN** __ __ __ __ __ __ __ __ **Zone: 11 NAD83 GPS error: ft./ m./ PDOP** 4.9'

Decimal degrees: LAT __ __ . __ __ __ __ __ __ **LONG** __ __ __ . __ __ __ __ __ __ __

GPS within stand? [✓ Yes] / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____ ☐

and record: **Base point ID** ______________ **Projected UTMs: UTME** __ __ __ __ __ __ **UTMN** __ __ __ __ __ __ __ ☐

Camera Name: Amy's phone **Cardinal photos at ID point:** ☐

Other photos:

Stand Size (acres): <1, [✓ 1-5] >5 | **Plot Area (m²): 100 /** ______ | **Plot Dimensions** ____ x ____ **m** | **RA Radius** 50 ~~m~~ ft ☐

Exposure, Actual °: 270 West NE NW SE SW Flat Variable | **Steepness, Actual °:** ~15° 0° 1-5° [✓ > 5-25°] > 25 ☐

Topography: Macro: top upper mid [✓ lower] bottom | **Micro:** convex [✓ flat] concave undulating ☐

Geology code: ____________ **Soil Texture code:** MELO | [✓ Upland] or Wetland/Riparian (circle one) ☐

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H₂0: 0 **BA Stems:** 1 **Litter:** 98 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** <1 **Fines:** <1 **=100%** ☐

% Current year bioturbation 0 **Past bioturbation present?** Yes / [✓ No] | **% Hoof punch** 0 ☐

Fire evidence: Yes / [✓ No] (circle one) If yes, describe in Site history section, including date of fire, if known. ☐

Site history, stand age, comments: ☐

Second growth/previously disturbed North Coast coniferous forest. No sign of stumps near plot. Multi-age stand w/older Sitka spruce & Douglas-fir and smaller diameter redwoods. Thick duff layer.

Disturbance code / Intensity (L,M,H): L/___ ___/___ ___/___ ___/___ ___/___ **"Other"** __________/____ ☐

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), [✓ **T4** (11-24" dbh)], **T5** (>24" dbh), **T6 multi-layered** (T3 or T4 layer under T5, >60% cover) ☐

Shrub: S1 seedling (<3 yr. old), **S2** young (<1% dead), [✓ **S3** mature (1-25% dead)], **S4** decadent (>25% dead) ☐

Herbaceous: H1 (<12" plant ht.), [✓ **H2** (>12" ht.)] ☐

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Picea sitchensis Forest Alliance ☐

Field-assessed Association name (optional): ________________ ☐

Adjacent Alliances/direction: See veg map ______/______, ______/______ ☐

Confidence in Alliance identification: L [✓ M] H **Explain:** Multiple canopy species (PISI, SESE, PSME) ☐

Phenology (E,P,L): Herb P **Shrub** L **Tree** – **Other identification or mapping information:** ☐

Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised March 27, 2018)

Database #: ______

SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 4 **Total % Vasc Veg cover:** ____ ☐

% Cover - **Conifer tree / Hardwood tree:** 74 / — **Regenerating Tree:** — **Shrub:** 10 **Herbaceous:** 16 ☐

Height Class - **Conifer tree / Hardwood tree:** 9? / — **Regenerating Tree:** — **Shrub:** 4 **Herbaceous:** 2 ☐

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
T	Pic sitch	65		
T	Pseud men	30		
T	Seq semp	15		
S	Samb race	7		
H	Polyst. mun	65		
S	Vacc ov	2		
S	Rub spect	1		
H	Hedera helix	r		

Unusual species: ______

Attachment 5 – Natural Community Photos

Arroyo Willow Shrubland Alliance North

Arroyo Willow Shrubland Alliance East

Arroyo Willow Shrubland Alliance South

Arroyo Willow Shrubland Alliance West

Arroyo Willow Shrubland Alliance Stand View

Pacific Willow Woodland Alliance North

Pacific Willow Woodland Alliance East

Pacific Willow Woodland Alliance South

Pacific Willow Woodland Alliance West

Slough sedge Herbaceous Alliance North

Slough Sedge Herbaceous Alliance East

Slough Sedge Herbaceous Alliance South

Slough Sedge Herbaceous Alliance West

Sitka spruce Forest Alliance North

Sitka spruce Forest Alliance East

Sitka spruce Forest Alliance South


Sitka Spruce Forest Alliance West


Redwood Forest Alliance North


Redwood Forest Alliance East


Redwood Forest Alliance South


Redwood Forest Alliance West


Individual Hooker’s willow

Individual Sitka willow

Appendix H – Wetland Delineation, GHD 2019f

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Save the Redwoods League

Redwood National and State Park Visitor Center and Restoration Project

Wetland Delineation Report

Rev 2 May 2019

Table of contents

Attachments

1. Introduction

On behalf of the Save the Redwoods League, GHD prepared this wetland delineation report, and accompanying appendices (figures and data sheets), in support of the proposed Redwood National and State Park Visitor Center and Restoration Project (Project). This report supports the project's environmental review, permitting, and construction planning as deemed appropriate. The goal of the proposed Project is to restore ecosystem function at the lowermost reach of Prairie Creek and to construct a visitor center and other amenities. The project area is shown in Figure 1, Appendix A. This report is subject to, and must be read in conjunction with, the limitations set out in Section 5, Special Terms and Conditions, and the assumptions and qualifications contained throughout the Report.

The Project Study Boundary (PSB) for the proposed project is shown in Figures 2-4, Appendix A. The PSB is 104.1 acres. Two wetland delineations were previously completed that covered much of, but not all of, the PSB prior to the work that GHD performed. One delineation was performed by students from Humboldt State University (HSU) with oversight from HSU soils lecturer and Redwood National Park soil scientist Joe Seney in 2016 (Appendix C). The second delineation was performed by LACO in 2012 for Green Diamond Resource Company (Appendix D). At the request of, and under contract with Save the Redwoods League, GHD compiled data from the two previous wetland delineations and updated the delineation as described further in the Methods section below. Fieldwork performed to update the previous wetland delineations was conducted by GHD on May 22, 2018 and January 22 and 24, 2019. During fieldwork, GHD identified and mapped some additional wetlands. In almost all instances, GHD added additional wetland areas to the wetlands that had been previously delineated by others.

The GHD delineation mapped only the extent of wetlands having wetland-type vegetation, hydric soils, and wetland hydrology (based on three parameters) per the U.S. Army Corps of Engineers (USACE) and the Regional Water Quality Control Board. The final map compiled by GHD determined that four types of presumed USACE jurisdictional wetlands occur within the PSB: Palustrine Emergent Ditch, Palustrine Emergent Wetland, Palustrine Forested Wetland, and Palustrine Scrub-Shrub Wetland. Additionally, the PSB contains Waters of the U.S. mapped at the Ordinary High Water Mark (OHWM) for Prairie Creek and the eastern tributary to Prairie Creek with data obtained from Northern Hydrology and Engineering (NHE). See Appendix E for NHE's report. The PSB also contains Waters of the U.S. with an estimated Ordinary High Water Mark (OHWM) that was digitized based on field observations directly above the inlet of the two small, unnamed tributaries on the north eastern side of the PSB. Figures 2-4 in Appendix A present results of the updated wetland delineation. Data sheets documenting conditions observed during the 2018-2019 investigation by GHD are included in Appendix B.

2. Methodology

2.1 Wetland delineation approach

Prior to visiting the site to perform fieldwork GHD reviewed the previous wetland delineation reports and confirmed with LACO botanist Gary Lester that LACO had relied solely on mapping obtained from the National Wetlands Inventory for wetland mapping north of Old Bald Hills Road (Gary Lester personal communication to Misha Schwarz 2018). Additionally GHD noted that the delineation performed by HSU mapped the locations of one, two, and three parameter wetlands (Appendix D). To facilitate updating the wetland delineation a GHD spatial analyst combined the shapefiles from the HSU (three parameter wetlands only) and LACO delineations to create a field map of the combined delineation results.

The combined wetlands map template was loaded onto an iPad running ESRI's Collector application for ArcGIS geographic information system (GIS) software connected to a "Bad Elf" global positioning system (GPS) receiver. A GHD botanist and soil scientist used the map template of combined data to update the wetland mapping and quality check existing mapping. In some cases, the GHD wetland team expanded the boundaries of the previously mapped wetlands and in other cases new wetlands were added to the field map. Only occasionally did GHD make edits that reduced the size of the previously mapped wetlands. As previously stated, GHD mapped only three parameter wetlands as defined by the USACE and the Regional Water Quality Control Board.

In some areas within the PSB over story canopy was dense and GPS satellite reception was not strong enough for accurate field mapping with a GPS receiver. In these cases, GHD marked delineated wetland boundaries in the field with wooden lathes and NHE later surveyed the locations of these features. These areas included the Palustrine Emergent Ditch along the upper and lower roads on the northeastern side of the PSB (designated as D4 along the upper road and D3 along the lower road on the wetland figures), and the "Gravel Impoundments" discussed in the results section. The ditch designated as D2 on the wetlands figures was mapped by GHD from its origin near a "Paved Impoundment" to its confluence with the eastern tributary to Prairie Creek. NHE provided data for OHWM of Prairie Creek and the tributary to Prairie Creek. A Technical Memorandum from NHE summarizing OHWM estimation along Prairie Creek is provided in Appendix E. Survey data for the inlet and outlet locations of Otter, Libby, and an unnamed creek were also provided by NHE and added by a GHD spatial analyst to the final wetland delineation figures (Figures 2-4, Appendix A).

To define a wetland, the USACE requires that all three parameters (vegetation, soil, and hydrology) show wetland attributes (USACE 1987; USACE 2010). The GHD wetland delineation used USACE criteria from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (USACE 2010). The current standard forms provided by the USACE (2010) were used for vegetation/soils/hydrology data collection.

Vegetation and soil data were collected at transects across the upland/wetland boundary with two plots (upland/wetland) per transect. The naming convention used on data sheets to designate upland or wetland plots associated with a transect was –U or –W, respectively. The wetland/upland boundary was recorded with a GPS device, individual wetland and upland plots were not. The distance to the wetland/upland boundary from the individual wetland and upland plots was recorded on each respective datasheet. Data sheets completed during the delineation are included in Appendix B.

2.2 Botanical methodology

Vegetation data collection consisted of listing the dominant species in the herbaceous, shrub, and tree layer within a standard sized plot depending on layer. The species listed for each plot were classified as to whether or not they were wetland or upland indicators, using the standard reference for plant wetlands indicators: *State of California 2016 Wetland Plant List* (Lichvar et al. 2016). Plants were classified based on the probability that they would be found in wetlands (USACE 1987), ranging from Obligate (almost always in wetlands) [OBL], Facultative/wet (67% to 99% in wetlands) [FACW], Facultative (34% to 66% in wetlands) [FAC], Facultative/up (1% to 33% in wetlands)

[FACU], or Uplands (less than 1% in wetlands) [UP]. Plants not listed in the manual were considered to be in the upland category (Lichvar et al. 2016). Standard procedures for documenting hydrophytic vegetation indicators were used per the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual (*USACE 2010).

2.3 Soils methodology

The *Regional Supplement to the Corps of Engineers Wetland Delineation Manual (*USACE 2010) procedures were combined with the Natural Resources Conservation Service's (NRCS) definition of hydric soils presented in Field Indicators of Hydric Soils in the United States (USDA/NRCS 2017). Soil pits were dug to an approximate depth of 16 inches. Data on soil color, texture and redoximorphic features were collected. Any observed redoximorphic features (iron concentrations) were noted along with their percentage within the soil matrix, and care was taken to distinguish chromas of 1 and 2 indicative of an iron-depleted soil within 12 inches of the soil surface (USACE 2010; USDA/NRCS 2016).

Colors were described for the entire depth of the test pit and colors were determined on moist natural soil aggregate (ped) surfaces, which had not been crushed, using the Munsell Color Chart (COLOR, M. 2000). Soils with low chromas were verified as being hydric or upland with Field Indicators of Hydric Soils in the United States (Version 8.0, 2016).

2.4 Hydrology methodology

GHD's wetland delineation fieldwork was performed on May 22, 2018 and on January 22 and 24th, 2019. According to data from the National Weather Service automated rain gage in Eureka (Eureka WFO (EKA01)), Eureka had received 17.4 inches of rain by January 25, 2019, since the beginning of the 2019 water year on October 1, 2018 (NWS 2019). This was 82% of mean normal rainfall for this date within the water year (NWS 2019). Although no water was observed in wetland test pits at the time of the delineation, primary and secondary indicators of hydrology were identified including sediment deposits and geomorphic position to meet the wetland hydrology parameter per the USACE criteria.

3. Results

The PSB contains a mixture of native and non-native plant communities. Wetland and upland vegetation plots described by GHD during the January 22nd and 24th 2019 delineation were located in pasture and exhibited a predominance of facultative (FAC) pasture grasses that are likely favored by the mowing and grazing of the pasture. Soils in delineated wetlands (not including Paved Impoundments and Gravel Impoundments) exhibited redoximorphic features typically found in hydric soils including low chromas with redoximorphic features (iron concentrations) at or above 10 inches from the soil surface. The hydric soil indicator most frequently observed was redox dark surface (F6). Data sheets are included in Appendix B.

Non-jurisdictional habitat types

Paved Impoundments

Areas where standing water occurred with hydrophytic vegetation, on paved areas of the former mill pad, but lacked actual "soil," were mapped as "Paved Impoundments." Four areas mapped as "Paved Impoundments" are shown on Figure 2 and Figure 3 as "PI-1 through PI-4." Mapping of

“Paved Impoundments” was completed by GHD on January 22, 2019 based on observation of standing water and presence of hydrophytic vegetation growing on a thin layer (in some cases) of sediment on top of pavement, or in cracks of the pavement. These Paved Impoundments consist of asphalt over imported gravel and formed on the engineered pad for the mill. Total vegetative cover within the Paved Impoundments ranged from approximately 8-50% depending on the Paved Impoundment area. Dominant species growing in these areas included:

- tall flat sedge (*Cyperus eragrostis*) [FACW]
- bird’s-foot trefoil (*Lotus corniculatus*) [FAC]
- bent grass (*Agrostis* sp.)
- common rush or Pacific rush (*Juncus effusus*) [FACW], and
- pennyroyal (*Mentha pulegium*) [OBL]

These Paved Impoundment areas are not considered three parameter wetlands as they lack “soil” (substrate consisted of pavement) and should not be considered jurisdictional wetlands by the USACE or the State Regional Water Quality Control Board.

Gravel Impoundments

Two additional areas were mapped as “Gravel Impoundments” and are shown on Figure 2 and Figure 4 as “GI-1” and “GI-2.” Areas mapped as “Gravel Impoundments” likewise lacked natural soils. The “Gravel Impoundments” consisted of areas of standing water or a water table within 12 inches of the surface with hydrophytic vegetation growing on compacted, imported gravel fill material. Dominant species growing in these areas included:

- common rush or Pacific rush [FACW]
- pennyroyal [OBL]
- velvet grass (*Holcus lanatus*) [FAC]
- buttercup (*Ranunculus repens*) [FAC]

Due to the lack of natural soil, the Gravel Impoundments were not considered three parameter wetlands and should not be considered jurisdictional wetlands by the USACE or the State Regional Water Quality Control Board.

Compacted Fill Area

An additional area of compacted fill material occurs on the north eastern side of the PSB directly below the Lower Road designated as “Compacted Fill Area” on Figures 2-4, Appendix A. This area contained scatter common rush and scattered spreading rush (*Juncus patens*) with some additional hydrophytic vegetation, but had a predominance of upland plant species. No primary or secondary hydrologic indicators were present within this area. No soil pits were dug as this area was too compacted.

Due to the absence of hydrology indicators, the predominance of upland plant species and due to the presence of the compacted fill material this area was not considered to be a three parameter wetland, and thus not a state or federal jurisdictional wetland.

Jurisdictional Habitat types

Palustrine Wetlands

The PSB supports four types of presumed USACE jurisdictional wetlands that were classified using Cowardin nomenclature from *Classification of Wetlands and Deepwater Habitats of the United States* (Federal Geographic Data Committee 2013). Vegetation composition varied within the palustrine emergent wetland category.

Palustrine Emergent Wetland

Palustrine emergent wetlands within the grazed pasture contained a predominance of perennial non-native grasses such as Kentucky blue grass (*Poa pratensis*) and tall fescue (*Festuca arundinacea*), with components of annual non-native grasses and, primarily, non-native forbs. Other palustrine emergent wetlands contained a predominance of native perennial herbaceous species such as slough sedge (*Carex obnupta*) and panicled bulrush (*Scirpus microcarpus*). Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of both primary, being sediment deposits and saturation, and secondary indicators, being geomorphic position.

Palustrine Emergent Ditch

Wetlands identified as palustrine emergent ditch contained a predominance of native perennial species and occur adjacent to Bald Hills Road and adjacent to the Upper and Lower Roads, and on the eastern boundary of the Mill site. Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of both primary, being sediment deposits, surface water, groundwater and saturation, and secondary indicators, being drainage patterns.

Palustrine Forested Wetland

Forested wetlands had a predominance of trees at least 20 feet in height and dominant species included red alder (*Alnus rubra*), willows (*Salix* spp.), redwoods (*Sequoia sempervirens*) and Sitka spruce (*Picea sitchensis*). Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of primary indicators, being high water table and saturation.

Palustrine Scrub Shrub

Wetlands with a predominance of woody plants less than 20 feet tall were identified as palustrine scrub-shrub per the Cowardin definition (Federal Geographic Data Committee 2013), and contained willows (Salix spp.) and native and non-native shrub species. Soils consisted of low chroma soils (chromas of 2 or less) with five percent or greater redoximorphic features, as irons concentrations. Soil indicators were commonly Depleted Matrix (F3) and Redox Dark Surface (F6). Hydrology indicators consisted of primary indicators, being high water table and saturation.

Figures 2-4 of Appendix A show the results of the delineation. The acreage for each type is shown in Table 1.1. These totals do not include Paved Impoundments or Gravel Impoundments, which are not considered three parameter wetlands.

Table 3.1 Acreage by Wetland Type

Wetland Type	Acres
Palustrine Emergent Ditch	1.00
Palustrine Emergent Wetland	6.85
Palustrine Forested Wetland	8.82
Palustrine Scrub-Shrub Wetland	3.58
Waters of the U.S. (OHWM)	5.60

At total of 25.85 acres of jurisdictional wetlands and WOTUS were identified within the PSB, which is 104.1 acres.

4. Conclusions

GHD complied wetland delineation data from two previous wetland delineations performed in 2016 by HSU and 2012 LACO. GHD used a combined field map to quality check existing wetland mapping and revised mapping as needed on May 22, 2018 and January 22 and 24, 2019. Fieldwork performed by GHD resulted primarily in the expansion of previously mapped wetland areas. Gravel and Paved Impoundments occur within the Project Study Boundary but lack natural soils and were not determined to be three parameter wetlands. The area of investigation was determined to consist of four types of three parameter wetlands as well as Waters of the U.S. mapped at the OHWM of Prairie Creek and its eastern tributary.

5. Special Terms and Conditions

5.1 Purpose of this Report

This report has been prepared by GHD for Save the Redwoods League and may only be used and relied on by Save the Redwoods League for the purpose agreed upon between GHD and Save the Redwoods League as set out in the scope and contract for work effort reported herein. GHD Inc. is not liable for any action arising out of the reliance of any third party on the information contained within this report. GHD otherwise disclaims responsibility to any person other than Save the Redwoods League arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

5.2 Scope and Limitations

This report does not authorize any individuals to develop, fill or alter the delineated wetlands. Verification of the delineation by jurisdictional agencies is necessary prior to the use of this report for planning and development purposes. A USACE and Regional Water Quality Control Board jurisdictional approval letter and maps are required to signify confirmation of delineation results. In situations where a field investigation determines that no jurisdictional wetlands occur, jurisdictional concurrence with these findings is recommended.

To achieve the delineation objectives stated in this report, conclusions of the delineation were based on the information available during the period of the investigation, which took place on May 22, 2018 and January 22 and 24, 2019. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed by the date of preparation of the report. Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change, unless contracted to do so.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points. Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

6. References

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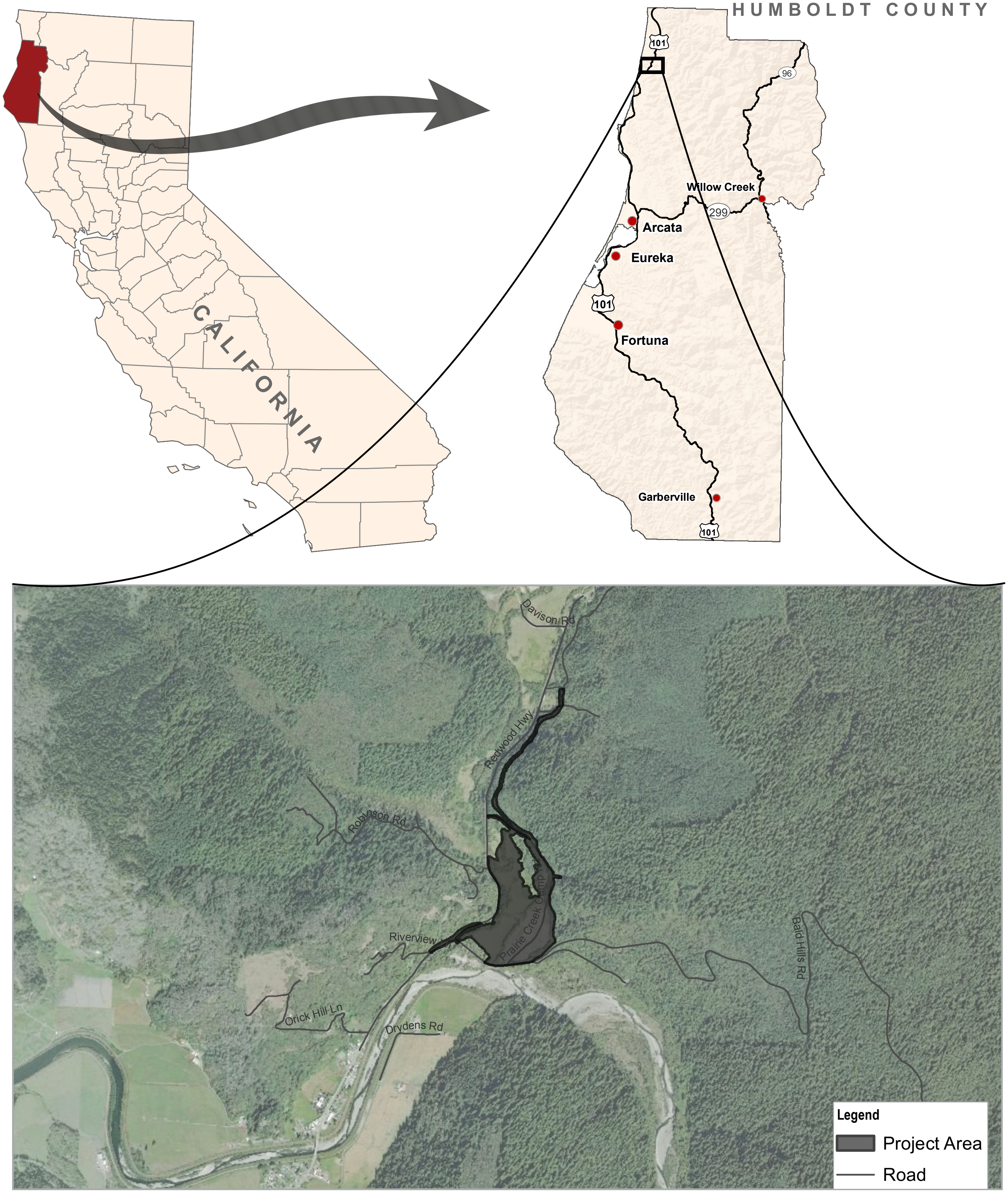
Appendices

Appendix A – Figures



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N

Save the Redwoods League
RNSP Visitor Center and Restoration Project

Project No.	**11187543**
Revision No.	**-**
Date	**06 May 2019**

Vicinity

FIGURE 1

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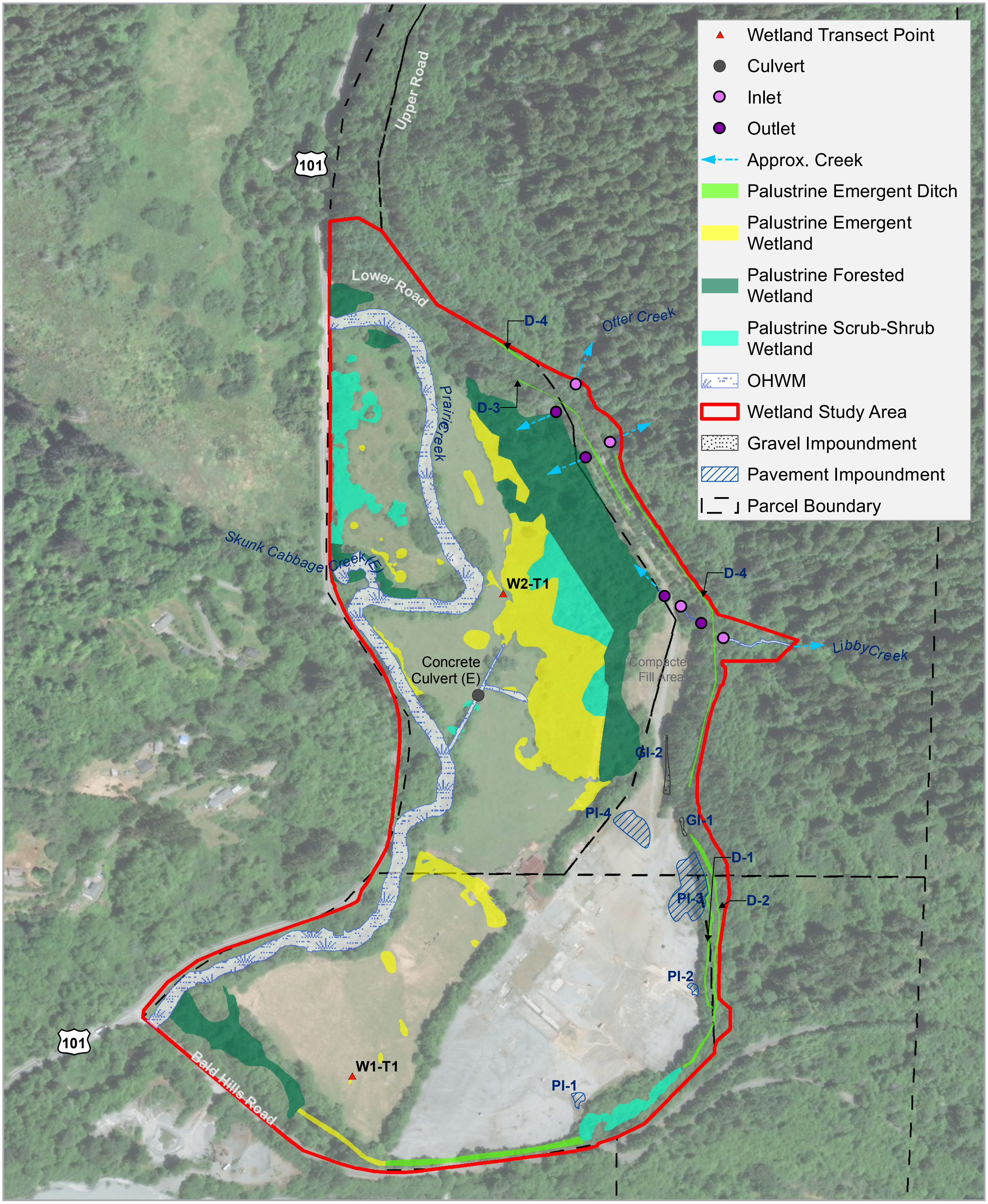

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N

GHD

Save the Redwoods League
RNSP Visitor Center and Restoration Project

Wetland Delineation Overview

Project No.	11176424
Revision No.	-
Date	05/07/2019

FIGURE 2

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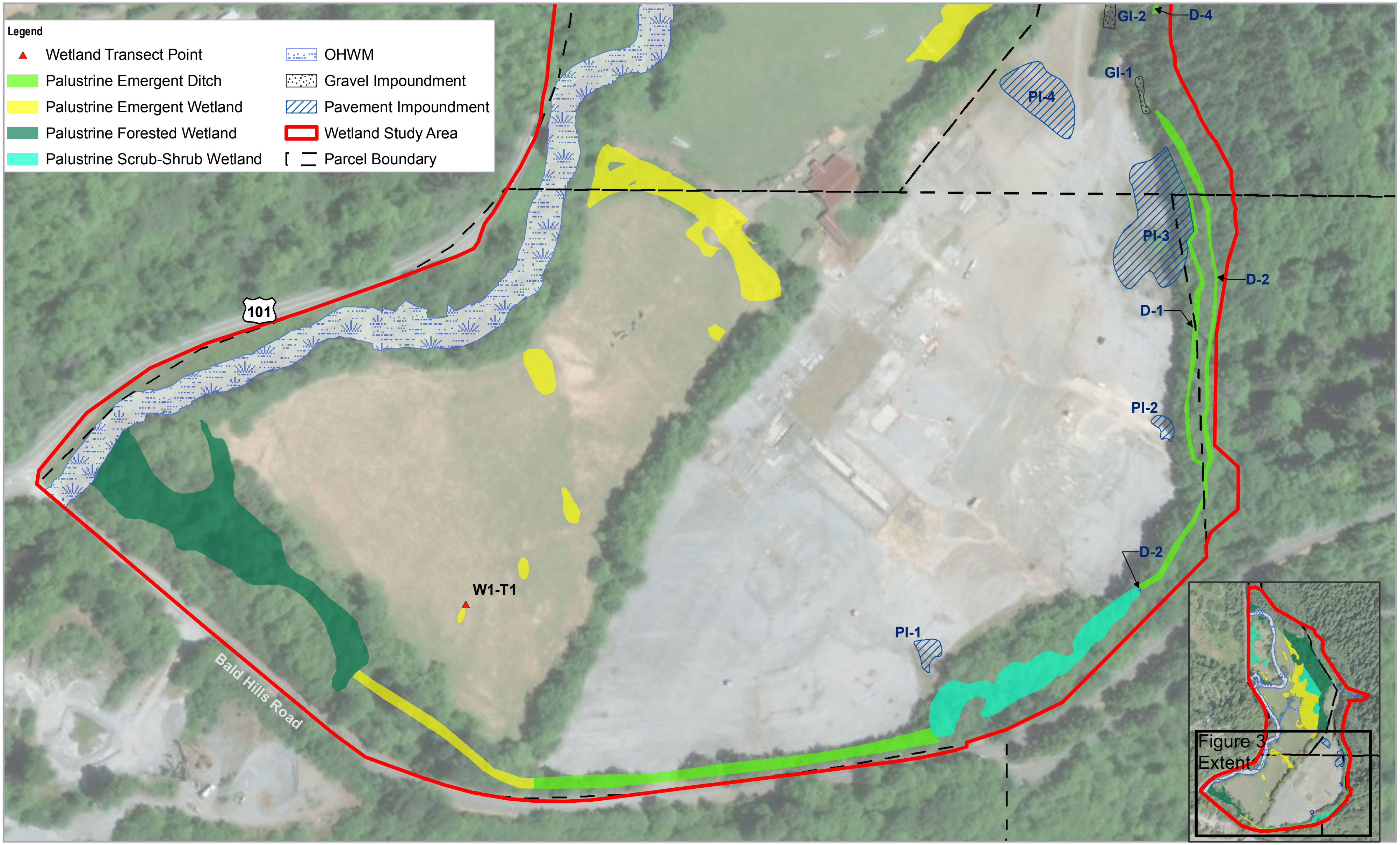

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Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Save the Redwoods League
RNSP Visitor Center and Restoration Project

Wetland Delineation South

Project No. **11176424**
Revision No. **-**
Date **05/07/2019**

FIGURE 3

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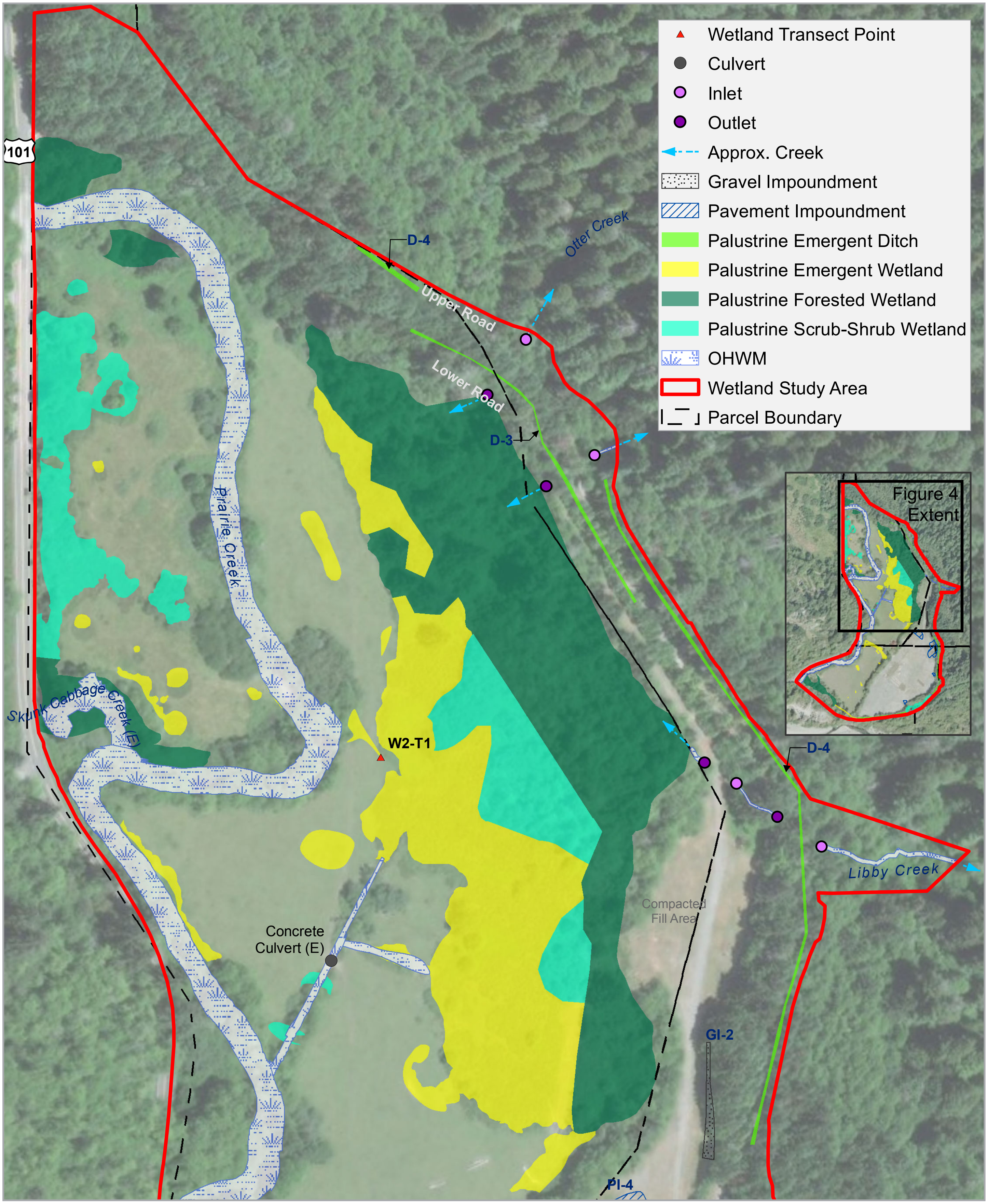

Paper Size ANSI A

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Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

N

Save the Redwoods League
RNSP Visitor Center and Restoration Project

Project No.	**11176424**
Revision No.	**-**
Date	**05/07/2019**

Wetland Delineation North

FIGURE 4

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Appendix B – Data Sheets

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site Prairie Creek City/County Orick / Humboldt Sampling Date 1/24/19

Applicant/Owner S.R.L. State CA Sampling Point W1-T1-W

Investigator(s) A.L., M.S. Section, Township, Range ______

Landform (hillslope, terrace, etc.) ______ Local relief (concave, convex, none) ______ Slope (%) ______

Subregion (LRR) ______ Lat ______ Long ______ Datum ______

Soil Map Unit Name ______ NWI classification ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	Is the Sampled Area within a Wetland?	Yes X No ______
Hydric Soil Present?	Yes X No ______		
Wetland Hydrology Present?	Yes X No ______		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	

Sapling/Shrub Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Herb Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Poa pratensis	60	X	FAC
2. Bellis perennis	2		UPL
3. Anthoxanthum odoratum	5		FACU
4. Agrostis stolonifera	10		FAC
5. Plantago lanceolata	3		FACU
6. Ranunculus repens	2		FAC
7. Trifolium subterraneum	5		UPL
8.			
9.			
10.			
11.			
	95	= Total Cover	

Woody Vine Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks:

Heavily grazed pasture. Wetland plot is 4' away from mapped transect point.

SOIL

Sampling Point: W1-T1-W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	2.5Y 3/1	85	7.5YR3/4	15	C	M	Siltloam	
3-16	2.5Y3/2	80	7.5YR3/4	20	C	M	Siltloam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☒ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2) Swale
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Prairie Creek City/County: Orick / Humboldt Sampling Date: 1/24/19

Applicant/Owner: S.R.L. State: CA Sampling Point: W1-T1-U

Investigator(s): A.L., M.S Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___

Hydric Soil Present? Yes ___ No X

Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks: Although Poa sp. is dominant site is grazed pasture. Other FACU and upland species are present.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			

Sapling/Shrub Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
= Total Cover			

Herb Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Poa pratensis	72	X	FAC
2. Plantago lanceolata	5		FACU
3. Trifolium subterraneum	5		UPL
4. Hypochaeris glabra	3		NL
5. Rumex acetosella	3		FACU
6. Agrostis Stolonifera	2		FAC
7. Anthoxanthum odoratum	5		FACU
8.			
9.			
10.			
11.			
= Total Cover	95		

Woody Vine Stratum (Plot size ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals	(A)		(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ___

Remarks: Site is heavily grazed pasture which likely favors dominance of Poa pratensis. Upland plot is 4' away from mapped transect point.

SOIL

Sampling Point: W1-T1-U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	2.5Y 3/2	100	—	—	①		Silt loam	
3-17	2.5Y 3/2	100	—	—	—	—	Silt loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks: ① Weak Redox due to Compaction

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Prairie Creek City/County: Orick / Humboldt Sampling Date: 1/24/19
Applicant/Owner: S.R.L State: CA Sampling Point: W2-T1-W
Investigator(s): A.L., M.S. Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1			
2			
3			
4			
= Total Cover			

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1			
2			
3			
4			
5			
= Total Cover			

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1 Festuca arundinaceae	70	X	FAC
2 Trifolium repens	15		FAC
3 Mentha pulegium	2		OBL
4 Ranunculus repens	3		FAC
5 Anthoxanthum odoratum	10		FACU
6			
7			
8			
9			
10			
11			
= Total Cover	98		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1			
2			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:
Wetland soil pit is 6' from wetland boundary.

SOIL

Sampling Point: W2-T1-W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y3/2	75	7.5YR3/4	25	C	M	SiltLoam	
3-16	2.5Y3/2	70	7.5YR3/4	30	C	m	Siltloam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
X Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
X Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ________

Water Table Present? Yes ____ No X Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ________

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Prairie Creek City/County: Orick / Humboldt Sampling Date: 1/24/19
Applicant/Owner: S. P. L. State: CA Sampling Point: W2-T1U
Investigator(s): A. L., M. S. Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	Is the Sampled Area within a Wetland?	Yes ______ No X
Hydric Soil Present?	Yes ______ No X		
Wetland Hydrology Present?	Yes ______ No X		

Remarks: Pasture is grazed and mowed likely favoring tall fescue.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Festuca arundinacea	60	X	FAC
2. Trifolium repens	20	X	FAC
3. Ranunculus repens	5		FAC
4. Anthoxanthum odoratum	10		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	95		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: Upland soil pit / plant plot are ~4' from wetland boundary

SOIL

Sampling Point: W2-T1-U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	2.5Y3/2	100	—	—	—	—	Siltloam	
10-16	2.5Y3/2	98	7.5YR5/4	2	C	M	Siltloam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ____________

Water Table Present? Yes ______ No X Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix C – HSU Delineation Report

Mill A Planning Project, Delineation of Wetlands, Save the Redwood League Orick, California

July 2016
Version 5.0

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Cover page. North pasture with a slough sedge dominated wetland in foreground.

Executive Summary

Redwood National Park (RNP) personnel, Save the Redwood League (SRL) staff, and private contractors are preparing conceptual designs to evaluate restoration opportunities of fisheries, geomorphic channel processes, wetlands and native plant assemblages on the Mill A property in Orick, California. Park staff in conjunction with the 2016 Spring Semester, Wetland Soils students from the Humboldt State University, Department of Forestry and Wildland Resources, have conducted wetland determinations and delineated one, two and three parameter wetlands for the 100.6 acre Mill A property. Joe Seney, Soil Scientist, Redwood National and State Parks and Wetland Soils students conducted field work for wetlands mapping at this location from April 9 to 23, 2016.

Three parameter wetlands mapped on the site fall within the jurisdiction of the U.S. Army Corp of Engineers (USACE). Portions of the project area may also fall under the primary or appeal jurisdiction of various local and state agencies. Data forms that document the soils, hydrology and vegetation findings that were used to support the wetland boundary determinations are included in the Appendix. The delineation procedure was completed pursuant to the *U.S. Army Corps of Engineers Wetlands Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0)* (USACE 1987, USACE 2010). The wetland maps and data will assist RNP and SRL staff, and private contractors to evaluate potential restoration opportunities through the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) processes. They also can be used for wetland compliance, including application for a Sections 401/404 permits under the Clean Water Act.

The wetlands within the project area were mapped based on the presence of either one, two, or three of the USACE parameters for determining wetlands. Soil excavation sites were chosen based on varying plant communities as well as landscape position and slope shape. Of the 78 plots observed, 48 plots were determined to be jurisdictional wetlands based on the USACE wetland definition. Eleven of these 48 plots were identified as wetlands due to soil compaction as a result of long-term cattle grazing. The results of the wetland delineation show that 68.5 acres met at least one USACE wetland parameter, 23.4 acres met two parameters, and 18.8 acres met all three parameters.

Introduction

Redwood National Park (RNP) personnel, Save the Redwood League (SRL) staff, and private contractors are preparing conceptual designs to evaluate restoration opportunities of fisheries, geomorphic channel processes, wetlands and native plant assemblages on the Mill A property in Orick, California. Park staff in conjunction with 2016 Spring Semester, Wetland Soils students from the Humboldt State University, Department of Forestry and Wildland Resources, have conducted wetland determinations and delineated one, two and three parameter wetlands for the 100.6 acre Mill A property. This delineation report includes a discussion of site conditions, sampling methodology, sampling results, and conclusions as well as a map delineating proposed upland-wetland boundaries for the project area.

Three parameter wetlands mapped on the site fall within the jurisdiction of the U.S. Army Corp of Engineers (USACE). Portions of the project area may also fall under the primary or appeal jurisdiction of various local and state agencies. The US Army Corps of Engineers regulates wetlands and other waters under section 404 of the Clean Water Act (CWA). The USACE defines "wetlands" as those areas that exhibit hydric soils, hydrophytic vegetation, and wetland hydrology. For purposes of identifying wetlands protected under the CWA when requesting a Nationwide or Individual CWA Permit from the USACE, wetland maps should be no more than five years old. The Army Corps of Engineers also has jurisdiction and permit authority over other "Waters of the U.S." – those additional aquatic systems such as streams, rivers, and mudflats, which are also protected by the CWA.

The delineation procedure was completed pursuant to the *U.S. Army Corps of Engineers Wetlands Delineation Manual and the USACE Wetlands Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0)* (USACE 1987, USACE 2010). The wetland maps and data will assist RNP and SRL staff, and private contractors to evaluate potential restoration opportunities through the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) processes. They also can be used for wetland compliance, including application for a Sections 401/404 permits under the Clean Water Act. Because federal, state and local agencies have slightly different definitions of wetlands, any project that may impact wetlands on the Mill A property requires compilation of one, two and three parameter wetland maps, with one parameter wetlands having the greatest extent.

The project area is located approximately, two miles north of the town of Orick, California, one-half mile north of the confluence of Prairie and Redwood creeks (figure 1). It’s bounded by Highway 101 to the west, Bald Hills Road to the south, and steep hillslopes with second and old-growth redwood (*Sequoia sempervirens*) and Sitka spruce (*Picea sitchensis*) forests to the east and north. The property is accessible by Bald Hills Road to the south and Prairie Creek Camp Road to the north. Prairie Creek Camp Road extends through the subject site southerly towards the former mill area, although both access routes are either gated or blocked by concrete barriers. The project area is approximately 100.6 acres, and some areas were difficult to determine wetland status due to soil compaction from past and current cattle grazing. The mill area and ranch roads, paved surfaces and a ranch barn cover 25.1 acres of the site. The south and north pasture are currently being grazed by 20-40 cattle and a herd of approximately 20 elk, which was observed on April 9, 2016. The northwest pasture is not easily accessible to livestock and is used sparingly by elk. The more intensively grazed areas have soils that exhibit significant soil compaction, which in some cases has caused creation of “cowpaction” wetlands in areas that would otherwise not meet the definition of a three parameter wetland.

Climate exerts an influence on vegetation and soil at regional, local, and micro scales. Regionally, cool, wet winters and nearly rainless summers characterize the climate of northwestern California. Summer conditions range locally from mild with fog drip on ocean-facing slopes to warm and dry farther inland. The Lower Prairie Creek area receives an average of 71 inches of precipitation annually, 59 inches or 83 percent falls as rain between November and April. Soil patterns may be attributable either to gradients in precipitation and air temperature or to differences in vegetation, which, in turn, are attributable to the influences of aspect and climate, although climate gradients are somewhat muted in the coastal summer fog belt (USDA-NRCS 2008). Based on the Crescent City climate data, the site has been functioning under relatively “normal” climatic conditions over the past six months, with a drier than “normal” February and a wetter than “normal” December (table 1).

The project area consists of actively grazed pastures and second growth hardwood riparian forests, with primarily second-growth coastal redwood (*Sequoia sempervirens*) and Sitka spruce (*Picea sitchensis*) forests on the adjacent hillslopes (figures 2a, 2b and 2c). The site can be divided into three plant groupings: native, non-native, and mixed native-non-native (figure 3). Pastures and legacy pastures can be divided into mesic and wet meadows, with bluegrass (*Poa pratensis*), creeping bentgrass (*Agrostis stolonifera),* velvetgrass (*Holcus lanatus),* and tall fescue (*Schedonorus arundinaceous),* red and white clover (*Trifolium pretense* & *Trifolium repens*) as the dominate grasses and forbs in mesic meadows and slough sedge (*Carex obnupta),* panicled bulrush (*Scirpus microcarpus),* reed canarygrass (*Phalaris arundinacea),* and northwestern mannagrass (*Glyceria occidentalis)* in wet meadows*.* Red Alder (*Alnus rubra),* Sitka spruce and willows *(Salix sp.)* dominate the canopy of the second growth riparian forests. Yellow skunk-cabbage (*Lysichiton americanus),* creeping buttercup (*Ranunculus repens),* common ladyfern (*Athyrium felix-femina).* Salmonberry *(Rubus spectabilis) and* Himalayan blackberry (*Rubus armeniacus)* are common in the understory (table 2).

Soils within the Project Area

Hydric soils are one of the three parameters used to delineate wetlands. Most hydric soils exhibit characteristic, identifiable morphologies that result from these anaerobic conditions and persist in the soil during both saturated (reduced) and dry (oxidized) conditions. Examples include a mottled color pattern resulting from reduction and reoxidation of iron or manganese, and accumulation of organic matter due to increased plant production and slow decomposition rates in saturated environments. Hydric soil field indicators display characteristic morphologies as a result of the accumulation or loss of iron, manganese, sulfur, or carbon compounds in a saturated and anaerobic environment (USDA NRCS 2008). They have been incorporated into the USACE wetland delineation manual supplement for this region as a means of confirming the presence or absence of hydric soils (USACE 2010)

The 1987 *Wetlands Delineation Manual* (USACE 1987) suggests evaluating existing soil maps before conducting in-field wetland delineations. For the project area, the most recent and complete soil map was prepared by NRCS (USDA-NRCS, 2008).
Soils in the project area are primarily Endoaquepts (Arlynda and Worswick Soil Series) and Udifluvents (Ferndale and Madriver Soil Series) which formed in recently deposited sediments by Prairie and Redwood creeks (figure 4). Soil textures range from very gravelly sands to silty clay loams, with peats in wetter locations. Variation in texture probably reflects how the soils were deposited. During flooding Prairie Creek overtop its banks and depositing coarse sediments, gravel and sand adjacent to channels and, as the flood waters lose velocity and turbulence finer sediments, grading from sands to silts and clays are deposited further away from the channel.

Soil profiles described during this wetland determination and delineation exercise aligned with the NRCS soils map, although due to both micro-topography and compaction by cattle grazing, some areas maps as non-hydric soils were identified as hydric soils as result of compacted surface soil layers approximately 4 to 8 inches thick. Compacted surface soils reduced infiltration and lower soil permeability, allowing water to perch on the soil surface for prolonged periods of time leading to saturation soils, depletion of oxygen, and development of reduction-oxidation features, primarily depleted matrices and iron concentrations along root channels within the compacted soil layers. Numerous times hydric soil and/or wetland hydrology indicators were identified within these compacted soils layers.

Of the 78 soil profiles we examined, 48 wetland and 30 upland, 63 exhibited hydric soil field indicator(s), 41 wetland and 13 upland respectively. The primary hydric soil indicators identified were: Redox Dark Surface (F6) and Depleted Matrix (F3), in 36 and 28, soil profiles (some profiles exhibited more than one indicator). We also identified the Muck (A10), Depleted Below Dark Surface (A11), Loamy Mucky Mineral (F1), Loamy Gleyed Matrix (F2) and Depleted Dark Surface (F7) indicators, but they were uncommon throughout the property (tables 3 and 4). By far the most common hydric soil features described were a soil layer that was greater than 4 inches thick starting within the upper 12 inches that had a value of 2, 3, 4 or 5 and a chroma of 1 or 2 with greater than 5 percent iron concentrations usually along root channels or within the soil matrix. When the soil profile has the features listed above and had a matrix value 2 or 3, then the Redox Dark Surface hydric soil indicator (F6) was applied. Conversely, when the soil matrix value was 4 or 5, the Depleted Matrix (F3) hydric soil indicator was used. Soil compaction was identified in 19 of the 48 wetland soil profiles and 15 of the 30 upland soil profiles, resulting in 11 wetland soil profiles and 13 upland soil profiles exhibiting hydric soil indicators, primarily Redox Dark Surface, as the result of soil compaction from livestock.

Hydrology within the Project Area

Precipitation in the region follows a very strong seasonal pattern of a wet season (November through April) and a relative dry season (May through October). The average annual precipitation recorded at Crescent City is 71.2 inches (1981-2010), with 59 inches or 83 percent falls as rain from November through April in the wet season and only 17% (approximately 12 inches) falling from May through October (table 1). The hydrology is predominantly driven by groundwater that is recharged annually by wet season precipitation. In some areas surface water and shallow groundwater tends to be perched on a layer of very dense, compacted silt loam or silt clay loam, in some cases as result of “cowpaction”, 2 to 12 inches below the soil surface, and discharges to the surface during the wet season. Portions of the project area, mainly in depressions, have surface ponding or groundwater in the upper 12 inches of soils for periods of 14 consecutive days or more from late November through early May in most years as a result.

Presence or absence of wetland hydrology is one of the three parameters used by the 1987 USACE manual (along with hydric soils and hydrophytic vegetation) to delineate wetland boundaries. Although wetland hydrology indicators are important in delineating wetlands, they are the least credible compared to soil and vegetation indicators to due to variability of seasonal and local weather patterns that influence hydrology. Wetland hydrology exists at a site when it is flooded, ponded, or has a water table within 12 inches of the ground surface for 14 or more consecutive days during the growing season in at least 5 out of 10 years. Wetland hydrology is the most seasonal and transitory of the three parameters. Therefore, the USACE manual describes primary and secondary wetland hydrology “indicators” that allow delineators to evaluate hydrology throughout the growing season, even late in the dry season when saturation in the upper part of the soil may no longer be present. Examples of primary indicators include surface water, a high water table, sediment deposits, water marks and drift deposits. Examples of secondary indicators include presence of a “dry season water table” between 12 and 24 inches below the ground surface, the FAC Neutral Test and “geomorphic position” of the site (e.g., toe slopes, drainageways, depressions and swales).

Prairie Creek’s flood frequency and duration have been altered, most likely from agricultural land conversion in the late 1800’s, and has led to the entrenchment of the channel. This has caused poor connectivity between the channel and the floodplain, though flooding does occur occasionally. During bank full, or 2-year, flood events water will breach the natural levee onto the floodplain, but will only retain surface water for a few days and happens more commonly in the northwest pasture. There is also evidence of flooding in the southeast corner of the south pasture in the form of stratified sediments, but due to its higher sand content tends to be better drained.

Of the 78 soil profile excavation sites we examined, 48 wetland and 30 upland sites, 55 exhibited wetland hydrology field indicator(s), 48 wetland and 7 upland sites (tables 3 and 4). The “A” group hydrology indicators are based on the direct observation of surface or groundwater and the “B” group identifies evidence of that the site is subject to flooding or ponding. The “C” group of indicators identify evidence that the soil is currently or recently saturated and the “D” group consists of landscape characteristics, and vegetation and soil features that indicate contemporary rather than historical wet conditions. By far the most common indicators identified were; Oxidized Rhizospheres (C3), Geomorphic Position (D2) and the FAC-Neutral Test (D5). The two secondary indicators used were Geomorphic position (D2) and the FAC-Neutral Test (D5), which include concave, depressional areas and toeslopes where we observed slough sedge wetlands primarily in the north and northwest pastures. The hydrology indicator oxidized rhizospheres adjacent to living roots (C3) was the most prevalent primary indicator of the plots and was found mostly in the north and south pastures, which had significant soil compaction due to grazing. Soil compaction was identified in 19 of the 48 wetland soil profiles and 15 of the 30 upland soil profiles, resulting in 18 wetland soil profiles and 12 upland soil profiles exhibiting wetland hydrology indicators, primarily Oxidized Rhizospheres, as the result of soil compaction from livestock.

Vegetation within the Project Area

Predominance of "hydrophytic" (wetland) vegetation is one of the three parameters used to identify wetlands. According to the USACE wetland delineation procedures, calls regarding presence or absence of hydrophytic vegetation are based on the “wetland indicator status” of each dominant species in the plant community being evaluated. Lichvar and others (2016) classified plant species into indicator status categories ranked from wettest to driest as follows: Obligate (OBL), Facultative Wetland (FACW), Facultative (FAC), Facultative Upland (FACU), Upland (UPL), and Not Listed (NI). Plant communities are considered to be hydrophytic (wetland vegetation) if greater than 50% of the plant cover by dominant species are ranked as OBL, FACW, or FAC (Dominance Test). Prevalence Indices were also calculated and used for hydrophytic vegetation determinations in cases where a plot was determined to have wetland hydrology and hydric soils but failed the Dominance Test (USACE 2012). The Prevalence Index uses the weighted average of all plant species in the sampling plot to determine hydrophytic vegetation. The FAC-Neutral Test was calculated and used as a Wetland Hydrology secondary indicator, and is essentially the same as the Dominance Test, but it disregards Facultative plant species.

Of the 78 plots we examined, 48 wetland and 30 upland plots, 68 exhibited hydrophytic vegetation using the Dominance Test, including 48 wetland and 20 upland plots, and 48 using the Prevalence Index, 33 wetland and 15 upland plots, respectively. There were only four plots, N1-2, N2-3, N3-3 and N4-6, which failed the Dominance Test but passed the Prevalence Index. With these results, 68 of the 78 plots (87%) have hydrophytic vegetation. The Dominance Test has a higher passing rate in comparison to the Prevalence Index (62%) as a result of treating all FAC species as wetland plants. Facultative (FAC) species are equally likely (33-67% of the time) to be found in wetlands and uplands (Lichvar and others, 2016).

Approximately 41 percent of the project area is covered with native species, 18 percent with a mix of native and non-natives species and 41 percent with non-native species, primarily non-native grasses, forbs and shrubs (figure 3). The native communities covered 25.8 acres of the property with the tendency to be within forested shrub wetlands composed of different combinations of red alder (*Alnus rubra*), slough sedge (*Carex obnupta*), Sitka spruce (*Picea sitchensis*), and skunk cabbage (*Lysichiton americanus*) (Figure 2). The mixed plant communities (21.3 acres) were commonly composed of red alder and Himalayan blackberry (*Rubus armeniacus*), and the non-native communities (26.2) were within the pasture areas including Himalayan blackberry (Figure 3 & 4). For this report Himalayan blackberry was not considered in the woody vine stratum.

Vegetation mapping is based on data provided by Seney and Weinberg (2015). In 2015, they conducted a wetland condition assessment of the Lower Prairie Creek Floodplain using the California Rapid Assessment Method (CRAM) (CWMW, 2014).Within the project area, vegetation was a strong indicator of the wetland/upland boundary, as the vegetation present on most of the site is strongly correlated with the natural plant communities and/or environmental gradients. The gradual ecotone, dominated by facultative grasses, at times made discerning a distinct vegetation change between wetland and upland conditions challenging.

The vegetation sections of the data sheets in the Appendix list each plant species identified in the plot, its indicator status, and whether or not it was considered to be a dominant species according to USACE manual procedures.

Wetlands within the Project Area

The wetlands within the project area were mapped based on the presence of one, two, or three of the USACE parameters for determining wetlands. Soil excavation sites were chosen based on varying plant communities as well as landscape position and slope shape. Aside from plot data, complete vegetative surveys helped in the determination of hydrophytic vegetation throughout the property. Of the 78 plots observed, 48 plots were determined to be jurisdictional wetlands based on the USACE wetland definition. 11 of these 48 plots were identified as wetlands due to soil compaction as a result of long-term cattle grazing. The results of the wetland delineation show that 68.5 acres met at least one USACE wetland parameter, 23.4 acres met at least two parameters, and 18.8 acres met all three parameters (Figure 6).

The wetlands mapped within the project area by the National Wetland Inventory (NWI) were classified as Palustrine, emergent, forested and scrub-shrub vegetation types, with non-tidally influences, seasonally flooded hydrology (PEM1C, PFO1C, and PSS1C) (figure 5)..The wetlands differ by vegetative class: emergent (EM), scrub/shrub (SS), and forested (FO). The NWI is based on remotely sensed data, with little ground verification, which uses drainage features, surface water and vegetation patterns across the landscape to identify and map wetlands. NWI mapped wetlands tend to be good approximations of location and extent of wetlands, however, extent of wetlands is not often accurately depicted due to lack of hydric soil and groundwater hydrology considerations (figure 5). The NWI mapped 24.1 acres of wetland, while our fieldwork verified 18.8 acres of three parameter wetland.

In the north and south pasture soil compaction had a significant effect in the development and identification of wetland hydrology and hydric soils. Due to its inaccessibility to livestock and more frequent periodic flooding, the northwest pasture has not experienced the same level of soil compaction. Of the 22 compacted wetland plots in the north pasture, four were considered to be wetlands as a result of soil compaction and were vegetated with primarily facultative grasses. There were seven plots that exhibited soil compaction but were considered wetlands due to concave landform positions, obligate plant communities and evidence of groundwater within the upper 12 inches of soil. The south pasture exhibited significant soil compaction in 18 of 23 soil profiles. Seven of the 18 plots met all three wetland parameters but only as result of “cowpaction”.

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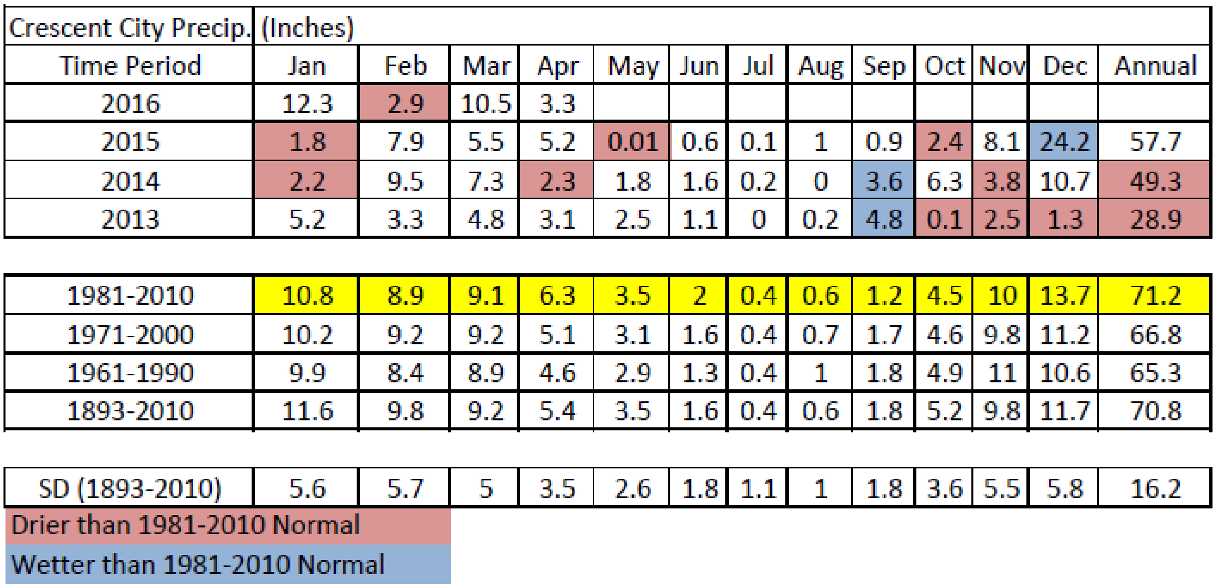
Table 1. Crescent City Airport Weather Station: Monthly and annual mean precipitation amounts for 2013 through April 2016, the 30 year 1981-2010, 1971-2000, 1961-1990 and Historic record, 1893-2010, and Standard Deviation (SD) for 1893-2010.



Crescent City Precip.	(Inches)												
Time Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2016	12.3	2.9	10.5	3.3									
2015	1.8	7.9	5.5	5.2	0.01	0.6	0.1	1	0.9	2.4	8.1	24.2	57.7
2014	2.2	9.5	7.3	2.3	1.8	1.6	0.2	0	3.6	6.3	3.8	10.7	49.3
2013	5.2	3.3	4.8	3.1	2.5	1.1	0	0.2	4.8	0.1	2.5	1.3	28.9
1981-2010	10.8	8.9	9.1	6.3	3.5	2	0.4	0.6	1.2	4.5	10	13.7	71.2
1971-2000	10.2	9.2	9.2	5.1	3.1	1.6	0.4	0.7	1.7	4.6	9.8	11.2	66.8
1961-1990	9.9	8.4	8.9	4.6	2.9	1.3	0.4	1	1.8	4.9	11	10.6	65.3
1893-2010	11.6	9.8	9.2	5.4	3.5	1.6	0.4	0.6	1.8	5.2	9.8	11.7	70.8
SD (1893-2010)	5.6	5.7	5	3.5	2.6	1.8	1.1	1	1.8	3.6	5.5	5.8	16.2

Drier than 1981-2010 Normal

Wetter than 1981-2010 Normal

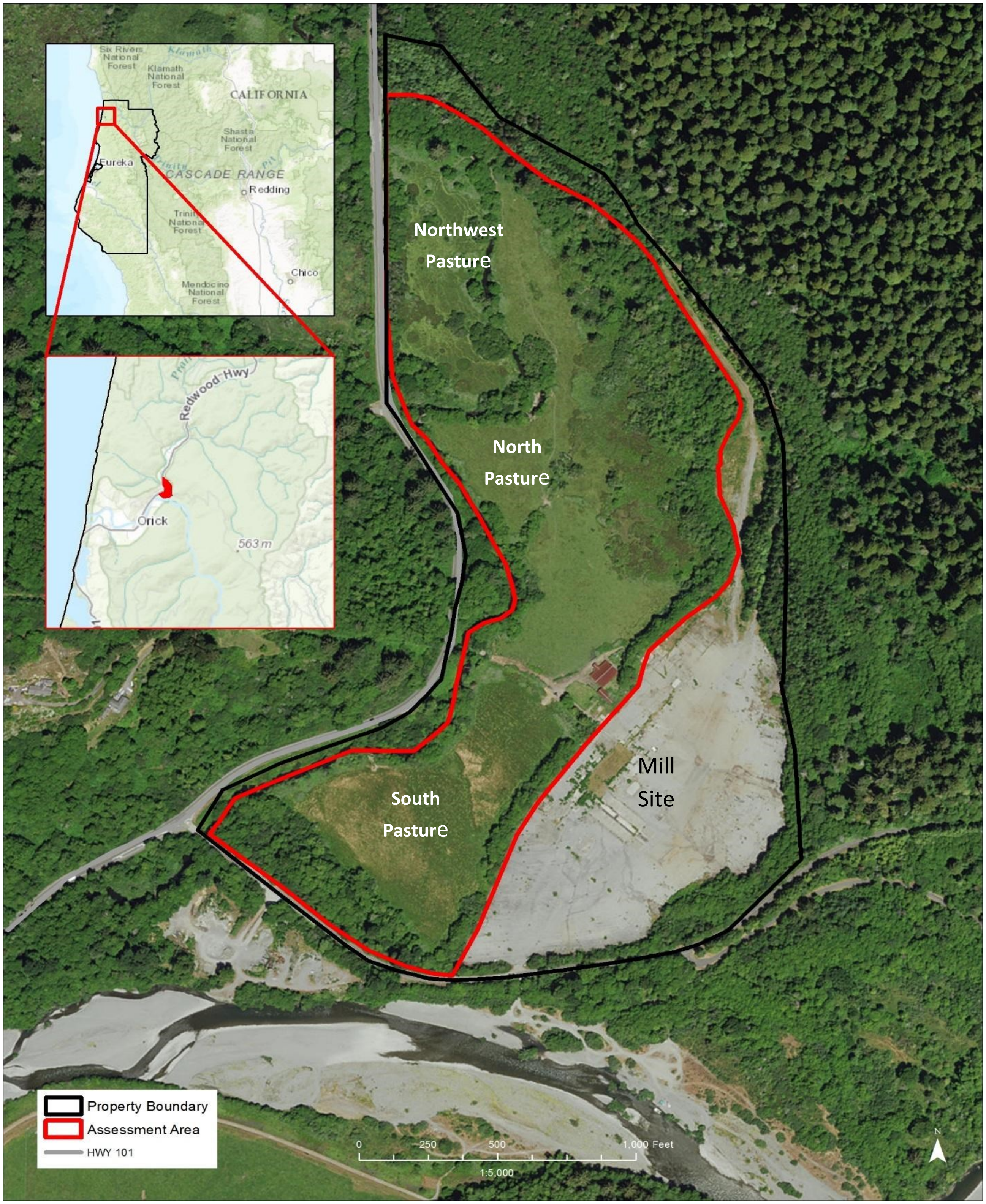


Figure 1. Mill A property boundary and wetland assessment area.

Figure 2a. Willow with slough sedge understory near the confluence of Prairie creek with Skunk Cabbage creek.

Figure 2b. North pasture-wetland complex: tall fescue in foreground, slough sedge wetland and a Sitka spruce, alder and willow forested wetland with a skunk cabbage and slough sedge understory.

Figure 2c. South pasture.

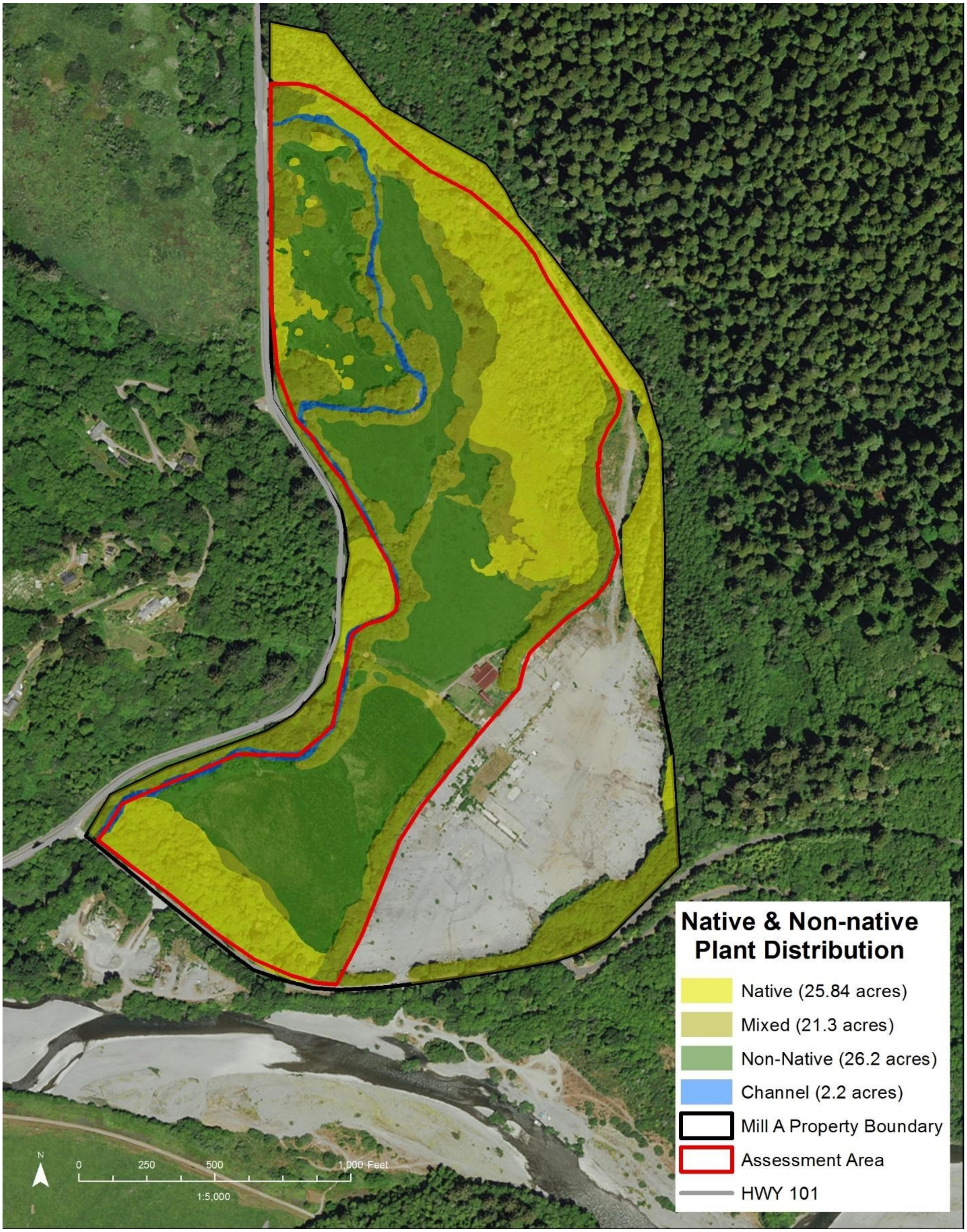


Figure 3. Distribution of native, non-native and mixed groupings for Mill A property.

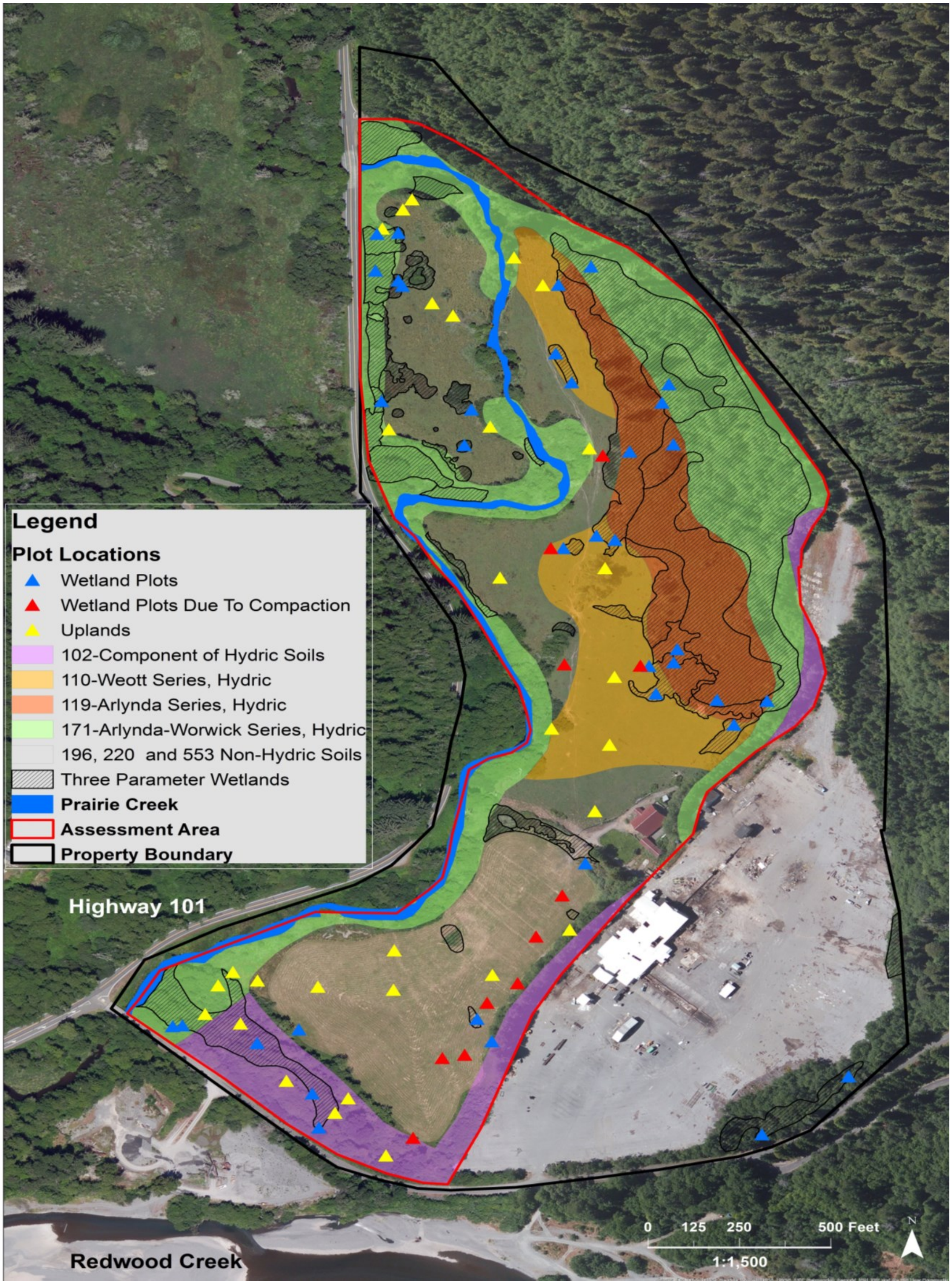


Figure 4. Soils mapped by the NRCS compared to mapped three parameter wetlands.

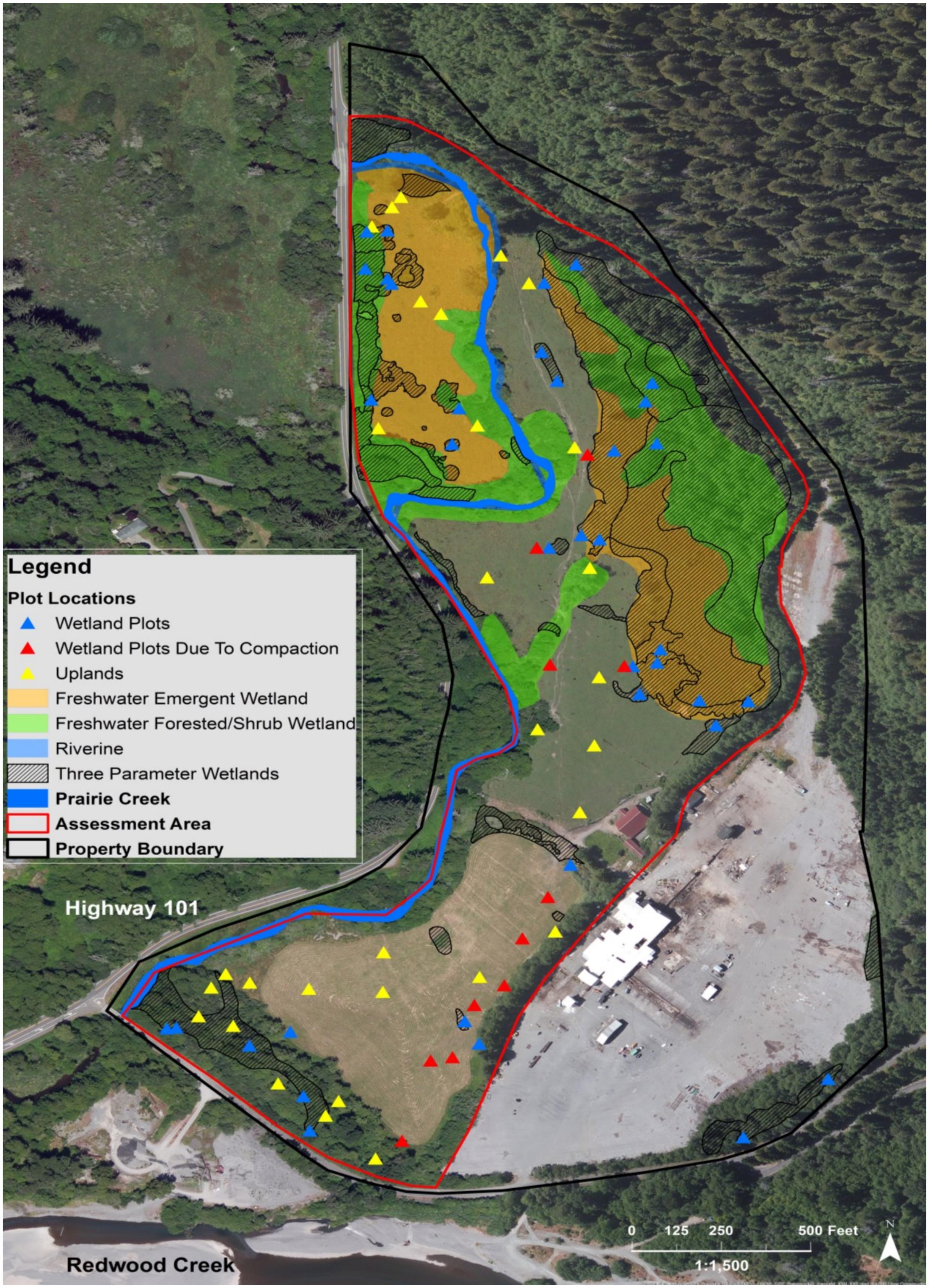


Figure 5. National Wetland Inventory mapped wetland compared to mapped three parameter wetlands.

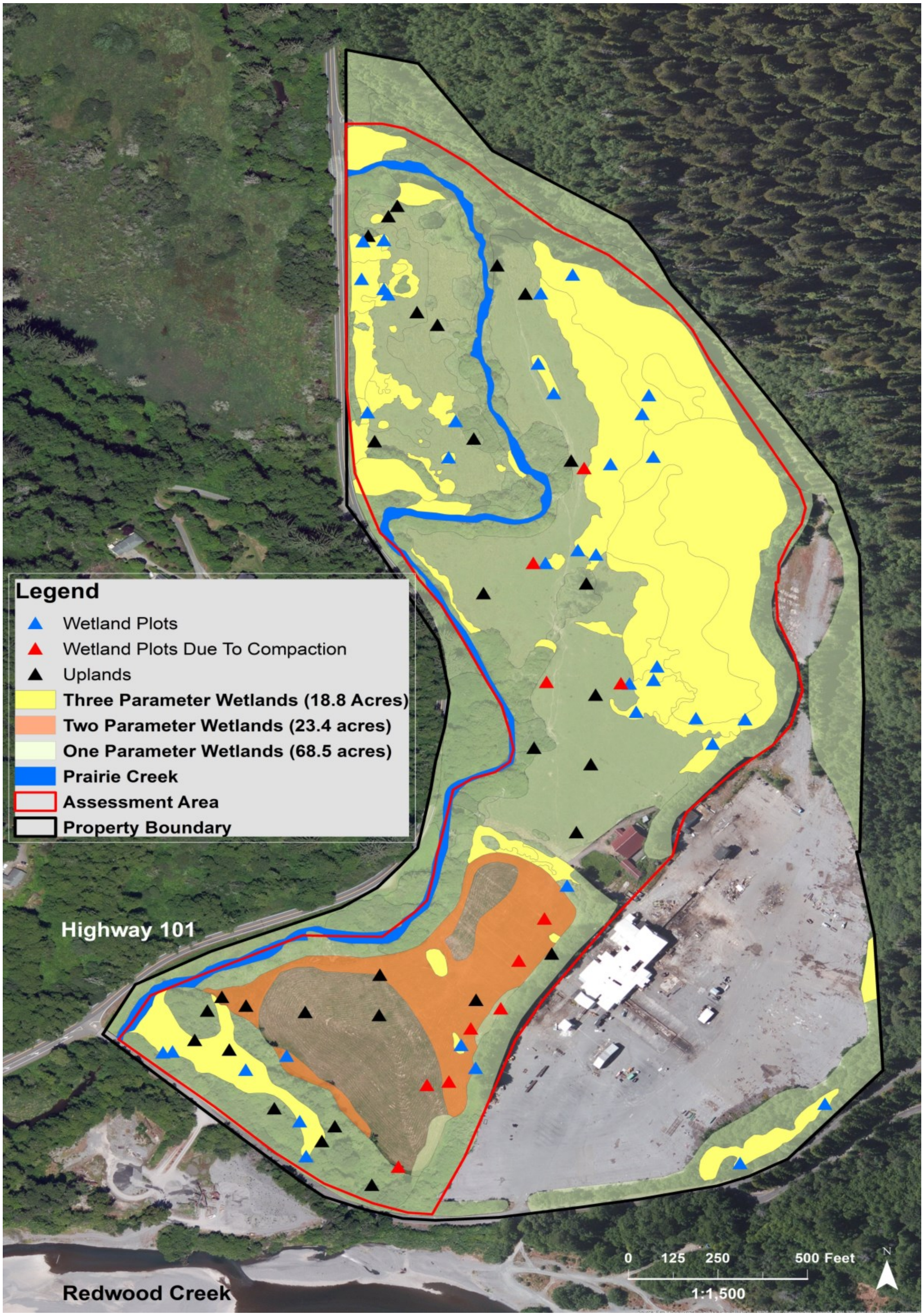


Figure 6. Map of one, two and three parameter wetlands, and plot locations.

Table 2. Plant list

Scientific Name	**Common Name**	**Wetland Status**	**Native**
Acer macrophyllum	Big-Leaf Maple	FACU	Yes
Agrostis stolonifera	Creeping Bentgrass	FAC	No
Alnus rubra	Red Alder	FAC	Yes
Anthoxanthum odoratum	Large Sweet Vernal Grass	FACU	No
Athyrium filix-femina	Lady Fern	FAC	Yes
Bellis perennis	English Daisy	NI	No
Carex obnupta	Slough Sedge	OBL	Yes
Carex sp.	Sedge	NI	Yes
Cirsium arvense	Canadian Thistle	FAC	No
Cirsium vulgare	Bull Thistle	FACU	No
Erodium botrys	Long-Beak Stork's-Bill	FACU	No
Galium sp.	Bedstraw	NI	Yes
Glyceria occidentalis	Manna Grass	OBL	Yes?
Holcus lanatus	Common Velvet Grass	FAC	No
Juncus effusus	Common Rush	FACW	Yes
Lemna sp.	Duckweed	OBL	Yes
Lolium perrene	Perennial Ryegrass	FAC	No
Lysichiton americana	Skunk Cabbage	OBL	Yes
Mentha pulgeium	Pennyroyal	OBL	No
Oenanthe sarmentosa	Water Parsley	OBL	Yes
Phalaris arundinacea	Reed canarygrass	FACW	Yes?
Picea sitchensis	Sitka Spruce	FAC	Yes
Plantago lanceolata	English Plantain	FACU	No
Plantago major	Broadleaf Plantain	FAC	No
Poa pratensis	Kentucky Bluegrass	FAC	No
Polystichum munitum	Western Sword Fern	FACU	Yes
Ranunculus repens	Creeping Buttercup	FAC	No
Rubus armeniacus	Himalayan Blackberry	FAC	No
Rubus parviflorus	Western Thimble-Berry	FACU	Yes
Rubus spectabilis	Salmonberry	FAC	Yes
Rubus ursinis	California blackberry	FACU	Yes
Rumex acetosella	Common Sheep Sorrel	FACU	No
Rumex crispus	Curly Dock	FAC	No
Salix lasiolepis	Arroyo Willow	FACW	Yes
Salix sp.	Willow	FACW	Yes
Sambucus racemosa	Red Elderberry	FACU	Yes
Schedonorus arundinacea	Tall Fescue	FAC	No
Stellaria media	Common Chickweed	FACU	No
Taraxacum officinale	Common Dandelion	FACU	No
Trifolium pratense	Red Clover	FACU	No
Trifolium repens	White Clover	FAC	No
Urtica dioica	Stinging Nettle	FAC	Yes

Table 3. Upland plots data summary.

Pastures	**Northwest**	**North**	**South**	**Riparian Forest**
	# of Plots	# of Plots	# of Plots	# of Plots
# of Plots	7	8	12	3
Hydric Soils	1	4	8	2
Indicators	**F3**	**F6,** F7	**F6**, F3	**F6**
Wetland Hydrology	0	1	6	0
Indicators	na	**C3, D2**	**C3, D2, D5**,	na
			B3, B4, B8	
Vegetation	7	6	6	1
Dominance Test	7	6	6	1
Prevalence Test	5	4	4	1
Compaction	0	7	8	0
Hydric Soil	0	4	8	0
Wetland Hydrology	0	1	5	0
Vegetation			2	0
Dominance Test	0	5	2	0
Prevalence Test	0	4	1	0

Table 4. Wetland plots data summary.

Pastures	**Northwest**	**North**	**South (Forest)**
	# of Plots	# of Plots	# of Plots
# of Plots	8	22	18
Hydric Soil	8	22	18
Indicators	F3, F6	F1, F2, **F3, F6**, F7	F3, **F6**, F2
Wetland Hydrology	8	22	18
Indicators	**C3, D2, D5**	**C3, D2, D5**, A2	**C3, D2, D5**, A2, A3
	A3	B4, B6, B8, B13	B4, B6, B8, B9, B10
Vegetation	8	22	18
Dominance Test	8	18	18
Prevalence Test	7	17	10
Compaction	0	11 (4)*	10 (7)*
Hydric Soil	0	11 (4)*	10 (7)*
Wetland Hydrology	0	11 (4)*	10 (7)*
Vegetation			
Dominance Test	0	10 (4)*	9 (7)*
Prevalence Test	0	6 (2)*	3 (0)

*Number of plots that soil compaction resulted in three parameter wetland plot.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-01
Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412350 Long: 4572753 Datum: NAD83
Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5m^2)			
1. Alnus Rubra	90	X	~~FAC~~
2.			
3.			
4.			
	90	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	30	X	FACU
2.			
3.			
4.			
5.			
	30	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Carex Obnupta	80	X	OBL
2. Rubus ursinus	10		FACU
3. Urtica diocia	3		~~FAC~~
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	93	= Total Cover 46.5 / 18.6	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	67%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	0	x 2 =	0
FAC species	93	x 3 =	279
FACU species	40	x 4 =	160
UPL species	0	x 5 =	0
Column Totals:	213 (A)		519 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: F1-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-5	10YR 3/2	100					Sil	
5-11	10YR 3/1	98	7.5YR 5/8	2	C	PL	Sil	
11-16	10YR 4/2	95	10YR 5/6	5	C	PL	Sil	
16-24	2.5Y 3/1	100					Grls	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
✓ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5) NO
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

OK

Surface Water Present? Yes ___ No ✓ Depth (inches): [redacted]
Water Table Present? Yes ___ No ✓ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches):

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-02
Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412358 Long: 4572754 Datum: NAD83
Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lasiolepis	75	X	FACW
2.			
3.			
4.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Salix lasiolepis	50	X	FACW
2.			
3.			
4.			
5.			
	50	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Athyrium filix-femina	20	X	FAC
2. Rubus parviflorus	15	X	FACU
3. Polystichum munitum	5		FACU
4. Carex spp.	15	X	FACW?
5. Unknown	1		NI
6.			
7.			
8.			
9.			
10.			
11.			
	56	= Total Cover	28/112
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	140	x 2 =	280
FAC species	20	x 3 =	60
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	180 (A)		420 (B)

Prevalence Index = B/A = 2.33

Hydrophytic Vegetation Indicators:

- __ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- __ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ 5 - Wetland Non-Vascular Plants[1]
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: F1-02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	2.5Y 3/2	95	10YR 5/6	5	C	PL	Sil	
9-15	2.5Y 3/2	80	10YR 5/6	20	C	PL	Sil	
15-23	2.5Y 3/2	90	10YR 4/6	10	C	PL/M	Sicl	
23-27	2.5Y 3/2	95	10YR 5/6	5	C	M	Sicl	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
✓ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5) OK
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-03

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): slightly convex Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412406 Long: 4572756 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? **Yes ____ No ✓**

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5m^2)			
1. Alnus Rubra	75	X	~~FAC~~
2. Populus fremontii	30	X	FACW
3.			
4.			
	105	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	25	X	FACU
2.			
3.			
4.			
5.			
	25	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Carex Obnupta	15	X	OBL
2. Rubus ursinus	30	X	FACU
3. Urtica diocia	20	X	~~FAC~~
4. Athyrium filix-femina	1		~~FAC~~
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	76	= Total Cover	38/15.2
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	30	x 2 = 60
FAC species	96	x 3 = 279
FACU species	55	x 4 = 220
UPL species	0	x 5 = 0
Column Totals:	206 (A)	559 (B)

Prevalence Index = B/A = 2.71

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓ No ____**

SOIL

Sampling Point: F1-03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-7	2.5Y 3/2	90	10YR 3/6	10	C	M	Sil	
7-11	2.5Y 3/2	90	10YR 4/4	10	C	M	Fsl	
11-24	2.5Y 2.5/1	100					Ls	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.   [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5) ok
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-04

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412419 Long: 4572737 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5m^2)			
1. Alnus Rubra	85	X	~~FAC~~
2.			
3.			
4.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	3		FACU
2. Rubus ursinus	15	X	FACU
3.			
4.			
5.			
	18	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Carex Obnupta	75	X	OBL
2. Lysichiton americana	5		OBL
3. Athyrium filix-femina	3		~~FAC~~
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	83	= Total Cover	43/16.6
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	0	x 2 =	0
FAC species	88	x 3 =	264
FACU species	18	x 4 =	72
UPL species	0	x 5 =	0
Column Totals:	186 (A)		416 (B)

Prevalence Index = B/A = 2.24

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

Remarks:

SOIL

Sampling Point: F1-04

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
1-7	10YR 3/1	85	7.5YR 4/6	15	C	PL	Sil	
7-14	10YR 4/1	85	7.5YR 5/6	15	C	PL	Sil	
14-24	2.5Y 3/1	80	10YR 5/6	20	C	M	Sl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5) NO
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

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Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____________

Water Table Present? Yes ____ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-05

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412444 Long: 4572700 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus Rubra	75	X	FAC
2.			
3.			
4.			
	75 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	60	X	FACU
2. Rubus ursinus	10		FACU
3.			
4.			
5.			
	70 = Total Cover		
Herb Stratum (Plot size: 2m^2)			
1. Carex Obnupta	75	X	OBL
2. Polystichum muntium	1		FACU
3. Urtica diocia	5		FAC
4. Hedera spp.	1		NI
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	82 = Total Cover		41 16
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	67%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	75	x 1 = 75
FACW species	0	x 2 = 0
FAC species	80	x 3 = 240
FACU species	71	x 4 = 284
UPL species	0	x 5 = 0
Column Totals:	226 (A)	599 (B)

Prevalence Index = B/A = 2.65

Hydrophytic Vegetation Indicators:

- __ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- __ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ 5 - Wetland Non-Vascular Plants[1]
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: F1-05

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
1-6	2.5Y 3/2	95	7.5YR 4/6	5	C	PL	Sil	
6-12	2.5Y 3/1	85	7.5YR 4/6	15	C	PL	Sil	
12-18	2.5Y 4/1	90	7.5YR 4/6	10	C	PL	Fsl	
18-24	2.5Y 4/1	80	10YR 5/6	20	C	M	Sl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
✓ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-06

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412466 Long: 4572688 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus Rubra	85	X	FAC
2. Populus fremontii	10		FACW
3.			
4.			
	95	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	40	X	FACU
2. Alnus Rubra	50	X	FAC
3.			
4.			
5.			
	90	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Carex Obnupta	75	X	OBL
2. Rubus ursinus	15		FACU
3. Urtica diocia	10		FAC
4. Athyrium filix-femina	5		FAC
5. Rubus spectabilis	5		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	110	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	75	x 1 =	75
FACW species	10	x 2 =	20
FAC species	155	x 3 =	465
FACU species	55	x 4 =	220
UPL species	0	x 5 =	0
Column Totals:	295 (A)		780 (B)

Prevalence Index = B/A = 2.65

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: F1-06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-14	2.5Y 2.5/1	90	7.5YR 4/6	10	C	PL	Sil	
14-18	2.5Y 3/1	95	7.5YR 4/6	5	C	M	Sicl	
18-22	10YR 4/1	90	7.5YR 4/4	10	C	M	Fsl	
22-30	10YR 4/1	100					Fsl	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-07

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412471 Long: 4572655 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus Rubra	50	X	FAC
2.			
3.			
4.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	80	X	FACU
2. Alnus Rubra	50	X	FAC
3.			
4.			
5.			
	130	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Carex Obnupta	85	X	OBL
2. Rubus ursinus	30	X	FACU
3. Athyrium Filix-femina	3		FAC
4. Hedera spp.	5		NI
5. Ribes spp.	5		NI
6.			
7.			
8.			
9.			
10.			
11.			
	127	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	85	x 1 =	85
FACW species	0	x 2 =	0
FAC species	103	x 3 =	309
FACU species	110	x 4 =	440
UPL species	0	x 5 =	0
Column Totals:	297 (A)		834 (B)

Prevalence Index = B/A = 2.81

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

SOIL

Sampling Point: F1-07

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
1-6.5	2.5Y 2.5/1	100					Sil	
6.5-18	2.5Y 4/1	65	2.5YR 3/6	35	C	PL	Sicl	
18-30	2.5Y 4/1	90	10YR 4/6	10	C	M	Fsl	
30-40	2.5Y 3/1	95	10YR 4/6	5	C	M	Sl	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ______ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-08

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Slightly convex Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412527 Long: 4572629 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5m^2)			
1. Alnus Rubra	85	X	FAC
2.			
3.			
4.			
	85 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	70	X	FACU
2. Rubus ursinus	25	X	FACU
3.			
4.			
5.			
	95 = Total Cover		
Herb Stratum (Plot size: 2m^2)			
1. Rubus ursinus	15	X	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	15 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		
% Bare Ground in Herb Stratum 10%			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	85	x 3 =	255
FACU species	110	x 4 =	440
UPL species	0	x 5 =	0
Column Totals:	195 (A)		695 (B)

Prevalence Index = B/A = 3.56

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: F1-08

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	2.5Y 4/1	100					Sil	
12-20	2.5Y 4/1	98	7.5YR 4/6	2	C	PL	Sil	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (except **MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ____________
Water Table Present? Yes _____ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-09

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412840 Long: 4572649 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5m^2)			
1. Salix lucida	60	X	FACW
2. Alnus Rubra	50	X	FAC
3. Picea sitchensis	10		FAC
4.			
	120	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Salix lucida	60	X	FACW
2.			
3.			
4.			
5.			
	130	= Total Cover	
Herb Stratum (Plot size: 2m^2)			
1. Mosses	80	X	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	127	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	120	x 2 =	240
FAC species	50	x 3 =	150
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	170 (A)		390 (B)

Prevalence Index = B/A = 1.71

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

US Army Corps of Engineers Western Mountains, Valleys, and Coast – Version 2.0

SOIL

Sampling Point: F1-09

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100					MP	
2-5	10YR 2/2	100					M	
5-9	5Y 2.5/1	100					Grl	
9-24	N 4/	95	10YR 4/6	5	C	PL	Sil	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
✓ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)

__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
✓ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

✓ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
✓ High Water Table (A2)
✓ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)

__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ✓ No ___ Depth (inches): 7
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 6

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A Riparian Forest City/County: Orick/Humboldt Sampling Date: 6-30-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: F1-10

Investigator(s): G. Davis, K.Cooper and J. Seney Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412913 Long: 4572704 Datum: NAD83

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____		
Wetland Hydrology Present?	Yes ✓	No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 5m^2)			
1. Alnus Rubra	85	X	FAC
2.			
3.			
4.			
	85 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5m^2)			
1. Sambucus racemosa	5	X	FACU
2. Rubus spectabilis	5	X	FAC
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 2m^2)			
1. Oenanthe sarmentosa	30	X	OBL
2. Phlaris arundinacea	20	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		
% Bare Ground in Herb Stratum 10%			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	30	x 1 = 30
FACW species	20	x 2 = 40
FAC species	90	x 3 = 270
FACU species	5	x 4 = 20
UPL species	0	x 5 = 0
Column Totals:	145 (A)	360 (B)

Prevalence Index = B/A = 2.48

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: F1-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100					MSil	
2-8	10YR 2/2	99	7.5YR 4/4	1	C	PL	Sil	
8-15	10YR 2/2	75	10YR 3/4	25	C	M	Sil	
15-24	2.5Y 3/2	85	10YR 3/4	15	C	PL	Sil	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
✓ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
✓ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 13

Wetland Hydrology Present? **Yes** ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-1

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412846 Long: 4573066 Datum: UTM 10T

Soil Map Unit Name: 119-Arlynda 0 to 2 Percent Slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ___

Hydric Soil Present? Yes ✓ No ___

Wetland Hydrology Present? Yes ✓ No ___

Is the Sampled Area within a Wetland? **Yes ✓ No ___**

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Alnus rubra	10	X	FAC
2.			
3.			
4.			
= Total Cover	10		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Athyrium filix-femina	40	X	FAC
2. Carex obnupta	20	X	OBL
3. Lysichiton americana	5		OBL
4. Rubus ursinis	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	70		
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	25	x 1 = 25
FACW species	0	x 2 = 0
FAC species	50	x 3 = 150
FACU species	5	x 4 = 20
UPL species	0	x 5 = 0
Column Totals:	80 (A)	195 (B)

Prevalence Index = B/A = 2.44

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: N1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1							Peat	
1-6	G1 4/10Y	99	2.5Y 4/4	1	C	RPO	SiL	
6-11	G1 4/10Y	80	2.5Y 4/4	20	C	M	SiL	
11-20	G1 4/10Y	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
✓ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
✓ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ✓ No ___ Depth (inches): 6
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 19.5

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-1
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412846 Long: 4573066 Datum: UTM 10T
Soil Map Unit Name: 119-Arlynda 0 to 2 Percent Slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Alnus rubra	10	X	FAC
2.			
3.			
4.			
= Total Cover	10		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Athyrium filix-femina	40	X	FAC
2. Carex obnupta	20	X	OBL
3. Lysichiton americana	5		OBL
4. Rubus ursinis	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	70		
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	80 (A)		195 (B)

Prevalence Index = B/A = 2.44

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: N1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1							Peat	
1-6	G1 4/10Y	99	2.5Y 4/4	1	C	RPO	SiL	
6-11	G1 4/10Y	80	2.5Y 4/4	20	C	M	SiL	
11-20	G1 4/10Y	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
✓ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
✓ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ✓ No ___ Depth (inches): 6
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 19.5

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-2
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412804 Long: 4573067 Datum: UTM 10T
Soil Map Unit Name: 119-Arlynda 0 to 2 Percent Slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	80	X	OBL
2. Rubus ursinus	30	X	FACU
3. Athyrium filix-femina	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	120		
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	80	x 1 = 80
FACW species	0	x 2 = 0
FAC species	10	x 3 = 30
FACU species	30	x 4 = 120
UPL species	0	x 5 = 0
Column Totals:	120 (A)	230 (B)

Prevalence Index = B/A = 1.92

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	G1 3/10Y	100					PSiL	
2-10	G1 3/10Y	95	7.5YR 4/6	5	C	M	SiCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ✓ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) **(LRR A)**
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)
- __ Raised Ant Mounds (D6) **(LRR A)**
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ____ Depth (inches): 2

Water Table Present? Yes ✓ No ____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-3

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412819 Long: 4573043 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 Percent Slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Ranunculus repens	60	X	FAC
2. Juncus effesus	30	X	FACW
3. Holcus lanatus	20		FAC
4. Rumex crispus	10		FAC
5. Anthoxanthum odoratum	10		FAC
6. Rubus ursinus	5		FACU
7. Cirsium arvense	1		FAC
8.			
9.			
10.			
11.			
= Total Cover	141		
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	80	x 3 =	240
FACU species	16	x 4 =	64
UPL species	0	x 5 =	0
Column Totals:	136 (A)		384 (B)

Prevalence Index = B/A = 2.82

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: N1-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10YR 3/2	95	7.5YR 4/6	5	C	PL	SiL	Highly compacted
12-17.5	10YR 3/2	99	7.5YR 5/6	1	C	RPO	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ________

Water Table Present? Yes ___ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-4

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412753 Long: 4573073 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 Percent Slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? **Yes ✓** **No ____**

Remarks:

Border of wetland/upland

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	40	X	FAC
2. Ranunculus repens	30	X	FAC
3. Carex obnupta	20		OBL
4. Mentha pulgeium	5		OBL
5. Anthoxanthum ordoratum	5		FACU
6. Rumex crispus	1		FAC
7.			
8.			
9.			
10.			
11.			
= Total Cover	101		
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	25	x 1 = 25
FACW species	1	x 2 = 2
FAC species	70	x 3 = 210
FACU species	5	x 4 = 20
UPL species	0	x 5 = 0
Column Totals:	101 (A)	257 (B)

Prevalence Index = B/A = 2.54

Hydrophytic Vegetation Indicators:

- __ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- __ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ 5 - Wetland Non-Vascular Plants[1]
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓** **No ____**

Remarks:

SOIL

Sampling Point: N1-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 3/2	95	7.5YR 5/8	5	C	M	SiL	many fine roots
10-29.5	10YR 3/2	90	7.5YR 5/8	10	C	M	CL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________
Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ____________
Water Table Present? Yes _____ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-5
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412715 Long: 4573024 Datum: UTM 10T
Soil Map Unit Name: 110-Weott 0 to 2 Percent Slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

Heavy compaction in surface

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Poa pratensis	60	X	FAC
2. Trifolium pratense	30	X	FACU
3. Ranunculus repens	20		FAC
4. Schedonorus arundinacea	10		FAC
5. Anthoxanthum ordoratum	10		FACU
6. Rubus armeniacus	10		FAC
7. Rumex crispus	5		FAC
8. Juncus effesus	5		FACW
9.			
10.			
11.			
= Total Cover	150		
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	10	x 2 = 20
FAC species	105	x 3 = 315
FACU species	40	x 4 = 160
UPL species	0	x 5 = 0
Column Totals:	150 (A)	495 (B)

Prevalence Index = B/A = 3.3

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: N1-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-22	10YR 3/2	95	7.5YR 4/6	5	C	RPO	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ✓ No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N1-6

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412666 Long: 4573039 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 Percent Slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Alnus rubra	50	X	FAC
2.			
3.			
4.			
= Total Cover	50		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus armeniacus	90	X	FAC
2. Rubus ursinus	15		FACU
3.			
4.			
5.			
= Total Cover	105		
Herb Stratum (Plot size: 1 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: 3 m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	140	x 3 =	420
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	155 (A)		480 (B)

Prevalence Index = B/A = 3.1

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N1-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-25.5	10YR 3/2	100					SL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______________
Water Table Present? Yes ______ No ✓ Depth (inches): ______________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N2-1

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412677 Long: 4573101 Datum: UTM 10T

Soil Map Unit Name: 220-Ferndale 0-2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Poa pratensis	50	X	FAC
2. Lolium perenne	20	X	FAC
3. Anthoxanthum odoratum	14		FACU
4. Bellis perennis	5		FACU
5. Taraxacum officinale	5		FACU
6. Rumex crispus	5		FAC
7. Ranunculus repens	1		FAC
8.			
9.			
10.			
11.			
= Total Cover	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	76	x 3 =	228
FACU species	24	x 4 =	96
UPL species	0	x 5 =	0
Column Totals:	100 (A)		324 (B)

Prevalence Index = B/A = 3.24

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N2-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	10YR 2/2	95	7.5YR 4/6	5	D	RPO	SiL	Compaction
3-7	10YR 2/1	98	7.5YR 4/4	2	D	PL	SiL	
7-20	2.5Y 3/2	93	7.5YR 4/4	7	D	PL	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N2-2

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412719 Long: 4573089 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** ✓
Hydric Soil Present?	Yes ____	No ✓		
Wetland Hydrology Present?	Yes ____	No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Anthoxanthum odoratum	60	X	FACU
2. Schedonorus arundinacea	50	X	FAC
3. Rumex crispus	12		FAC
4. Poa pratensis	10		FAC
5. Ranunculus repens	9		FAC
6. Taraxacum officinale	2		FACU
7. Bellis perennis	1		NI
8.			
9.			
10.			
11.			
= Total Cover	144		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	81	x 3 =	243
FACU species	62	x 4 =	248
UPL species	0	x 5 =	0
Column Totals:	143 (A)		491 (B)

Prevalence Index = B/A = 3.43

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ____ **No** ✓

Remarks:

SOIL

Sampling Point: N2-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-5	10YR 2/2	97	10YR 4/6	3	C	PL	SiL	
5-9.5	10YR 3/2	97	10YR 4/6	3	C	PL	SiCL	
9.5-29.5	10YR 3/3	60	5Y 4/1	40	D	M	SiC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____________
Water Table Present? Yes ____ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A   City/County: Orick/Humboldt   Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League   State: CA   Sampling Point: N2-3
Investigator(s): HSU Wetland Soils Class Spring 2016   Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain   Local relief (concave, convex, none): None   Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast   Lat: 412768   Long: 4573103   Datum: UTM 10T
Soil Map Unit Name: 119-Arlynda 0 to 2 percent slopes   NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed?   Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? **Yes** ✓ **No** ___

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus ursinus	20	X	FACU
2.			
3.			
4.			
5.			
= Total Cover	20		
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	90	X	OBL
2. Glyceria occidentalis	15		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	105		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	105	x 1 = 105
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	20	x 4 = 80
UPL species	0	x 5 = 0
Column Totals:	125 (A)	185 (B)

Prevalence Index = B/A = 1.48

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks:

SOIL

Sampling Point: N2-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3							Peat	
3-6.5	5Y 4/1	80	7.5YR 5/8	20	C	RPO	SiC	Oxidized roots
6.5-12	5Y 4/1	60	7.5YR 5/8	40	C	M	SiCL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
✓ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

✓ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 3

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N2-4
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412771 Long: 4573116 Datum: UTM 10T
Soil Map Unit Name: 119-Arlynda 0 to 2 percent slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Glyceria occidentalis	100	X	OBL
2. Lemna sp.	5		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	105		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	105	x 1 =	105
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	105 (A)		105 (B)

Prevalence Index = B/A = 1.0

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N2-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR 3/1	100					Peat	
2-4	2.5Y 3/2	70	7.5YR 4/6	30	C	PL	SiCL	
4-8	2.5Y 3/1	60	7.5YR 4/6	40	C	M	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

✓ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
✓ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ____ Depth (inches): 2.5
Water Table Present? Yes ____ No ✓ Depth (inches): ________
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N2-5

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412748 Long: 4573100 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Ranunculus repens	40	X	FAC
2. Poa pratensis	15	X	FAC
3. Schedonorus arundinacea	15	X	FAC
4. Anthoxanthum odoratum	10		FACU
5. Agrostis stolonifera	10		FAC
6. Plantago major	3		FAC
7. Rumex crispus	2		FAC
8. Taraxacum officinale	1		FACU
9.			
10.			
11.			
= Total Cover	96		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 4

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	85	x 3 =	255
FACU species	11	x 4 =	44
UPL species	0	x 5 =	0
Column Totals:	96 (A)		299 (B)

Prevalence Index = B/A = 3.1

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: N2-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4.5	5Y 3/2	60	7.5YR 4/6	40	C	PL	SiL	
4.5-10.5	5Y 4/1	80	7.5YR 4/4	20	C	PL	SiL	
10.5-19.5	5Y 3/1	65	7.5YR 4/6	35	C	PL	SiCL	
19.5-27.5	5Y 4/1	60	7.5YR 4/4	40	C	PL	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): 22

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N2-6
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412740 Long: 4573100 Datum: UTM 10T
Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____		Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present? Yes ✓ No ____		
Wetland Hydrology Present? Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 1 m^2)			
1. Trifolium repens	50	X	FAC
2. Poa pratensis	30	X	FAC
3. Lolium perenne	10		FAC
4. Anthoxanthum odoratum	10		FACU
5. Bellis perennis	5		NL
6. Schedonorus arundinacea	3		FAC
7.			
8.			
9.			
10.			
11.			
	108	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	93	x 3 = 279
FACU species	10	x 4 = 40
UPL species	0	x 5 = 0
Column Totals:	103 (A)	319 (B)

Prevalence Index = B/A = 3.1

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

US Army Corps of Engineers Western Mountains, Valleys, and Coast – Version 2.0

SOIL

Sampling Point: N2-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4.5	2.5Y 4/2	95	7.5YR 3/4	5	C	RPO	SiL	Compaction
4.5-10	2.5Y 4/2	94	7.5YR 3/4	6	C	PL	SiL	
10-15.5	5Y 4/1	70	5YR 4/6	30	C	PL	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

✓ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N3-1

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412676 Long: 4573213 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

Is the Sampled Area within a Wetland? **Yes** ✓ **No** ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus armeniacus	2	X	FACU
2.			
3.			
4.			
5.			
= Total Cover	2		
Herb Stratum (Plot size: 1 m^2)			
1. Ranunculus repens	50	X	FAC
2. Scheonorus arundinacea	25	X	FAC
3. Juncus effesus	20		FACW
4. Agrostis stolonifera	20		FAC
5. Carex obnupta	5		OBL
6. Plantago major	1		FAC
7. Rumex crispus	1		FAC
8.			
9.			
10.			
11.			
= Total Cover	122		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species	20	x 2 = 40
FAC species	97	x 3 = 291
FACU species	2	x 4 = 8
UPL species	0	x 5 = 0
Column Totals:	122 (A)	344 (B)

Prevalence Index = B/A = 2.81

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

Remarks:

SOIL

Sampling Point: N3-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4.5	2.5Y 3/2	90	7.5YR 3/4	10	C	RPO	CL	
4.5-14	5Y 3/2	98	5YR 3/4	2	C	M	CL	
14-23.5	5Y 3/2	95	10YR 3/4	5	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
✓ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ____________
Water Table Present? Yes ___ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N3-2
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hummock Local relief (concave, convex, none): Convex Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412666 Long: 453213 Datum: UTM 10T
Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ___
Hydric Soil Present? Yes ✓ No ___
Wetland Hydrology Present? Yes ✓ No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Agrostis stolonifera	70	X	FAC
2. Scheonorus arundinacea	45	X	FAC
3. Ranunculus repens	10		FAC
4. Taraxacum officinale	3		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	128		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	125	x 3 =	375
FACU species	3	x 4 =	12
UPL species	0	x 5 =	0
Column Totals:	128 (A)		387 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ 5 - Wetland Non-Vascular Plants[1]
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: N3-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-9	5Y 3/2	90	7.5YR 4/6	10	C	RPO	SiL	
9-25	5Y 3/2	97	7.5YR 2.5/3	2	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N3-3

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Hummock Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412719 Long: 4573221 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	90	X	OBL
2. Rubus armeniacus	35	X	FACU
3. Lysichiton americana	15		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	140		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	105	x 1 = 105
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	35	x 4 = 140
UPL species	0	x 5 = 0
Column Totals:	140 (A)	245 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

US Army Corps of Engineers Western Mountains, Valleys, and Coast – Version 2.0

SOIL

Sampling Point: N3-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-23.5	G1 3/	90	5YR 3/4	10	C	RPO	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
✓ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
✓ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
✓ High Water Table (A2)
__ Saturation (A3)
✓ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
✓ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____________
Water Table Present? Yes ✓ No ____ Depth (inches): 6.5
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N3-4
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hummock Local relief (concave, convex, none): Convex Slope (%): 8
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412623 Long: 4573185 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ✓	No ___	
Wetland Hydrology Present?	Yes ___	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus armeniacus	5	X	FACU
2.			
3.			
4.			
5.			
= Total Cover	5		
Herb Stratum (Plot size: 1 m^2)			
1. Agrostis stolonifera	50	X	FAC
2. Schedonorus arundinacea	40	X	FAC
3. Taraxacum officinale	5		FACU
4. Cirsium arvense	3		FAC
5. Juncus effusus	2		FACW
6. Trifolium repens	1		FAC
7.			
8.			
9.			
10.			
11.			
= Total Cover	106		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ___			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	2	x 2 =	4
FAC species	94	x 3 =	282
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	111 (A)		326 (B)

Prevalence Index = B/A = 2.94

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: N3-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1							Peat	
1-6	10YR 3/1	95	7.5YR 4/6	5	C	M	SiC	Compacted
6-15.5	2.5Y 4/3	100					SiC	
15.5-29.5	2.5Y 4/1	90	2.5Y 4/4	10	C	M	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- __ 2 cm Muck (A10)
- __ Red Parent Material (TF2)
- __ Very Shallow Dark Surface (TF12)
- __ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- __ Salt Crust (B11)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Stunted or Stressed Plants (D1) **(LRR A)**
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)
- __ Raised Ant Mounds (D6) **(LRR A)**
- __ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ______

Water Table Present? Yes ____ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N3-5

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Natural Levee Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412711 Long: 4573194 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: PSS1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓		
Wetland Hydrology Present?	Yes ____ No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Salix lasiolepis	50	X	FACW
2. Alnus rubra	30	~~X~~	~~FAC~~
3.			
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus armeniacus	60	~~X~~	FAC
2.			
3.			
4.			
5.			
	60	= Total Cover	
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	65	X	OBL
2. Ranunculus repens	45	~~X~~	~~FAC~~
3. Juncus effusus	10		FACW
4. Trifolium repens	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	125	= Total Cover 62.5	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	65	x 1 =	65
FACW species	60	x 2 =	120
FAC species	140	x 3 =	420
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	265 (A)		605 (B)

Prevalence Index = B/A = 2.28

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N3-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					SiC	Compacted
5-14	10YR 3/2	100					SiC	
14-24	5Y 2.5/1	95	5YR 3/4	5	C	M	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ______
Water Table Present? Yes ____ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N3-6

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Convex Slope (%): 5

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412704 Long: 4573225 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

Is the Sampled Area within a Wetland? **Yes** ✓ **No** ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	70	X	FAC
2. Agrostis stolonifera	40	X	FAC
3. Juncus effusus	30		FACW
4. Ranunculus repens	25		FAC
5. Trifolium repens	2		FAC
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	167		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	30	x 2 = 60
FAC species	137	x 3 = 411
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	167 (A)	471 (B)

Prevalence Index = B/A = 2.82

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

SOIL

Sampling Point: N3-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-15.5	2.5Y 4/2	90	7.5YR 4/4	10	C	RPO	SiC	
15.5-30	G1 5/	90	2.5YR 3/4	10	C	M	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-1
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hummock Local relief (concave, convex, none): ______ Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412698 Long: 4573310 Datum: UTM 10T
Soil Map Unit Name: 171-Worswick-Arlynda 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	70	X	FAC
2. Rannunculus repens	15		FAC
3. Poa pratensis	5		FAC
4. Plantago lanceolata	2		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	92 = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	2	x 2 = 4
FAC species	90	x 3 = 180
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	92 (A)	184 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N4-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	2.5Y 3/2						SiCL	
3-12	10YR 3/3		2.5Y 5/1	5	D	M	SiCL	
12-27	10YR 4/3		2.5Y 4/1	5	D	M	CL	Oxidized 7.5 YR 5/6
27-31.5	2.5Y 4/3		2.5Y 5/1	10	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)

__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
✓ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)

__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-2
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412709 Long: 4573303 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	80	X	FAC
2. Rannunculus repens	5		FAC
3. Plantago lanceolata	2		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	92		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	2	x 2 =	4
FAC species	85	x 3 =	255
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	27 (A)		259 (B)

Prevalence Index = B/A = 2.98

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: N4-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	2.5Y 3/2						SiCL	
4-18	2.5Y 4/2		5YR 3/4 / 2.5Y 4/3	10/15	C/D	PL/M	SiCL	Depletions in Matrix
18-29.5	2.5Y 4/2						SiCL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-3

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412732 Long: 4573307 Datum: UTM 10T

Soil Map Unit Name: 220-Ferndale 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	90	X	OBL
2. Schedonorus arundinacea	20		FAC
3. Cirsium arvense	8		FAC
4. Ranunculus repens	5		FAC
5. Holcus lanatus	1		FAC
6. Athyrium filix-femina	1		FAC
7.			
8.			
9.			
10.			
11.			
= Total Cover	124		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	0	x 2 =	0
FAC species	34	x 3 =	102
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	124 (A)		192 (B)

Prevalence Index = B/A = 1.55

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

45 cm to water table

SOIL

Sampling Point: N4-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	10YR 3/3						SiCL	
4-7	2.5Y 4/2		10YR 4/6	5	C	M	SiCL	Depletions in Matrix 2.5Y 4/1 (40%)
7-32.5	2.5Y 4/1		10YR 4/6	5	C	M	SiCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ✓ No ___ Depth (inches): 18
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-4

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412768 Long: 4573313 Datum: UTM 10T

Soil Map Unit Name: 119-Arlynda 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____		
Wetland Hydrology Present?	Yes ✓	No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Salix lasiolepis	80	X	FACW
2.			
3.			
4.			
= Total Cover	80		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	50	X	OBL
2. Lysichiton americanus	25	X	OBL
3. Athyrium filix-femina	2		NL
4. Oenanthe sarmentosa	1		OBL
5. Rubus ursinus	1		FACU
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	77		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	76	x 1 =	76
FACW species	80	x 2 =	160
FAC species	1	x 3 =	3
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	157 (A)		239 (B)

Prevalence Index = B/A = 1.52

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N4-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4.5	5Y 3/1		7.5YR 4/6	8	D	M	ML	
4.5-16	5Y 3/1		2.5YR 2.5/4 / 5YR 5/8	15/7	C/C	PL/M	MSiC	
16-31	5Y 3/2		2.5YR 2.5/4	3	C	PL/M	SiC	
31-35.5	5Y 3/2		2.5YR 2.5/4	6	C	M	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
✓ Loamy Mucky Mineral (F1) **(except MLRA 1)**
✓ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

✓ Surface Water (A1)
✓ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
✓ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 12
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-5
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412764 Long: 4573371 Datum: UTM 10T
Soil Map Unit Name: 119-Arlynda 0 to 2 percent slopes NWI classification: PFO1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Picea sitchensis	80	X	FAC
2. Alnus rubra	25	X	FAC
3.			
4.			
	105	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus spectabilis	10	X	FAC
2. Rubus ursinus	5	X	FACU
3.			
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot size: 1 m^2)			
1. Lysichiton americanus	20	X	OBL
2. Carex spp.	15	X	FACW
3. Ranunculus repens	15	X	FAC
4. Carex obnupta	7		OBL
5. Rubus ursinus	5		FACU
6. Plantago major	2		FAC
7. Juncus effesus	1		FACW
8. Belles perrenis	1		NL
9. Athyrium filix-femina	1		NL
10.			
11.			
	65	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	6	(A)
Total Number of Dominant Species Across All Strata:	7	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	86	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	27	x 1 =	27
FACW species	16	x 2 =	32
FAC species	132	x 3 =	396
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	175 (A)		495 (B)

Prevalence Index = B/A = 2.82

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N4-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	10YR 4/1	95	7.5YR 4/6	5	C	M	SiL	
4-12	10YR 4/1	85	7.5YR 4/6	15	C	PL/M	SiL	
12-21	10YR 5/1	80	7.5YR 4/6	10	C	M	SiL	
21-30	10YR 5/1	80	7.5YR 5/6	20	C	M	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-6

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Hummock Local relief (concave, convex, none): Convex Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412758 Long: 4573354 Datum: UTM 10T

Soil Map Unit Name: 119-Arlynda 0 to 2 percent slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Rubus ursinus	85	X	FAC
2. Carex obnupta	20		OBL
3. Schedonorus arundinacea	20		FAC
4. Ranunculus repens	5		FAC
5. Galium sp.	1		FAC
6. Athyrium filix-femina	1		NL
7.			
8.			
9.			
10.			
11.			
= Total Cover	131		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	0	x 2 =	0
FAC species	111	x 3 =	333
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	131 (A)		353 (B)

Prevalence Index = B/A = 2.69

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: N4-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	2.5Y 4/2	97	2.5Y 4/1	3	D	M	SiL	
4-12	2.5Y 5/2	92	5Y 5/1 / 10YR 4/6	5/3	D/C	M	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- [✓ Depleted Matrix (F3)]
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- [✓ Saturation (A3)]
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- [✓ Geomorphic Position (D2)]
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ______ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 9

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N4-6
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hummock Local relief (concave, convex, none): Convex Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412758 Long: 4573354 Datum: UTM 10T
Soil Map Unit Name: 119-Arlynda 0 to 2 percent slopes NWI classification: PFO1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Rubus ursinus	85	X	FAC
2. Carex obnupta	20		OBL
3. Schedonorus arundinacea	20		FAC
4. Ranunculus repens	5		FAC
5. Galium sp.	1		FAC
6. Athyrium filix-femina	1		NL
7.			
8.			
9.			
10.			
11.			
= Total Cover	131		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	0	x 2 =	0
FAC species	111	x 3 =	333
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	131 (A)		353 (B)

Prevalence Index = B/A = 2.69

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: N4-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	2.5Y 4/2	97	2.5Y 4/1	3	D	M	SiL	
4-12	2.5Y 5/2	92	5Y 5/1 / 10YR 4/6	5/3	D/C	M	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 9

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N5-1
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412672 Long: 4573467 Datum: UTM 10T
Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Ranunculus repens	50	X	FACU
2. Rubus armeniacus	45	X	OBL
3. Carex obnupta	40	X	FAC
4. Schedonorus arundinacea	20		FAC
5. Cirsium vulgare	2		FACU
6. Lysichiton americana	2		NL
7.			
8.			
9.			
10.			
11.			
= Total Cover	159		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	45	x 1 =	45
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	52	x 4 =	208
UPL species	0	x 5 =	0
Column Totals:	157 (A)		433 (B)

Prevalence Index = B/A = 2.75

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N5-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-6	10YR 4/2	90	7.5Y 4/6	10	C	RPO	SiL	
6-14	10YR 4/2	92	10YR 3/6	10	C	PL	SiL	
14-17	10YR 4/2	80	7.5YR 3/4	20	C	PL	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ✓ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): 17

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 15

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N5-2

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412659 Long: 4573467 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	70	X	FAC
2. Ranunculus repens	40	X	FAC
3. Rumex crispus	30	X	FAC
4. Bellis perennis	5		NL
5. Plantago major	5		FAC
6. Taraxacum officinale	2		FACU
7.			
8.			
9.			
10.			
11.			
	152 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	67	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	145	x 3 =	435
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	147 (A)		443 (B)

Prevalence Index = B/A = 3.01

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N5-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	10YR 4/3	90	10YR 4/6	10	C	M	SiL	Compacted by livestock
4-8	10YR 5/2	95	10YR 3/6	5	C	M	SiL	
8-14	10YR 3/3	95	10YR 4/6	5	C	M	SiL	
14-24	10YR 3/3	95	10YR 4/6	5	C	M	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): __________
Water Table Present? Yes _____ No ✓ Depth (inches): __________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): __________

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N5-3
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412699 Long: 4573485 Datum: UTM 10T
Soil Map Unit Name: 171-Arlynda-Worswick 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ✓ No ______

Is the Sampled Area within a Wetland? **Yes ✓ No ______**

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Alnus rubra	80	X	FAC
2. Picea sitchensis	20	X	FAC
3.			
4.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus spectabilis	20	X	FAC
2. Rubus parviflorus	5	X	FACU
3.			
4.			
5.			
	25	= Total Cover	
Herb Stratum (Plot size: 1 m^2)			
1. Lysichiton americana	80	X	OBL
2. Ranunculus repens	15		FAC
3. Carex obnupta	5		OBL
4. Urtica dioica	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	105	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	85	x 1 =	85
FACW species	0	x 2 =	0
FAC species	140	x 3 =	420
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	230 (A)		525 (B)

Prevalence Index = B/A = 2.28

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓ No ______**

Remarks:

SOIL

Sampling Point: N5-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	7.5YR 3/1	80	7.5YR 4/6	20	C	M	SiL	
4-12	7.5YR 3/4	80	7.5YR 4/6	20	C	M	SiL	
12-17	7.5YR 5/1	80	7.5YR 5/8	20	C	M	SiCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
✓ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ✓ No ______ Depth (inches): 12

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 12

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N5-4
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Natural Levee Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412635 Long: 4573494 Datum: UTM 10T
Soil Map Unit Name: 171-Worswick-Arlynda complex 0 to 2 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____
Hydric Soil Present? Yes ✓ No ____
Wetland Hydrology Present? Yes ✓ No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Alnus rubra	80	X	FAC
2.			
3.			
4.			
= Total Cover	80		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Ranunculus repens	35	X	FAC
2. Lolium perenne	33	X	FAC
3. Rubus armeniacus	15		FAC
4. Schedonorus arundinacea	15		FAC
5. Trifolium repens	5		FAC
6. Rumex crispus	5		FAC
7. Plantago major	5		FAC
8.			
9.			
10.			
11.			
= Total Cover	113		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	193	x 3 =	579
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	193 (A)		579 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N5-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type¹	Loc²		
0-6	10YR 3/2	90	10YR 3/6	10	C	M	SL	
6-22	10YR 3/3	90	7.5YR 4/4	10	C	M	SL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______________
Water Table Present? Yes ______ No ✓ Depth (inches): ______________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N5-5

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 5

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412670 Long: 4573401 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	60	X	OBL
2. Phalaris arundinacea	50	X	FACW
3. Ranunculus repens	15		FAC
4. Rumex crispus	1		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	126 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	60	x 1 = 60
FACW species	50	x 2 = 100
FAC species	16	x 3 = 48
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	126 (A)	208 (B)

Prevalence Index = B/A = 1.65

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: N5-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5YR 4/2	100					ML	
4-11	7.5YR 4/2	95	7.5YR 4/6	5	C	M	SiL	
11-18	10YR 3/2	95	10YR 5/6	5	C	M	SiL	
18-30	10YR 4/2	95	10YR 5/6	5	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
✓ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

✓ Surface Water (A1)
✓ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 6
Water Table Present? Yes ✓ No ___ Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/16/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: N5-6

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412683 Long: 4573373 Datum: UTM 10T

Soil Map Unit Name: 110-Weott 0 to 2 percent slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** **Yes ✓ No ____**
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	
Remarks:		

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	15	X	FAC
2. Ranunculus repens	10	X	FAC
3. Taraxacum officinale	5		FACU
4. Rumex crispus	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	35 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		
% Bare Ground in Herb Stratum 65			

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	30	x 3 = 90
FACU species	5	x 4 = 20
UPL species	0	x 5 = 0
Column Totals:	35 (A)	110 (B)

Prevalence Index = B/A = 3.14

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓ No ____**

SOIL

Sampling Point: N5-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	10YR 3/2	95	10YR 5/8	5	C	M	SiL	
4-11	10YR 3/2	95	10YR 5/6	5	C	M	SiL	
11-25	10YR 4/2	95	10YR 4/6	5	C	M	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 0.5

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW1-1
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 0-2%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412531 Long: 4573328 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Schedonorus arundinaceus	80	X	FAC
2. Holcus lanatus	20	X	FAC
3. Ranunculus repens	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	110		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	110	x 3 =	330
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		330 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9.5	10YR 4/2	100					SiL	
9.5-15	10YR 4/2	100					SiL	
15-23	10YR 4/2	100					SiL	
23-31	2.5YR 5/1	93	5YR 5/4	7	C		SiCL	
31-35	5YR 5/1	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______________
Water Table Present? Yes ______ No ✓ Depth (inches): ______________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW1-2
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 0-2%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412594 Long: 4573313 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____		
Wetland Hydrology Present?	Yes ✓	No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Carex Obnupta	100	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW1-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5YR 4/2	100						
3-6.5	5YR 4/2	100					PSiC	Root content
6.5-18	5YR 4/2	96	7.5YR 4/2	4	C		SiCL	
18+	5YR 4/4	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______________

Water Table Present? Yes ______ No ✓ Depth (inches): ______________

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW1-3
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 0-2%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412600 Long: 4573347 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PSS1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland?	Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___		
Wetland Hydrology Present?	Yes ✓ No ___		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Salix sp.	80	X	FACW
2.			
3.			
4.			
	80 = Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus armeniacus	5	X	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Ranunculus repens	60	X	FAC
2. Holcus lanatus	20	X	FAC
3. Juncus effusu	10	X	FACW
4. Schedonorus arundinaceus	10	X	FAC
5. Rumex crispis	2		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	102 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	6	(A)
Total Number of Dominant Species Across All Strata:	6	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	90	x 2 = 180
FAC species	97	x 3 = 291
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	187 (A)	471 (B)

Prevalence Index = B/A = 2.51

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ 5 - Wetland Non-Vascular Plants[1]
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: NW1-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3.5	2.5YR 4/2	90	7.5YR 4/3	10	C	RPO	PSiC	
3.5-9.5	2.5YR 4/1	85	10YR 4/4	15	C	RPO	SiL	
9.5-16	10YR 4/2	85	7.5YR 4/3	15	C	LPO	SiL	
16-29	10YR 4/2	100					SiL	
29+	10YR 4/2	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW1-4
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): ______ Slope (%): ______
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412615 Long: 4573331 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PSS1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	**Is the Sampled Area within a Wetland?** Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix sp.	100	X	FACW
2.			
3.			
4.			
	100 = Total Cover		

Sapling/Shrub Stratum (Plot size: 3m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Rubus armeniacus	4	X	FAC
2.			
3.			
4.			
5.			
	4 = Total Cover		

Herb Stratum (Plot size: 1m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ranunculus repens	80	X	FAC
2. Holcus lanatus	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 3m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	104	x 3 =	312
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	204 (A)		512 (B)

Prevalence Index = B/A = 2.51

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: NW1-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 4/2	100					PSiL	
5-10	2.5YR 4/2	100					PSiL	
10-19	2.5YR 4/3	95	7.5YR 4/2	5	C		SiL	
19+	2.5YR 4/2	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): __________
Water Table Present? Yes _____ No ✓ Depth (inches): __________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): __________

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW1-5
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): River valley Local relief (concave, convex, none): ______ Slope (%): ______
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412525 Long: 4573355 Datum: UTM 10T
Soil Map Unit Name: 171- Worswick-Arlynda Complex, 0-2% slopes NWI classification: PFO1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus rubra	80	X	FAC
2.			
3.			
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus armeniacus	60	X	FAC
2.			
3.			
4.			
5.			
	60	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Carex Obnupta	90	X	OBL
2. Athyrium filix-femina	5		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	90	x 1 = 90
FACW species	0	x 2 = 0
FAC species	145	x 3 = 435
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	235 (A)	525 (B)

Prevalence Index = B/A = 2.23

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: NW1-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5.5	10YR 4/1	100					SiL	
5.5-8.5	5YR 4/1	60	7.5YR 4/5	40	C		SiL	
8.5-13.5	N 6/1	60	7.5YR 4/4	40	C		SiL	
13.5-25	N 6/1	70	7.5YR 4/4	30	C		SiL	
25+	N 6/1	70	7.5YR 4/4	30	C		SiL	Gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 26cm

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW2-1
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): linear Local relief (concave, convex, none): _____ Slope (%): _____
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412584 Long: 4573438 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PSS1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	Is the Sampled Area within a Wetland? Yes _____ No ✓
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus armeniacus	85	X	FAC
2.			
3.			
4.			
5.			
= Total Cover	85		
Herb Stratum (Plot size: 1m^2)			
1. Schedonorus arundinaceus	5	X	FAC
2. Ranunculus repens	5	X	FAC
3. Cirsium arvense	5	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	15		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	95	x 3 = 285
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	100 (A)	285 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- _____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- _____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- _____ 5 - Wetland Non-Vascular Plants[1]
- _____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: NW2-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1	2.5YR 4/2	100						
1-10.5	2.5YR 4/2	95	10YR 4/6	5	C	MAT	SiL	Fe
10.5-39.5	2.5YR 4/2	95	10YR 4/6	5	C	MAT	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW2-2

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): linear Local relief (concave, convex, none): ____ Slope (%): <2%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412567 Long: 4573450 Datum: UTM 10T

Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____ Hydric Soil Present? Yes ____ No ✓ Wetland Hydrology Present? Yes ____ No ✓	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 3m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot size: 1m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Holcus lanatus	50	X	FAC
2. Schedonorus arundinaceus	20	X	FAC
3. Ranunculus repens	15		FAC
4. Taraxacum Officionale	5		FACU
5. Trifolium repens	5		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	95 = Total Cover		

Woody Vine Stratum (Plot size: 3m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	95	x 3 =	270
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		285 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW2-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1								
1-14.5	10YR 4/2	100					SiL	
14.5-39.5	2.5YR 4/2	80	5YR 4/6	20	C	MAT	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ____________
Water Table Present? Yes _____ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW2-3
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): linear Local relief (concave, convex, none): ____ Slope (%): 2%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412542 Long: 4573466 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Carex Obnupta	90	X	OBL
2. Rubus armeniacus	5		FAC
3. Ranunculus repens	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		120 (B)

Prevalence Index = B/A = 1.2

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW2-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1								
1-7	10YR 4/2	98	2.5YR 4/8	2	C		SiL	
7-13	10YR 4/2	100					SiL	
13-27	10YR 3/2	100					LS	
27-41	10YR 5/2	98	7.5YR 5/6	2	C		Sil	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)

__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)

__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____________
Water Table Present? Yes ____ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW2-4

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): depressional Local relief (concave, convex, none): ______ Slope (%): 0-2%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412538 Long: 4573471 Datum: UTM 10T

Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?**	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Rubus armeniacus	60	X	FAC
2. Carex Obnupta	30	X	OBL
3. Athyrium filix-femina	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	100		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	60	x 1 = 60
FACW species	0	x 2 = 0
FAC species	40	x 3 = 120
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	100 (A)	180 (B)

Prevalence Index = B/A = 1.8

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW2-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2								
2-13	10YR 4/2	95	7.5YR 5/6	5	C		SiL	
13+	10YR 4/2	95	7.5YR 5/6	5	C		SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ________

Water Table Present? Yes _____ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW2-4

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): depressional Local relief (concave, convex, none): ____ Slope (%): 0-2%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412538 Long: 4573471 Datum: UTM 10T

Soil Map Unit Name: 220-Ferndale, 0-2% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Rubus armeniacus	60	X	FAC
2. Carex Obnupta	30	X	OBL
3. Athyrium filix-femina	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	100		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60	x 1 =	60
FACW species	0	x 2 =	0
FAC species	40	x 3 =	120
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		180 (B)

Prevalence Index = B/A = 1.8

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW2-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2								
2-13	10YR 4/2	95	7.5YR 5/6	5	C		SiL	
13+	10YR 4/2	95	7.5YR 5/6	5	C		SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______________
Water Table Present? Yes ______ No ✓ Depth (inches): ______________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-23-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: NW2-5

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): linear Local relief (concave, convex, none): ______ Slope (%): 2%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412519 Long: 4573481 Datum: UTM 10T

Soil Map Unit Name: 171- Worswick-Arlynda Complex, 0-2% slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus rubra	95	X	FAC
2.			
3.			
4.			
	95 = Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Carex Obnupta	50	X	OBL
2. Ranunculus repens	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	0	x 2 =	0
FAC species	115	x 3 =	345
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	165 (A)		395 (B)

Prevalence Index = B/A = 2.39

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: NW2-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1		100						
1-3.5	10YR 4/2	100					SiL	
3.5-17	10YR 4/2	90	10YR 5/6	10	C		SiL	
17-30	10YR 4/2	85	10YR 5/6	15	C		SiL	
30+	Y 4/1	30	10YR 4/6	70	C		SiCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ✓ No ___ Depth (inches): 66cm
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 75cm

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/23/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: NW3-1
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 2
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412550 Long: 4573550 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale 0 to 2 percent slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus armeniacum	60	X	FAC
2. Athyrium filix-femina	10		FAC
3.			
4.			
5.			
	70	= Total Cover	
Herb Stratum (Plot size: 1 m^2)			
1. Rubus armeniacum	75	X	FAC
2. Athyrium filix-femina	15		FAC
3. Polystichum munitum	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	160	x 3 =	480
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	165 (A)		500 (B)

Prevalence Index = B/A = 3.03

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW3-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1							MSiL	
1-12	2.5YR 3/3	100					L	
12-21	2.5YR 3/2	99	7.5YR 5/6	1	C	M	LS	
21-27.5	10YR 3/2	99	10YR 4/6	1	C	M	L	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___________
Water Table Present? Yes ___ No ✓ Depth (inches): ___________
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___________

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/23/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: NW3-
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 1
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412542 Long: 4573540 Datum: UTM 10T
Soil Map Unit Name: 220-Ferndale 0 to 2 percent slopes NWI classification: PEM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Schedonorus arundinacea	85	X	FAC
2. Cirsium arvense	30		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	115		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	115	x 3 =	345
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	115 (A)		345 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: NW3-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	10YR 3/2	100					MSiL	
3-7	10YR 3/3	100					SiL	
7-16	7.5YR 4/4	100					L	
16-31.5	7.5YR 3/3	100					SiCL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (LRR A)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (LRR A)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ________
Water Table Present? Yes ____ No ✓ Depth (inches): ________
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/23/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: NW3-3
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412525 Long: 4573521 Datum: UTM 10T
Soil Map Unit Name: 171-Worswick-Arlynda complex 0 to 2 percent slopes NWI classification: PFO1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____		
Hydric Soil Present? Yes ____ No ✓	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** ✓
Wetland Hydrology Present? Yes ____ No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Alnus rubra	65	X	FAC
2. Salix lasiolepis	5		FACW
3.			
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Rubus armeniacum	70	X	FAC
2. Carex obnupta	15		OBL
3.			
4.			
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 1 m^2)			
1. Holcus lanatus	70	X	FAC
2. Ranunculus repens	65	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	135	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	5	x 2 =	10
FAC species	270	x 3 =	810
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	290 (A)		835 (B)

Prevalence Index = B/A = 2.88

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

Remarks:

SOIL

Sampling Point: NW3-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1.5	10YR 2/2	100					L	
1.5-8.5	10YR 3/2	100					SiL	
8.5-17	10YR 4/3	100					L	
17-23.5	10YR 4/3	100					SiL	
23.5-29	10YR 4/3	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ____________
Water Table Present? Yes ___ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/23/2016

Applicant/Owner: Save The Redwoods League State: CA Sampling Point: NW3-4

Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412538 Long: 4573517 Datum: UTM 10T

Soil Map Unit Name: 220-Ferndale 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	90	X	OBL
2. Athyrium filix-femina	10		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		120 (B)

Prevalence Index = B/A = 1.2

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: NW3-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/3	95	10YR 4/6	5	C	RPO	MSiL	
3-7	10YR 4/2	95	10YR 5/6	5	C	PL	SiL	
7-25	10YR 4/2	95	7.5YR 5/6	5	C	PL	SiL	
25-31	10YR 4/2	98	10YR 4/3	2	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4/23/2016
Applicant/Owner: Save The Redwoods League State: CA Sampling Point: NW3-5
Investigator(s): HSU Wetland Soils Class Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR): LRR A - Northwest Forest & Coast Lat: 412521 Long: 4573516 Datum: UTM 10T
Soil Map Unit Name: 171-Worswick-Arlynda complex 0 to 2 percent slopes NWI classification: PFO1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No
Hydric Soil Present? Yes ✓ No
Wetland Hydrology Present? Yes ✓ No

Is the Sampled Area within a Wetland? **Yes ✓ No**

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7 m^2)			
1. Sambucus racemosa	65	X	FACU
2. Alnus rubra	40	X	FAC
3.			
4.			
	105 = Total Cover		
Sapling/Shrub Stratum (Plot size: 3 m^2)			
1. Sambucus racemosa	25	X	FACU
2. Rubus armeniacum	20	X	FAC
3.			
4.			
5.			
	85 = Total Cover		
Herb Stratum (Plot size: 1 m^2)			
1. Carex obnupta	20	X	OBL
2. Athyrium filix-femina	1		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	21 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	20	x 1 = 20
FACW species	0	x 2 = 0
FAC species	61	x 3 = 183
FACU species	90	x 4 = 360
UPL species	0	x 5 = 0
Column Totals:	171 (A)	563 (B)

Prevalence Index = B/A = 3.29

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- 5 - Wetland Non-Vascular Plants[1]
- Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓ No**

Remarks:

SOIL

Sampling Point: NW3-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4.5	10YR 3/2	80	7.5YR 5/6	20	C	M	SiL	
4.5-11	10YR 3/2	100					SiL	
11-16	10YR 3/2	100					SiCL	
16-27	10YR 3/3	100					SiL	
27-36	10YR 3/2	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___________
Water Table Present? Yes ___ No ✓ Depth (inches): ___________
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___________

Wetland Hydrology Present? **Yes** ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-1

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): High point of flood channel Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412535 Long: 4572826 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Anthoxanthum oderatum	50	X	FACU
2. Lolium perenne	20	X	FAC
3. Trifolium pratense	20	X	FACU
4. Poa pratensis	15		FAC
5. Plantago lanceolata	12		FACU
6. Ranunculus repens	10		FAC
7. Rumex crispis	7		FAC
8. Taraxacum Officionale	3		FACU
9. Rumex acetosella	2		FACU
10. Bellis perennis	2		NL
11.			
= Total Cover	141		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	52	x 3 =	156
FACU species	87	x 4 =	348
UPL species	0	x 5 =	0
Column Totals:	139 (A)		504 (B)

Prevalence Index = B/A = 3.62

Hydrophytic Vegetation Indicators:

- __ 1 - Rapid Test for Hydrophytic Vegetation
- __ 2 - Dominance Test is >50%
- __ 3 - Prevalence Index is ≤3.0[1]
- __ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ 5 - Wetland Non-Vascular Plants[1]
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: S1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1.5	5YR 3/2	93	5YR 4/6	7	F3M	RPO	PL	Fibric
1.5-9.5	10YR 3/1	93	5YR 4/6	7	F3M	RPO	SiL	
9.5-29.5	N 4/1	90	5YR 4/6	10	F3M	RPO	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

Bottom layer compacted, buried by flood sediments, then surface compacted again.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-2

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Convex Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412534 Long: 4572788 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No ✓	Is the Sampled Area within a Wetland?	Yes ______ No ✓
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Ranunculus repens	35	X	FAC
2. Anthoxanthum oderatum	25	X	FACU
3. Plantago lanceolata	20	X	FACU
4. Poa pratensis	20	X	FAC
5. Lolium perenne	15		FAC
6. Trifolium pratense	15		FACU
7. Rumex crispis	15		FAC
8. Bellis perennis	5		NL
9.			
10.			
11.			
	150 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	85	x 3 =	255
FACU species	60	x 4 =	240
UPL species	0	x 5 =	0
Column Totals:	145 (A)		495 (B)

Prevalence Index = B/A = 3.41

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: S1-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	2.5Y 3/2	90	2.5YR 4/8	10	F3M	RPO	L	Fibric
12-23	5Y 4/1	100					SiL	
23-29.5	5Y 4/1	95	5YR 5/4	5	F3M	RPO	L	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-3

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412471 Long: 4572791 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Trifolium pratense	25	X	FACU
2. Poa pratensis	15	X	FAC
3. Anthoxanthum oderatum	15	X	FACU
4. Plantago lanceolata	15	X	FACU
5. Lolium perenne	15	X	FAC
6. Erodium botrys	10		FACU
7. Trifolium repens	5		FAC
8. Taraxacum officionale	5		FACU
9. Rumex acetosella	4		FACU
10. Rumex crispis	4		FAC
11. Lamiaceae sp./Bellis perennis	4/2		UNK/NL
= Total Cover	119		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	39	x 3 =	117
FACU species	74	x 4 =	296
UPL species	0	x 5 =	0
Column Totals:	113 (A)		413 (B)

Prevalence Index = B/A = 3.65

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: S1-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2.5	2.5Y 3/1	95	5YR 3/4	5	F3M	RPO	SIL	Fibric
2.5-7	10YR 4/2	90	10YR 3/3	10	F3M	MAT	SiL	
7-12	2.5Y4/2	100					SL	
12-29.5	5Y 3/1	100					SL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-4

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Edge of Alder Forest Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412456 Long: 4572749 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓	No ______	
Wetland Hydrology Present?	Yes ✓	No ______	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Ranunculus repens	40	X	FAC
2. Holcus lanatus	20	X	FAC
3. Juncus effusu	20	X	FACW
4. Anthoxanthum oderatum	10		FACU
5. Taraxacum Officionale	7		FAU
6. Lolium perenne	5		FAC
7.			
8.			
9.			
10.			
11.			
= Total Cover	102		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 3%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	65	x 3 =	195
FACU species	17	x 4 =	68
UPL species	0	x 5 =	0
Column Totals:	102 (A)		303 (B)

Prevalence Index = B/A = 2.62

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: S1-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	2.5Y 3/1	98	7.5Y 4/6	5	F3M		SiL	
2-5.5	2.5Y 3/2	82	7.5Y 4/6	10	F3M	RPO	SiL	
5.5-14	2.5Y 3/1	100					SL	
14-29.5	5Y 3/1	100					SL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-5

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412421 Long: 4572797 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No ✓	Is the Sampled Area within a Wetland?	Yes ______ No ✓
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ______ No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Trifolium pratense	25	X	FACU
2. Poa pratensis	25	X	FAC
3. Lolium perenne	15	X	FAC
4. Anthoxanthum oderatum	15	X	FACU
5. Trifolium repens	10		FAC
6. Plantago lanceolata	10		FACU
7. Taraxacum Officionale	10		FACU
8. Bellis perennis	7		NL
9. Rumex crispis	3		FAC
10. Ranunculus repens	2		FAC
11.			
= Total Cover	122		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 1%

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	55	x 3 =	165
FACU species	60	x 4 =	240
UPL species	0	x 5 =	0
Column Totals:	115 (A)		405 (B)

Prevalence Index = B/A = 3.52

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

SOIL

Sampling Point: S1-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/1		7.5Y 4/6		F3M		SiL	
4-9	2.5Y 3/2		7.5Y 4/6		F3M		SiL	
9-23.5	5Y 3/1	100					SiL	
23.5-29.5	5Y 3/1	100					SL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-6

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412400 Long: 4572805 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ✓	No ______	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Ranunculus repens	60	X	FAC
2. Trifolium repens	15	X	FAC
3. Anthoxanthum oderatum	15	X	FACU
4. Festuca perennis	10		FAC
5. Rumex crispis	7		FAC
6. Unknown	2		NI
7. Unknown	2		NI
8. Taraxacum Officionale	2		FACU
9.			
10.			
11.			
	113	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 1%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	92	x 3 =	276
FACU species	17	x 4 =	51
UPL species	0	x 5 =	0
Column Totals:	109 (A)		344 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S1-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3.5	2.5Y 3/2	98		2	F3M	RPO	SiL	
3.5-29.5	2.5Y 4/2	85	5YR 4/2	15	F3M	MAT	SL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)

__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)

__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-7
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ______
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412377 Long: 4572764 Datum: UTM 10T
Soil Map Unit Name: 171- Worswick-Arlynda Complex, 0-2% slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Salix sp.	55	X	FACW
2. Alnus rubra	45	X	FAC
3.			
4.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Rubus armeniacus	35	X	FACU
2. Grass sp.	10	X	UNK
3. Urtica dioica	10	X	FACU
4. Athyrium filix-femina	10	X	FAC
5. Polystichum munitum	10	X	FAC
6. Unkown	5		UNK
7. Unknown	5		UNK
8. Fern sp.	2		UNK
9.			
10.			
11.			
	87	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)
Total Number of Dominant Species Across All Strata: 7 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 85% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	55	x 2 =	110
FAC species	110	x 3 =	330
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	165 (A)		440 (B)

Prevalence Index = B/A = 2.67

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S1-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-29.5	2.5Y 3/2	100					SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

Moist at surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S1-8

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412388 Long: 4572792 Datum: UTM 10T

Soil Map Unit Name: 171- Worswick-Arlynda Complex, 0-2% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus rubra	60	X	FAC
2. Salix sp.	35	X	FACW
3.			
4.			
	95	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus parviflorus	5	X	Fac
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Rubus armeniacus	40	X	FAC
2. Rubus spectabilis	20	X	FAC
3. Urtica dioica	20	X	FAC
4. Unknown	12		FAC
5. Polystichum munitum	5		FACW
6. Grass sp.	1		FACW
7. Athyrium filix-femina	1		FAC
8.			
9.			
10.			
11.			
	99	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	6	(A)
Total Number of Dominant Species Across All Strata:	6	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	41	x 2 =	82
FAC species	124	x 3 =	372
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	165 (A)		454 (B)

Prevalence Index = B/A = 2.75

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ 5 - Wetland Non-Vascular Plants[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S1-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11.5	2.5Y 3/2	100					SiL	
11.5-29.5	2.5Y 3/2	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:
Moist at surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-1
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 0%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412613 Long: 4572775 Datum: UTM 10T
Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______	Hydric Soil Present? Yes ✓ No ______	Wetland Hydrology Present? Yes ✓ No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	65	X	FAC
2. Trifolium repens	20	X	FAC
3. Anthoxanthum oderatum	20	X	FACU
4. Lolium perenne	15		FAC
5. Plantago lanceolata	15		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	135 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	100	x 3 = 300
FACU species	35	x 4 = 140
UPL species	0	x 5 = 0
Column Totals:	135 (A)	440 (B)

Prevalence Index = B/A = 3.3

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S2-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-1.5	10YR 2/1	100					SiCL	
1.5-6	5YR 2.5/1	80	7.5YR 5/8	20	F3M	RPO/SPO	SL	
6-10	5Y 2.5/2	98	7.5YR 5/8	2	F3M	RPO	SL	
10-29.5	5Y 3/1	98	5YR 3/4	2	F3M	MAT	LS	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

First 3 horizons heavily compacted, Redox due to compaction

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16
Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-2
Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression on Floodplain Local relief (concave, convex, none): Concave Slope (%): 2%
Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412604 Long: 4572760 Datum: UTM 10T
Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	50	X	FAC
2. Trifolium repens	35	X	FAC
3. Lolium perenne	25	X	FAC
4. Ranunculus repens	15		FAC
5. Plantago major	10		FAC
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	135		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	135	x 3 =	405
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	135 (A)		405 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:
Hoof prints of Grazers add to bare earth.

SOIL

Sampling Point: S2-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-8.5	10YR 3/1	60	5YR 4/6	40	F3M	LPO	SiL	
8.5-29.5	10YR 4/1	75	7.5YR 5/6	25	F3M	RPO/MAT	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)

__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1) **(except MLRA 1)**
__ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10)
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

Redox due to compaction.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
✓ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
✓ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
✓ Sparsely Vegetated Concave Surface (B8)

__ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Tilled Soils (C6)
__ Stunted or Stressed Plants (D1) **(LRR A)**
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) **(LRR A)**
__ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-3

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412617 Long: 4572738 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus rubra	15	X	FAC
2.			
3.			
4.			
	15	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus ursinus	5	X	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	30	X	FAC
2. Ranunculus repens	20	X	FAC
3. Lolium perenne	20	X	FAC
4. Rumex crispis	10		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	80	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 15%

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across All Strata:	5	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	80%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	95	x 3 =	285
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	100 (A)		305 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: S2-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6.5	10YR 2/1	100						
6.5-7	N 3/1	90	5YR 3/3	10	F3M	MAT	SCL	
7-8.5	10YR 2/1	100						Buried Organic Horizon
8.5-17.5	N 4/1	85	7.5YR 3/4	15	F3M	RPO/MAT	SCL	
17.5+	N 3/1	80	5YR 4/6	20	F3M	MAT	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
✓ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

Redox due to compaction

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
✓ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
✓ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
✓ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0cm

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

pplicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-4

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412594 Long: 4572725 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	40	X	FAC
2. Trifolium repens	25	X	FAC
3. Anthoxanthum oderatum	20	X	FACU
4. Ranunculus repens	10		FAC
5. Plantago lanceolata	10		FACU
6. Bellis perennis	10		NL
7.			
8.			
9.			
10.			
11.			
= Total Cover	115		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	105 (A)		345 (B)

Prevalence Index = B/A = 3.28

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: S2-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	5Y 3/1	80	5YR 3/3	20	F3M	RPO/MAT	SiCL	Heavily Compacted
4-17	2.5Y 2.5/1	90	5YR 3/5	10	F3M	MAT/LPO	SiL	
17-29.5	2.5Y 3/1	100					SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

Redox due to compaction.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): __________
Water Table Present? Yes _____ No ✓ Depth (inches): __________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): __________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-5

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 3%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412575 Long: 4572722 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ✓ No ______

Is the Sampled Area within a Wetland? **Yes** ✓ **No** ______

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	70	X	FAC
2. Trifolium repens	20	X	FAC
3. Ranunculus repens	15		FAC
4. Plantago lanceolata	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	110		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	105	x 3 =	315
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	110 (A)		335 (B)

Prevalence Index = B/A = 3.04

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

SOIL

Sampling Point: S2-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2.5	7.5YR 3/2	100					CL	
2.5-16.5	7.5YR 4/1	80	2.5YR 4/8	20	F3M	MAT	CL	
16.5+	2.5YR 4/1	65	5YR 6/8	35	F3M	MAT	SiC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

Redox due to compaction.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
✓ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
✓ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
✓ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-6

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 0%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412551 Long: 4572645 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus Rubra	25	X	FAC
2.			
3.			
4.			
= Total Cover	25		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Ranunculus Repens	30	X	FAC
2. Poa pratensis	20	X	FAC
3. Anthoxanthum oderatum	20	X	FACU
4. Bellis perennis	10		NL
5. Juncus effusu	5		FACW
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	85		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	5	x 2 = 10
FAC species	75	x 3 = 225
FACU species	20	x 4 = 80
UPL species	0	x 5 = 0
Column Totals:	100 (A)	315 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

- __ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- __ 3 - Prevalence Index is ≤3.0[1]
- __ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ 5 - Wetland Non-Vascular Plants[1]
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: S2-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4.5	5YR 4/1	95	7.5YR 3/4	5	F3M	RPO	SiCL	Mucky, Compacted
4.5-16	10YR 4/1	85	7.5YR 4/6	15	F3M	MAT	SiCL	
16+	5YR 2.5/1	100					LS	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
✓ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:
Redox due to compaction.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-7

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412497 Long: 4572683 Datum: UTM 10T

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus Rubra	40	X	FAC
2. Sambucus racemosa	35	X	FACU
3.			
4.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	35	X	FAC
2. Sambucus racemosa	25	X	FACU
3.			
4.			
5.			
	60	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Carex Obnupta	15	X	OBL
2. Polystichum munitum	10	X	FACU
3. Rubus ursinus	10	X	FAC
4. Ranunculus Repens	2		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	37	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1. Hedera helix	15	X	FACU
2.			
	15	= Total Cover	

% Bare Ground in Herb Stratum 35%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	5	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	60%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	87	x 3 =	261
FACU species	85	x 4 =	340
UPL species	0	x 5 =	0
Column Totals:	172 (A)		626 (B)

Prevalence Index = B/A = 3.58

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: S2-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 4/1	100					S	
9-31	7.5YR 4/1	100					SiC	
31+	10YR 4/2	100					S	Over 75% cobble

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
✓ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

✓ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
✓ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ____________

Water Table Present? Yes _____ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S2-8

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0%

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412486 Long: 4572669 Datum: UTM 10T

Soil Map Unit Name: 102 Fluvents, 2-5% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ______ No ✓

Wetland Hydrology Present? Yes ______ No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Sambucus racemosa	70	X	FACU
2. Alnus Rubra	10	X	FAC
3.			
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	20	X	FAC
2. Sambucus racemosa	20	X	FACU
3.			
4.			
5.			
	40	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Carex Obnupta	60	X	OBL
2. Satchys Chamissonis	10	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60	x 1 =	60
FACW species	10	x 2 =	20
FAC species	30	x 3 =	90
FACU species	90	x 4 =	360
UPL species	0	x 5 =	0
Column Totals:	190 (A)		530 (B)

Prevalence Index = B/A = 2.79

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

US Army Corps of Engineers

SOIL

Sampling Point: S2-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-8.5	10YR 4/1	100					CL	
8.5-16	7.5YR 4/1	100					SiC	
16+	10YR 4/2	70	2.5YR 4/6	30	F3M	MAT	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-1

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412695 Long: 4572910 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓	No ______	
Wetland Hydrology Present?	Yes ✓	No ______	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Juncus effusu	30	X	FACW
2. Ranunculus repens	25	X	FAC
3. Agrostis stonolifera	15	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	85		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 30%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	40	x 3 =	120
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70 (A)		180 (B)

Prevalence Index = B/A = 2.57

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S3-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-19.5	2.5YR 3/1	95	5YR 4/6	5	C	MAT	SiL	
19.5-27.5	2.5YR 3/1	85	2.5YR 3/6	15	C	MAT	SiL	
27.5-35.5	2.5YR 3/1	75	2.5YR 3/6	25	C	MAT	SiL	More distinct redox

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.
[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
✓ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
✓ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
✓ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ________
Water Table Present? Yes ______ No ✓ Depth (inches): ________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-2

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Concave Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412675 Long: 4572879 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	
Hydric Soil Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Wetland Hydrology Present?	Yes ✓	No ______	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			

Sapling/Shrub Stratum (Plot size: 3m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
= Total Cover			

Herb Stratum (Plot size: 1m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Poa pratensis	70	X	FAC
2. Ranunculus repens	8		FAC
3. Trifolium repens	4		FAC
4. Rumex crispis	3		FAC
5. Trifolium pratense	1		FACU
6. Plantago lanceolata	1		FACU
7.			
8.			
9.			
10.			
11.			
= Total Cover	87		

Woody Vine Stratum (Plot size: 3m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 3%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	85	x 3 = 255
FACU species	2	x 4 = 8
UPL species	0	x 5 = 0
Column Totals:	87 (A)	263 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S3-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	5YR 3/1	95	5YR 4/6	5	C	LPO	SiL	
2-6	2.5YR 3/2	97	5YR 4/6	3	C	LPO	SiL	
6-12	5YR 3/1	100					SiL	More distinct redox
12-23.5	2.5YR 3/1	100					SL	
23.5-31.5	2.5YR 3/1	95	7.5YR 4/6	5	C	MAT	SL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☑ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☑ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☑ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) **(LRR A)**
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) **(LRR A)**
☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
C3 due to cattle compactions

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-3

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): ____

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412682 Long: 4572846 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland?	
Hydric Soil Present?	Yes ✓	No ____	Yes ____	No ✓
Wetland Hydrology Present?	Yes ✓	No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Acer macrophyllum	100	X	FACU
2.			
3.			
4.			
= Total Cover	100		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Ranunculus repens	50	X	FAC
2. Anthoxanthum oderatum	10		FACU
3. Taraxacum Officionale	5		FACU
4. Rumex crispis	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	70		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 30%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	55	x 3 =	255
FACU species	115	x 4 =	460
UPL species	0	x 5 =	0
Column Totals:	170 (A)		625 (B)

Prevalence Index = B/A = 3.67

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: S3-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-7.5	2.5YR 2.5/1	95	5YR 3/4	5	C	MAT	L	
7.5-27	2.5YR 3/2	100					SiL	Very velvety, little grit

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
✓ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
✓ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
B8 -may be shade influenced

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-4

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%):

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412653 Long: 4572839 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No
Hydric Soil Present?	Yes ✓	No
Wetland Hydrology Present?	Yes ✓	No

Is the Sampled Area within a Wetland? Yes ✓ No

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Lolium perenne	60	X	FAC
2. Poa pratensis	25	X	FAC
3. Plantago lanceolata	15		FACU
4. Rumex acetosella	10		FACU
5. Trifolium pratense	5		FACU
6. Ranunculus repens	5		FAC
7. Anthoxanthum oderatum	5		FACU
8.			
9.			
10.			
11.			
= Total Cover	125		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	35	x 4 =	140
UPL species	0	x 5 =	0
Column Totals:	125 (A)		410 (B)

Prevalence Index = B/A = 3.28

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No

Remarks:

SOIL

Sampling Point: S3-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-10	5YR 3/2	90	7.5YR 3/4	10	C	MAT	SiL	
10-17	5YR 2.5/2	100					SL	
17-21	5YR 2.5/2	100					SiCL	
21-28	5YR 3/1	100					L	
28-34.5	2.5YR 3/1	100					S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

C3 - caused by cattle compaction

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-5

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): ____

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412638 Long: 4572794 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1. Alnus rubra	5	X	FAC
2.			
3.			
4.			
= Total Cover	5		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	100	X	FAC
2. Urtica dioica	35	X	FAC
3. Rubus armeniacus	5		FAC
4. Plantago lanceolata	1		FACU
5. Stellaria media	1		FACU
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	142		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	142	x 3 =	426
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	147 (A)		446 (B)

Prevalence Index = B/A = 3.03

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: S3-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	5YR 2.5/1	95	7.5YR 3/4	5	C	MAT/LPO	SiCL	
4-7	5YR 2.5/2	95	7.5YR 3/4	5	C	MAT	SiCL	Less diffused
7-21	5YR 3/1	99	7.5YR 4/6	1	C	LPO	SiL	
21-28	5YR 3/2	98	7.5YR 5/6	2	C	MAT	SL	
28-36	2.5YR 3/1	100						

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ________

Water Table Present? Yes ____ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

C3 - caused by cattle compaction

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-6

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): ____

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412617 Long: 4572802 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 7m^2)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	75	X	FAC
2. Trifolium pratense	50	X	FACU
3. Plantago lanceolata	5		FACU
4. Lolium perenne	5		FAC
5. Anthoxanthum oderatum	3		FACU
6. Rumex acetosella	1		FACU
7. Erodium botrys	1		FACU
8.			
9.			
10.			
11.			
	140 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	80	x 3 = 240
FACU species	60	x 4 = 240
UPL species	0	x 5 = 0
Column Totals:	140 (A)	476 (B)

Prevalence Index = B/A = 3.42

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

SOIL

Sampling Point: S3-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	5YR 2.5/1	98	5YR 3/4	2	C	LPO	SiL	
2-5	2.5YR 3/2	85	5YR 3/4	15	C	LPO	SL	
5-16	2.5YR 4/1	100					SL	
16-31	5YR 3/1	100					LS	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
✓ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______________
Water Table Present? Yes ______ No ✓ Depth (inches): ______________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______________

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

C3 - caused by cattle compaction

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Mill A City/County: Orick/Humboldt Sampling Date: 4-9-16

Applicant/Owner: Save the Redwoods League State: CA Sampling Point: S3-7

Investigator(s): HSU Wetland Soils Class, Spring 2016 Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): ______

Subregion (LRR): LRRA - Northwest Forests and Coast Lat: 412617 Long: 4572802 Datum: UTM 10T

Soil Map Unit Name: 196-Madriver, 0-2% Slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ✓	No ______	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 7m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 3m^2)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Poa pratensis	90	X	FAC
2. Rumex crispis	25	X	FAC
3. Ranunculus repens	25		FAC
4. Taraxacum Officionale	1		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	141 = Total Cover		
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	140	x 3 = 420
FACU species	1	x 4 = 4
UPL species	0	x 5 = 0
Column Totals:	141 (A)	424 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: S3-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-9.5	5YR 3/1	98	5YR 3/4	2	C	MAT	SiL	
9.5-15								
15-23								
23-31								
31-35								

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
✓ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? **Yes** ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix D – LACO Delineation Report

ROUTINE WETLANDS DELINEATION

GREEN DIAMOND RESOURCE COMPANY
Former Orick Mill Site
545 Bald Hills Road and 122305 Highway 101
Orick, California

Assessor's Parcel Numbers 520-012-013 and 519-231-018

Prepared for:
Green Diamond Resource Company
Post Office Box 68
Korbel, California 95550-0068

Prepared by:
LACO Associates
21 W. 4th Street
Eureka, California 95501

LACO

March 30, 2012
LACO Project No. 7291.08

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Appendices

I. Introduction

From November 7, 2011 to February 2, 2012, a routine wetland investigation was undertaken by LACO Associates (LACO) staff on two parcels (Assessor's Parcel Numbers (APN) 520-012-013 & 519-231-018) owned by the California Redwood Company in Orick, California (Figure 1). The physical address of the parcel includes 525 Bald Hills Road and 122305 Highway 101, Orick, California. The purpose of the investigation was to assess the property for the presence of wetland habitats and to characterize those habitats if found to be present. LACO staff that conducted the site visits included Mr. Gary Lester (Biologist/Botanist), Mr. Robert Ulibarri (Environmental Scientist), and Ms. Deirdre MacClelland (Associate Planner).

The subject properties are located on the Orick 7.5 minute USGS quadrangle (1975) on portions of Section 34 Township 11N, Range 1E and Section 27 Township 11N, Range 1E, Humboldt Meridian, California. The site is located within Humboldt County's inland zone and is not located within the coastal zone.

The wetland delineation determined the extent of jurisdictional wetlands, pursuant to the United States Army Corps of Engineers (COE) wetland definition (3-parameter approach). The wetland delineation procedure was completed pursuant to the COE 1987 Wetland Delineation Manual. Three 3-parameter wetlands were delineated; the North Wetland comprised of 9.98 acres, the Central Wetland comprised of 0.36 acres, and the South Wetland comprised of 0.07 acres. In addition, a riparian corridor was identified, as well as the limits of Prairie Creek.

The subject site is located on the former Orick Mill Site situated north of the confluence of Prairie Creek and Redwood Creek, in Orick, and south of the area known as Berry Glen. The two subject properties total approximately 102 acres in whole, as calculated by the County of Humboldt WebGIS database. Located approximately 1.25 miles north of Orick, the contiguous properties are bounded by Highway 101 to the west, Bald Hills Road to the south, and National Park lands to the east and north. There is also a single-family residence north of the property along Highway 101. The property is accessed via Bald Hills Road to the south and Prairie Creek Camp Road to the north. Prairie Creek Camp Road extends through the subject site southerly towards the former mill area.

A large portion of APN 520-012-013, the smaller of the two, was a former industrial lumber mill site and contains a paved area approximately 22 acres in size, with irrigation fire hydrants and a gravel berm just west of the paved area. APN 519-231-018 is much larger and is primarily vegetated with creek-side meadow and riparian habitat, an aging barn and accessory structures. A small portion of this parcel includes the paved area. The undeveloped area is split into two grazing fields, which flank Prairie Creek along the western property border. The southern field is currently housing two horses, and the northern field is occupied by over a dozen beef cows. The two fields are separated by the former Bald Hills Road alignment, extending east from Highway 101 and located immediately south of the barn. Residual paving and gravel exist in this area from the abandoned alignment. In general, the entire site, excluding the creek and minimal streamside areas, is disturbed due to the large 22-acre paved area and atypical disturbances caused by grazing activities. Selected photographs of the site are included in Appendix C.

Figure 1 - Project Vicinity

LACO ASSOCIATES EUREKA · UKIAH CONSULTING ENGINEERS 1-800-515-5054 WWW.LACOASSOCIATES.COM	PROJECT FORMER ORICK MILL SITE WETLAND DELINEATION	BY JR		
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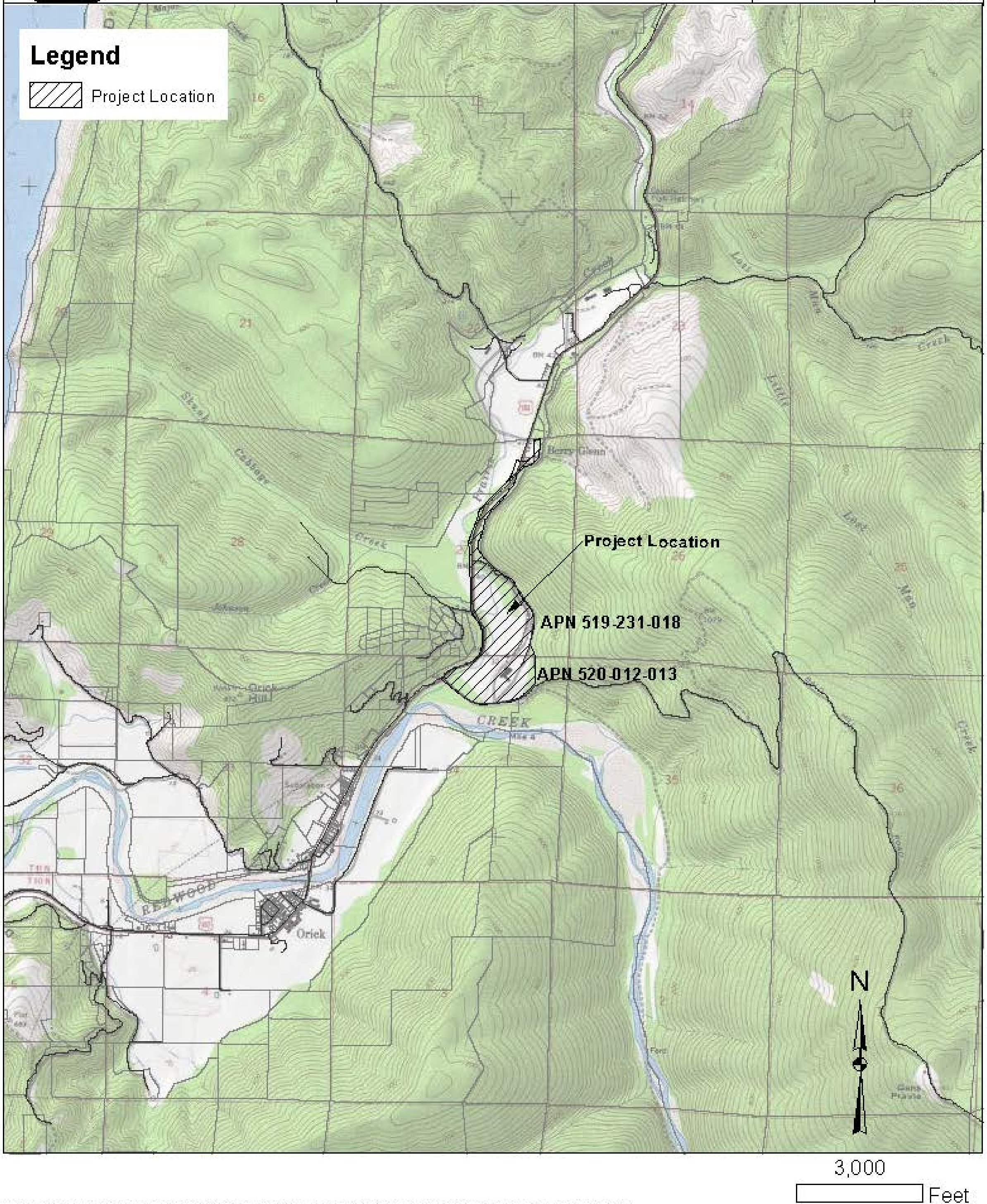
	LOCATION MAP		7291.08	



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II. Methods

Wetlands were delineated using procedures outlined in the *U.S. Army Corps of Engineers (COE) Wetland Delineation Manual (Environmental Laboratory 1987)*. The COE utilizes a 3-parameter approach for making wetland determinations. It is based on the presence of indicators for 1) wetland hydrology (permanent or periodic inundation or saturation of the soil to the surface at some time during the growing season of the prevalent vegetation), 2) a predominance of hydrophytic vegetation (plants adapted to anaerobic conditions resulting from a prolonged inundation with water), and 3) hydric soils (soils that become saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth of hydrophytic vegetation). The COE identifies an area as wetland when all three parameters are present.

The COE also defines two approaches for wetland delineations; the routine approach and the comprehensive approach. The routine approach normally will be used in the vast majority of determinations and was used for the project site. The routine approach requires a reduced level of effort, using primarily qualitative procedures and onsite inspections.

a. Data Collection

Herbaceous vegetation and saplings/shrubs were identified within a 3-foot radius of each soil pit, and trees were identified within a 30-foot radius of each pit, as per COE methodology. Determinations for dominant vegetation were made using visual estimations of percent cover for each stratum (tree, sapling/shrub, and herb) and applying the “50/20” rule. The 50/20 rule indicates that all vegetation be ranked in descending order by percent cover for each stratum and cumulatively totaled. Species that cumulatively total 50 percent, plus any additional species that comprise 20 percent or more of the cover for each stratum are considered dominants.

Plants addressed in the wetland study were identified by their assigned wetland status indicator, taken from the *National List of Plant Species That Occur in Wetlands: 1988* and *1996 National Summary* (Ecology Section U.S. Fish and Wildlife Service), as defined below. Taxonomy for all species listed in this report follows *The Jepson Manual: Higher Plants of California* (Hickman 1993).

- OBL (Obligate Wetland) Occurs in wetlands under natural conditions at an estimated probability > 99 percent;
- FACW (Facultative Wetland) Usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands;
- FAC (Facultative) Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%);
- FACU (Facultative Upland) Usually occurs in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%);
- UPL (Obligate Upland) Occur in wetlands in another region, but occur almost always (estimated probability > 99%) under natural conditions in non-wetlands in the region specified;
- NI (Not Indicated) Recorded for those species for which insufficient information was available to determine an indicator status;
- NL (Not Listed) Generally considered upland; and
- *(Tentative assignment) Due to limited information.

Soil colors were described using *Munsell Soil Color Charts* (2000). Hydric soil determinations are based upon hydric soil indicators that include either a chroma color of 1 or a chroma of 2 with oxidation-reduction (redox) features present. Redox features in the soil usually result from the presence of periodic reducing soil conditions. Soils with bright redox features and/or low matrix chroma are indicative of a fluctuating water regime. Additionally, the presence of gleyed soil in upper horizons is indicative of waterlogged conditions during at least a major part of the growing season and is used to determine wetlands. Gley is a condition in which the soil is under prolonged anaerobic conditions and iron is chemically reduced to compounds that have low-chroma (gray, bluish, or gray-green) colors.

Soils with low chromas were verified as being hydric or upland utilizing the indicators outlined in the document *Field Indicators of Hydric Soils in the United States, Version 7.0, 2010, Natural Resources Conservation Service, 2010*.

Wetland hydrology determinations were based upon the presence of at least one primary indicator (such as inundation or saturation in the upper 16 inches of soil) or at least two secondary indicators, in accordance with COE methodology. The presence of oxidized root channels (called rhizospheres) in the upper 14 inches is considered a secondary wetland hydrology indicator, and suggests that soils likely fluctuate between wet and dry for significant periods of time. At least two secondary indicators are required for a wetland hydrology determination when a primary hydrology indicator is lacking. Another common secondary indicator is the use of the fac-neutral test, wherein plant species with a facultative designation are disregarded (due to their versatility in upland and wetland environments), and the remaining dominants are considered.

III. Environmental Conditions

The project site is on the east side of Highway 101 near Bald Hills Road, and directly east of the channel of Prairie Creek and north of Redwood Creek. One area under study mostly consists of grassy pastures of predominantly non-native species and has historically been used for grazing livestock (APN 519-231-018). The site has been significantly disturbed from past agricultural use, which has largely dominated the development of the vegetation and surrounding area (Appendix C). According to the lessee, the property has been grazed for over 50 years by his family (pers. comm. Ron Barlow). The topography is typical of Redwood Creek flood plains that are flat to very gently undulating with slopes being less than three percent. One large berm was constructed presumably for flood control and divides the property into two distinct areas.

The portion of the study area northeast of Bald Hill Road (APN 520-012-013) includes a large 22± acre paved area that housed the Orick Mill operations of California Redwood Company. The saw mill closed in October 2009, and most buildings have been removed. Equipment including a head rig and edger were moved to the Korbel facility of the California Redwood Company. The Orick sawmill was acquired by Simpson Timber Company (now California Redwood Company) from Arcata Redwood Company in 1988. The sawmill had been in operation since 1954.

a. Soils

According to the California Resource Lab at U.C. Davis the soils are classified as Ladybird-Stonehill (approximately 22% of the site), which consists of gravelly silty clay loam at 16 inches in depth and is a Typic Haplohumult; Worswick–Arlynda (approximately 31% of the site) consists of silt loam and are Fluvaquentic Endoaquepts; and soils that have not been classified due to the asphalt cap at the site (approximately 20% of the site).

The Ladybird series consists of very deep well drained soils that formed in colluvium and residuum from schist, sandstone, and mudstone. Ladybird soils are on mountains and have slopes of 15 to 75 percent.

The Worswick series (U.C. Davis) consists of very deep, very poorly drained soils on backswamps adjacent to natural levees and low flood-plain steps on alluvial plains. These soils formed in alluvium derived from mixed sources. Slopes range from zero to two percent.

Soil color in the upper 16 inches of the soil profile is predominately 10 YR 3/2, with some areas that exhibit redox features and contain gleyed soils. Both the Ladybird-Stonehill and the Worswick–Arlynda soil map classifications have hydric ratings by the Natural Resource Conservation Service. The Worswick series sometimes shows redoximorphic features from 1 to 4 inches and includes most of the surveyed areas.

Several areas include a dense hardpan created presumably by the 60+ years of grazing activities. This hardpan in the A horizon prevents surface hydrology from penetrating and is up to 8 inches in depth. Most of the hardpan areas are located along the riparian corridor where cattle congregate for shade. Specific information on soils follows.

b. Hydrology

The subject property is situated in an elongated, north-south trending alluvial valley flanked by steep, forested hillslopes to the east and west. The valley bottom is mainly open pasture with riparian vegetation. The valley bottom is very gently sloping to the south-southwest at a gradient of less than about one to two percent. The majority of area occupied by the former mill site on the subject property has been elevated above the FEMA 100-year flood zone with the addition of 2- to 10-feet of river-run gravel fill and an elevated berm. On the pasture area, the majority of the area is within Zone A of the 100-year Floodplain according to FEMA and includes areas that fall under Humboldt County’s Streamside Management Area Ordinance (Figure 2).

The project is located within the Mad-Redwood Watershed (USGS Cataloging Unit 18010102), and the Redwood Creek Hydrologic Unit (HU). The Prairie Creek sub basin (USGS Cataloging Unit 18010102000371) includes almost 40 square miles of naturally occurring waterways and encompasses all of the area within the project site (FEMA Q3 data).

The project site occupies a low-gradient, elongated stream valley underlain by a thick sequence of stream and overbank flood deposits. Prairie Creek flows in a southwesterly direction along the northwest edge of the stream valley and is entrenched within a well-incised channel flanked by steep stream banks. A broad alluvial flood plain separates the project site from the active stream channel.

The delineation was performed during late fall and early winter of 2011. Total rainfall was 85 percent of normal rainfall for this time of year. As a result, site review was also conducted after a storm event on December 1, 2011, to observe hydrology. Direct evidence of groundwater (soil saturation, standing water, etc.) was present in some of the plots when the delineation was performed and where hardpan soils were present. Wetland hydrologic conditions were based on direct observation of the water table within 16 inches of the surface.

According to California's Groundwater Update 2003 (Bulletin 118), the project is within the Prairie Creek Groundwater Basin, which is bounded by Lost Man Fault to the east and rocks of the Franciscan Formation on all sides. Hydrogeologic information was collected for the asphalt capped portion of the site by LACO geologists, including wet-weather testing and percolation testing for wastewater disposal designs.

Hydraulic head measurements were made using an electronic water level meter, beginning January 18 through March 9, 2011, by LACO. The groundwater measurements were typically scheduled to occur immediately following significant precipitation events in order to determine the highest groundwater elevations. One monitoring event occurred following 1.73 inches of precipitation that fell during a 24-hour period as measured at the National Oceanic and Atmospheric Administrations (NOAA) weather station located at the Arcata airport in McKinleyville, California.

LACO's monitoring results indicate the hydraulic head elevations within the water table aquifer to fluctuate between about 13 to 18 feet below existing ground surface during the period of measurement. The highest hydraulic head measurements were consistently recorded in the piezometers located along the southerly edge of the area investigated, where the fill soils are generally thinnest and the ground surface elevation is lowest. The lowest hydraulic head measurements were located where the fill soils are thickest and the ground surface elevation is highest. Based on the thickness of imported fill observed in the continuous cores and backhoe test pits, the depth of the groundwater surface below the base of the asphalt cap was consistently observed to be approximately 10 feet.

Specific information on wetland hydrology follows.

c. Vegetation

The majority of the area occupied by the former mill site on the subject property has been elevated above the FEMA 100-year flood zone with the addition of 2 to 10 feet of river-run gravel fill capped by asphalt concrete paving. The paved ground surface is nearly level with no discernible grade. Topographic surveying indicates a less than one percent grade directed to the southwest. Broad drainage swales graded within the fill material and surfaced with paving exist near the southerly and easterly boundaries of the site to direct surface runoff to a drainage ditch that runs along Bald Hills Road.

The Prairie Creek stream channel and associated riparian vegetation occurs adjacent to the northwestern boundary flank of the property, dominated by a red alder (*Alnus rubra*) with scattered Sitka spruce (*Picea sitchensis*), Douglas-fir (*Pseudotsuga menziesii*), coast redwood (*Sequoia sempervirens*), and big-leaf maple (*Acer macrophyllum*) canopy, and with an understory of salmon berry (*Rubus spectabilis*), cascara (*Rhamnus purshiana*), thimbleberry (*Rubus parviflorus*), and ground cover including colt's foot (*Petasites frigidus* var*. palmatus*), sword fern (*Polystichum munitum*), and creeping buttercup (*Ranunculus repens*).

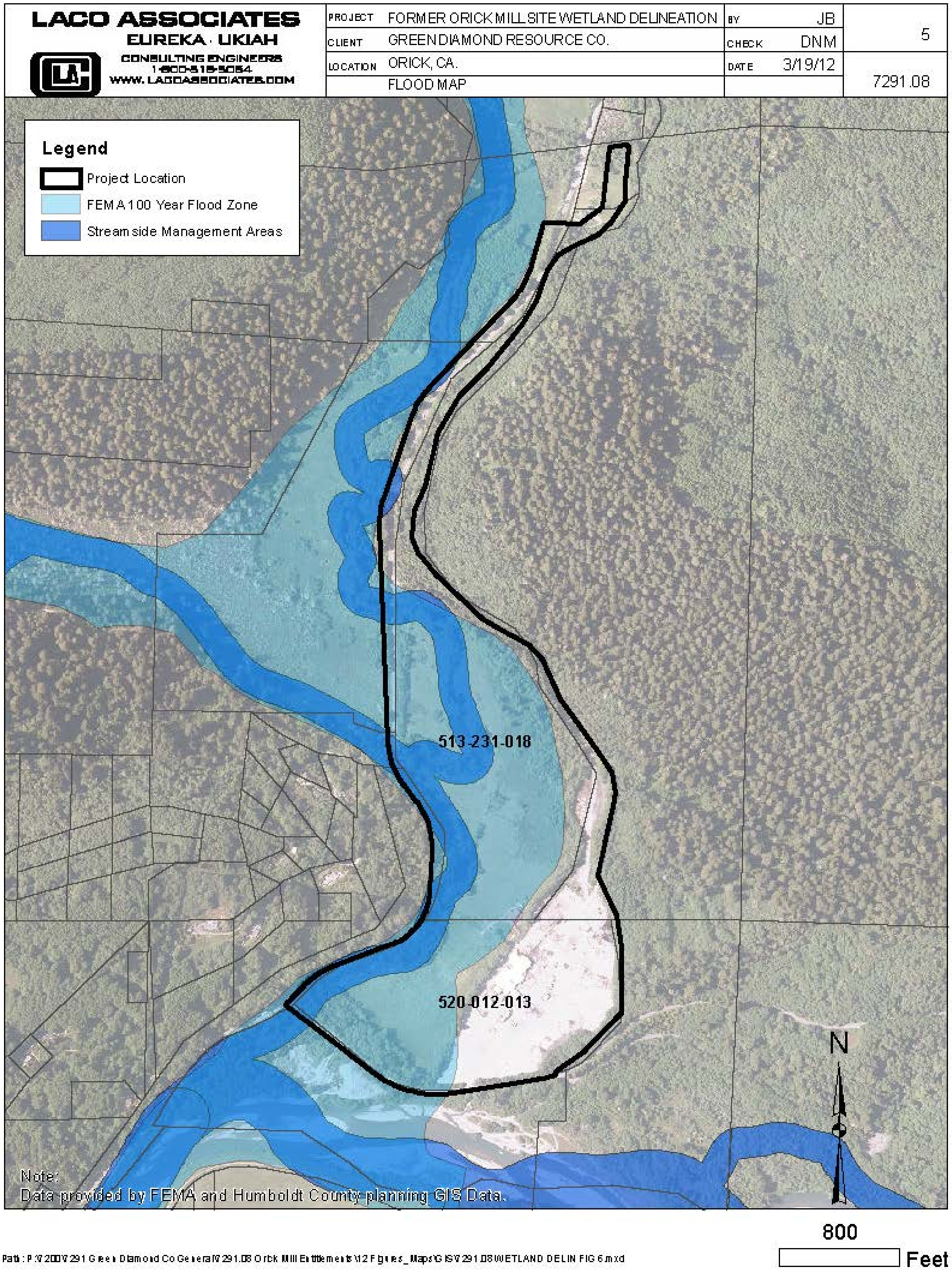
Vegetation along the riparian edges is composed of Himalayan blackberry (*Rubus discolor*) as well as California blackberry (Rubus ursinus) and a variety of native and non-native grasses and herbs. A central large clearing that dominates most of the site is sparsely vegetated by sweet vernal grass (*Anthoxanthum oderatum*), English daisy (*Bellis perennis*), velvet grass (*Holcus lanatus),* perennial ryegrass (*Lolium perenne*), penny royal (*Mentha pulgeium*) and white clover (*Trifolium repens).* Specific information on hydrophytic vegetation follows.

d. National Wetlands Inventory

The National Wetlands Inventory (NWI) project, administered by the U.S. Fish and Wildlife Service (USFWS), was established to generate information about the characteristics, extent and status of the Nation's wetlands and deepwater habitats. This information is used by Federal, State, and local agencies, academic institutions, U.S. Congress, and the private sector. The Emergency Wetland Resources Act of 1986 directs the USFWS to map the wetlands of the United States. NWI data uses the Cowardin classification system (*Classification of Wetlands and Deepwater Habitats of the United States, Cowardin et al, 1985*). According to this system, there are three categories of wetlands within the project area: Riverine, freshwater emergent and freshwater forested/shrub.

Prairie Creek contributes to the wetlands at the site as a Riverine System. The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts. A channel is an open conduit either naturally or artificially created, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water. The creek is a lower perennial waterway with gradients, water velocity, and no tidal influence. It has a well developed floodplain, an unconsolidated bottom, and is permanently flooded with variable scour lines due to seasonable variations in flow due to rainfall.

Figure 2 - FEMA Flood Zone and Streamside Management Areas



Note:
Data provided by FEMA and Humboldt County planning GIS Data.

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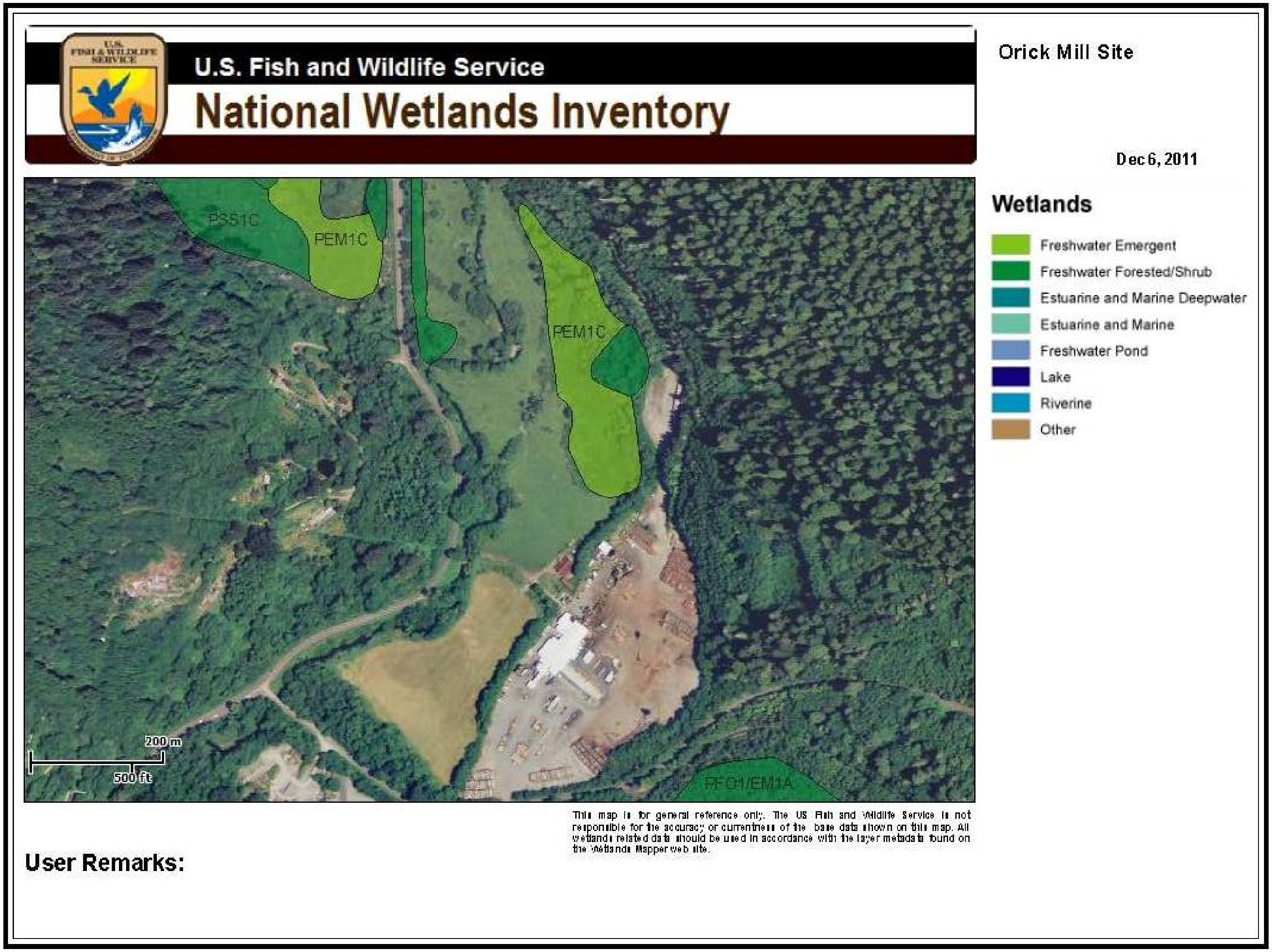
Of the freshwater emergent wetlands, the PEM1C designation in Figure 3 is Palustrine, meaning it is non-tidal, salinity < 0.5 parts per trillion (ppt), water depth < 2 meters, and does not have a wave formed or bedrock shoreline. This wetland is characterized by erect, rooted, herbaceous hydrophytes (aquatic plants), excluding mosses and lichens. The vegetation is present for most of the growing season in most years. This persistent wetland is dominated by plant species that normally remain standing at least until the beginning of the next growing season. PEM1C is also seasonally flooded with surface water present for extended periods in the growing season, but absent by the end of the growing season in most years. The water table is variable and could be saturated to the surface or well below the ground surface.

The freshwater forested/shrub designation includes deciduous broadleaf tall shrub lands that are located in old river terraces where water tables fluctuate seasonally (mostly seasonally flooded regime), in areas that receive nutrient-rich waters. These depressions are poorly drained with fine-textured organic, muck or mineral soils, and standing water common throughout the growing season. This system is a class of freshwater emergent wetlands. For the purposes of this delineation, this area is known as the North Wetland.

The NWI data is not precise. It is important that wetland boundaries are known so that appropriate areas may be protected. Therefore, LACO did examine this wetland and determined that the size was 9.98 acres as compared to the NWI of 9.67 acres.

Buffers should exist around wetlands to ensure that they are not degraded and so that wildlife populations are not disturbed. They should be of sufficient size to ensure wetland features are not degraded by construction or future activities. Buffered areas are mapped in Figure 2 and are based on the County of Humboldt WebGIS and not field conditions.

Figure 3 - National Wetlands Inventory



This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

IV. Wetland Determination

The wetland boundary was evaluated using the COE (3-parameter) methodology. The wetland determination was made with an emphasis on predominance of hydric vegetation and presence of wetland hydrology indicators (one primary or two secondary indicators). These areas were determined to be uplands based on absence of at least one of the three wetland indicators (soils/vegetation/hydrology). All wetland plots (Appendix A) exhibited a predominance of facultative (FAC) or wetter vegetation and most upland plots exhibited predominance of facultative-up (FACU) or drier vegetation.

Once wetland characteristics were determined for each transect, the horizontal location of the upland/wetland boundary were recorded by LACO's land surveyors. Flags were placed in most areas. In some areas, flags were hung on adjacent vegetation along tree drip lines. All flags were mapped by land survey staff at LACO. Survey grade (accurate to 1/10th of an inch) wetland delineation mapping is provided on Appendix A. The Wetland Data Form (Western Mountains, Valleys, and Coast – Version 2.0) documenting conditions observed during the investigation are included in Appendix B.

a. Ordinary High Water Mark (OHWM)

Non-tidal Waters of the U.S./State were mapped and defined at the Ordinary High Water Mark (OHWM) and/or limits of adjacent freshwater emergent wetlands. The OHWM is determined by observance of scour, water-marked vegetation, drift lines, and/or drift deposit. Due to the confined nature of Prairie Creek (Riverine wetland), the OHWM is defined as the top-of-bank (TOB).

b. Riparian Mapping

Riparian mapping was conducted during the wetland delineation. The extent of riparian vegetation was collected based on drip lines of riparian-related plant species. In cases where leaning vegetation/falling branches skewed the extent of the drip line, the average drip line was recorded. Riparian vegetation that was not mapped as wetlands (i.e. lacked wetland soils and/or hydrology) was recorded at the drip line as riparian. (See Photos 9 and 10 of Appendix C).

c. Uplands

Disturbed sites were found throughout study areas dominated by non-native vegetation with poorly drained soils, compacted engineered fill, or the asphalt paved areas. Upland areas on the field map are represented by areas not identified as wetlands.

d. Atypical Situations

Due to historical and present day cattle grazing, several areas are considered "atypical situations". The term atypical situation includes areas in which one or more parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter. At the project site both vegetation and soil have been disturbed sufficiently to render a determination difficult.

Wetland identification challenges related to disturbance are addressed by deciding if the delineation or agency expert has confidence that the evidence obtained (direct observations or indicators) can be used to render a valid decision. If it is determined that the routine methods provided for in section IV of the COE Manual and routine indicators provided in chapters 2 through 4 in the COE Supplement are not sufficient or suitable due to disturbance, then the sampling unit fails to support a typical situation for the factor under consideration (typical and atypical situations are determined for each of the three wetland diagnostic factors independently, not for the sampling unit as a whole). The former Bald Hills Road prism and the area illustrated in Photo 3 of Appendix C are examples of atypical situations at the site.

e. Wetlands

Due to the asphalt paved area that comprises some of APN 520-012-013, none of the three parameters that define wetlands are present in this area. Soil boring logs conducted as part of a wastewater disposal study (LACO Associates, August 31, 2010) indicated that the asphalt paving averages 2 inches deep. Below the asphalt, approximately 15 inches of compacted fill gravel exist. This area is not considered wetlands (See Photo 2 of Appendix C). Hydrophytic vegetation was dominant within all other areas (Appendix B, Data Sheets). Typical vegetation associated with Palustrine Persistent Emergent wetlands and Forested/Shrub includes:

Table 1 – Vegetation at the Site

Common Name	Latin Name	Indicator
coast redwood	*Sequoia sempervirens*	NL
common plantain	*Plantago major*	FAC
velvet grass	*Holcus lanatus*	FAC
sheep sorrel	*Rumex acetosella*	FAC-
lady fern	*Athyrium filix-femina*	FAC
English plantain	*Plantago lanceolata*	FAC-
Canadian thistle	*Cirsium arvense*	FAC-
perennial rye grass	*Lolium perenne*	FAC+
California blackberry	*Rubus ursinus*	FAC+
white clover	*Trifolium repens*	FACU
orchard grass	*Dactylis glomerata*	FACU
sweet vernal grass	*Anthoxanthum oderatum*	FACU
hairy cat's ear	*Hypochaeris radicata*	NL
red clover	*Trifolium pratense*	FACU+
creeping buttercup	*Rannunculus repens*	FACW
Himalaya berry	*Rubus discolor*	FACW
spreading bent grass	*Agrostis stolonifera*	FACW
Pacific willow	*Salix lasiolepis*	FACW
red alder	*Alnus rubra*	FACW
curly dock	*Rumex crispus*	FACW-
English daisy	*Bellis perennis*	NL
soft rush	*Juncus effusus*	OBL
sough sedge	*Carex obnupta*	OBL
dandelion	*Taraxacum officinale*	FACU
Kentucky blue grass	*Poa pratensis*	FAC
English ivy	*Hedera helix*	NL
penny royal	*Mentha pulgeium*	OBL

Most of the above aforementioned species are OBL, FACW, or FAC designated indicator species (USFWS, 1988 and 1996) except for ryegrass, which made up 40 percent of the area.

A part (approximately 10%) of the site has been disturbed due to 60+ years of grazing land use and is considered an atypical situation. For the subject parcels, this includes the area around the barn and trails that connect the north and south wetland areas. Atypical situations are areas where one or more field indicators have been obscured by some recent change. In this case, grazing activities have obscured either soil conditions and/or hydrophytic vegetation (see Photo 3 in Appendix C).

Upland vegetation was not dominant in most upland plots. Most uplands plots contained a predominance of hydrophytic species but lacked hydrology or hydric soils. All upland plots were confirmed by soils and groundwater parameters.

Four Palustrine (freshwater) Emergent Persistent wetlands were confirmed on the study site (labeled North Wetland, Central Wetland, South Wetland on Figure 2 and Appendix A). LACO delineated this North Wetland as 9.98 acres in size. The NWI has the size of this area as 9.67 acres. The rest of the property (just east of the 22-acre paved area) contains areas dominated by hydrophytic vegetation, hydric soils and hydrology; thus there are wetlands in that area of the project site.

Soils in the Palustrine Persistent Emergent seasonally flooded wetlands consisted of loams to clay loams. Wetland soils exhibited redoximorphic features typically found in hydric soils. These features included mottles (iron concentrations) at or above 16 inches from the surface. Wetland (hydric) soils had a matrix color 10YR 4/1 or 10YR 3/2.

Uplands soils had surface colors of 10YR 3/2, the low chroma of which is due to high organic matter. Underlying colors in upland plots were 10YR 3/2+ with no redoximorphic features within 16 inches of the surface. The lack of primary and secondary hydrologic indicators at the upland test pits was verified and the upland determination was corroborated with the identification of vegetation. Table 2 provides the plots that were sampled that correspond to the maps in Appendix A.

The numbering convention for each of the plots is:

> NW, SW, CW, and TP = North Wetland, South Wetland, Central Wetland areas and confirmation Test Pits;
>
> The numeral following represents the consecutive numbering system for each sampling point;
>
> U and W = Upland or Wetland designation
>
> **SO**
>
> NW1U = North Wetland, sampling point 1, classified as Upland.

Table 2 - Plot ID & Determination

Plot ID	Wetland Hydrology	Hydric Soils	Predominance of Hydrophytic Vegetation	Determination
NW1U	no	yes	no	upland
NW2W	yes	yes	yes	wetland
NW3U	no	no	yes	upland
NW4W	yes	yes	yes	wetland
SW1U	no	no	yes	upland
SW2W	yes	yes	yes	wetland
CW1U	no	no	yes	upland
CW2W	yes	yes	yes	wetland
CW3U	no	no	yes	upland
CW4U	no	no	yes	upland
CW5W	yes	yes	yes	wetland
CW6U	no	no	yes	upland
CW7U	no	no	yes	upland
CW8W	yes	yes	yes	wetland
CW9U	no	no	yes	upland
CW10U	no	no	yes	upland
CW11W	yes	yes	yes	wetland
CW12W	yes	yes	yes	wetland
CW13W	yes	yes	yes	wetland
CW14U	no	no	yes	upland
TP1U	no	no	yes	upland
TP2U	no	yes	yes	upland
TP3U	no	yes	yes	upland
TP4U	no	no	yes	upland

V. Discussion

The overall characteristics of the southern parcel (the portion of the parcel that is the paved 22-acre portion of APN 520-012-013) and a small section of APN 513-231-018 are not indicative of wetland habitats.

Wetland vegetation is present throughout the western portion of APN 520-012-013; and this vegetation is composed chiefly of native and exotic annual grasses, some seeded to be used for grazing activities (pers. comm. Ron Barlow). The soils are moist, but well drained, and likely do not become permanently or semi-permanently saturated under normal conditions during the growing season. The portion of the study areas that are labeled as the North Meadow and South Meadow contain three distinct wetland areas as described in Section IV Wetland Determination.

The riparian wetlands, the NWI wetlands, and the delineated wetlands are of high quality. The upland areas include native trees and herbs; however, the area is dominated by non-native grasses and the soil has been displaced in several areas or is not hydric or does not demonstrate hydrological signs. These are 2-parameter wetlands and do not meet the COE wetland definition (3-parameter approach).

The 0.36 acre Central Wetland is separated by the atypical situation. With some enhancement efforts such as the planting of higher quality native wetland vegetation (FACW) and elimination of the cattle, the two wetland areas comprising the Central Wetland could be merged into one larger wetland that could provide quality wetland habitat and function as an infiltration and uptake of run-off water from the 22-acre asphalt area. Run-off from the paved area is already taking place and has been since the days of the mill operation. According to the topographic survey completed by LACO, the asphalt grade was purposely designed to provide run-off from storms and milling operations into this area. Hydrologically, the Central Wetland will continue to receive water from this area.

Conversely, the small isolated 0.07 acre South Wetland could be hydrologically connected to the riparian edge of Prairie Creek to expand those areas that are adjacent and 2-parameter wetlands into one larger high quality habitat. This connection will probably occur naturally with the removal of grazing or by the construction of barriers to keep cattle from grazing in this area.

VI. Findings

Jurisdictional wetlands are present throughout both parcels and are presented in Section V Discussion. The following table provides a synopsis of the wetland name or identification of plot areas and our findings:

Wetland Name & Map ID	Size (acres)	Delineated or Verified	Wetland	Type	Comments
North Wetland	9.98	Both	Yes	3-parameter	This wetland is mapped in the National Wetlands Inventory as freshwater emergent and freshwater forest shrub. There are hydrologic connections with Prairie Creek and its tributaries. The NWI wetland in the western portion was not delineated but was field verified. The large portion that is in the NWI was both delineated and field verified as 9.98 acres. All of this wetland is within APN 519-231-018, which also includes the barn and a portion of the paved area.
Central Wetland	0.36	Delineated	Yes	3-parameter	This wetland is partially located within APN 520-012-013 and APN 519-231-018. It consists of two wetlands separated by an atypical situation. If grazing was eliminated, the two wetlands would probably merge into a larger wetland over time. Both of these wetland areas are hydrologically connected to the stormwater run-off of the larger former mill site to the east and Prairie Creek. The majority of the 22-acre paved area shares APN 520-012-013 (See Below).

Wetland Name & Map ID	Size (acres)	Delineated or Verified	Wetland	Type	Comments
Paved Area	22	No	No	N/A	This parking area is within both APN 520-012-013 and a small portion of APN 513-231-018. During the lumber mill operations, the site was purposely graded so that stormwater run-off and saw mill operations water was discharged into Prairie Creek. This run-off created the Central wetland and today provided the hydrologic connection. An earthen berm was constructed to protect the saw mill from occasional flooding from Prairie Creek. To the east and south of the paved area is a roadside drainage along Bald Hill Road (See Below).
Riparian Drainage	N/A	Verified	Yes	3-parameter	This riparian drainage runs along Bald Hills Road and is fed from run-off from a portion of the 22-acre asphalt parcel, run-off from Bald Hills Road, and small springs and seeps originating from RNP lands. Field verification along shrub drip-lines was completed, however, the asphalt cap and Bald Hills Road meets the edge of the drainage and can not be penetrated.
Southern portion of APN 520-012-013	N/A	Delineated	No	2-parameter	This area located in the South Meadow was delineated and either did not have a predominance of hydrology or hydric soils. This area is labeled as TP (Test Pit) in Figures 2 and 3. As a consequence of the delineation, it is classified as a 2-parameter wetland area and does not meet the definition of a jurisdictional wetland.
South Wetland	0.07	Delineated	Yes	3-parameter	This wetland is located within a depression in the South Meadow and is hydrologically connected to the riparian edge of Prairie Creek. Due to atypical situations involving cattle grazing along the riparian edge of Prairie Creek and overall within the parcel, this wetland is confined to the small 0.07 acre space. If cattle grazing were to be eliminated or the area fenced, this small wetland would increase in size over time.
Prairie Creek Riparian Zone	N/A	Verified	Yes	3-parameter	This riparian area is along Prairie Creek. Riparian mapping was conducted during the wetland delineation. The extent of riparian vegetation was collected based on drip lines of riparian-related plant species. In cases where leaning vegetation and falling branches skewed the extent of the drip line, the average drip line was recorded. Riparian vegetation that was not mapped as wetlands (i.e. lacked wetland soils and/or hydrology) was recorded at the drip line as riparian.

VII. Special Terms and Conditions

To achieve the delineation objectives stated in this report, we based our conclusions on the information available during the period of the investigation, stated above. This report does not authorize any individuals to develop, fill, or alter the wetlands delineated. Verification of the delineation by jurisdictional agencies is necessary prior to the use of this report for site development purposes. Permits to affect wetlands must be obtained from the involved government agencies.

If permits are obtained to develop the delineated wetlands after agency review, and written verification (jurisdictional determination), the delineation is given a five-year expiration period. If filling is used under permitted authority, care should be given to maintain and a sufficient quantity of fill used to prevent reestablishment of wetlands. Land use practices and regulations can change, thereby affecting current conditions and delineation results.

This Report was prepared for the exclusive use of Green Diamond Resources Company. LACO is not liable for any action arising out of the reliance of any third-party on the information contained within this Report.

VIII. References and Literature Cited

Corps of Engineers Wetlands Delineation Manual, 1987. Prepared by Environmental Laboratory, Department of the Army, U.S. Army Corps of Engineers.

Cowardin, 1979. Classification of Wetlands and Deepwater Habitats of the United States, FWS/OBS 79/31. United States Fish and Wildlife Service (FWS).

Hickman, James C., Ed. 1993. The Jepson Manual: Higher Plants of California. University of California Press, Berkeley, CA.

Humboldt County, Title 3, Land Use and Development, Division 1, Planning Zoning Regulations, Chapter 6 - General Provisions and Exceptions, Section 314-61.1, Streamside Management Area Ordinance.

LACO Associates, 2011. Wet-Weather Testing ROF; APNs 520-012-13 and 519-231-18 GDRCo - Orick Mill Site.

McLaughlin, J. & F. Harradine, 1965. Soils of Western Humboldt County California. Cooperative project between the Department of Soils and Plant Nutrition, University of California, Davis and the County of Humboldt, California.

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Natural Resources Conservation Service, 1996. Changes in Hydric Soils of the United States, Federal Register Vol. 61, No. 111, USDA.

Natural Resources Conservation Service, 2002. Field Book for Describing and Sampling Soils, National Soil Survey Center, USDA.

U.S. Fish and Wildlife Service, 1996. National List of Vascular Plant Species That Occur in Wetlands: 1996 National Summary. Compiled by National Ecology Research Center.

United States Department of Agriculture, Natural Resources Conservation Service, Field Indicators of Hydric Soils in the United States, Version 7.0, 2010.

Web Sites

County of Humboldt WebGIS: http://gis.co.humboldt.ca.us/

FEMA Map Service Center (Subscription Required):
https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?langId=-1&storeId=10001&catalogId=10001&ddkey=https:Logoff

NCRS Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

USFWS National Wetland Inventory Data Mapper:
http://www.fws.gov/wetlands/Data/Mapper.html

APPENDIX A

Delineation Maps

APPENDIX A

Mar 27,2012—4:13pm
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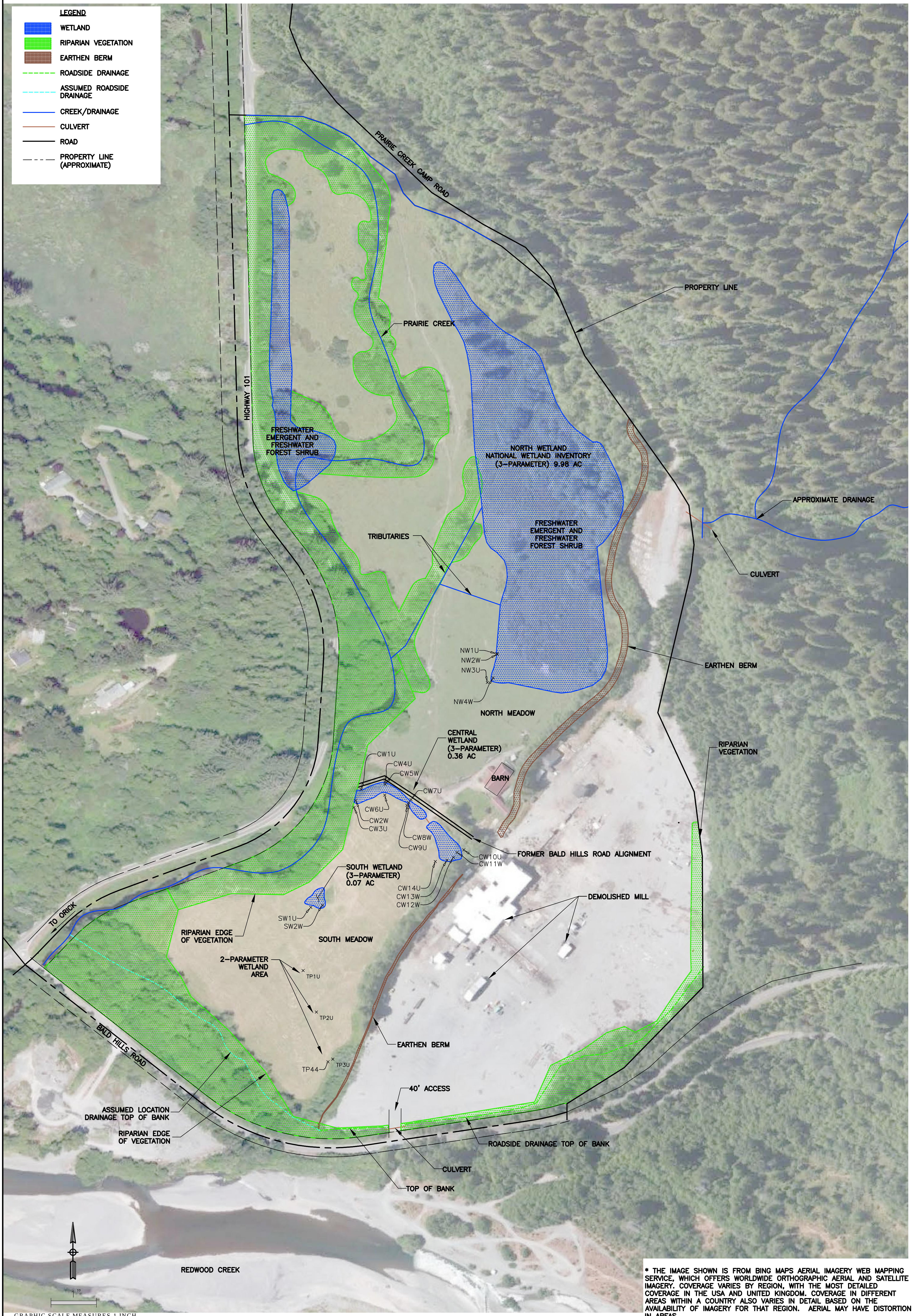
LEGEND

🟦	WETLAND
🟩	RIPARIAN VEGETATION
🟫	EARTHEN BERM
- - -	ROADSIDE DRAINAGE
- - -	ASSUMED ROADSIDE DRAINAGE
—	CREEK/DRAINAGE
—	CULVERT
—	ROAD
— - —	PROPERTY LINE (APPROXIMATE)



* THE IMAGE SHOWN IS FROM BING MAPS AERIAL IMAGERY WEB MAPPING SERVICE, WHICH OFFERS WORLDWIDE ORTHOGRAPHIC AERIAL AND SATELLITE IMAGERY. COVERAGE VARIES BY REGION, WITH THE MOST DETAILED COVERAGE IN THE USA AND UNITED KINGDOM. COVERAGE IN DIFFERENT AREAS WITHIN A COUNTRY ALSO VARIES IN DETAIL BASED ON THE AVAILABILITY OF IMAGERY FOR THAT REGION. AERIAL MAY HAVE DISTORTION IN AREAS.

GRAPHIC SCALE MEASURES 1 INCH
ON FULL-SIZE PLANS.

SCALE	1"=150'
DRAWN	JB
CHECK	MDN
APPVD	
DATE	03/27/12
JOB NO.	7291.08
FIGURE	4

WETLAND DELINEATION REPORT

WETLAND PLOT MAP - OVERALL

GREEN DIAMOND RESOURCE COMPANY

FORMER ORICK MILL, ORICK, CA

NO.	REVISION	BY	CHK	DATE

LACO ASSOCIATES
EUREKA · UKIAH
CONSULTING ENGINEERS
1-800-515-5054
WWW. LACOASSOCIATES.COM

APPENDIX A

Mar 27,2012—4:12pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ 7291.08 WETLAND DELIN FIG 5.dwg

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.

GRAPHIC SCALE MEASURES 1 INCH
ON FULL-SIZE PLANS.

* THE IMAGE SHOWN IS FROM BING MAPS AERIAL IMAGERY WEB MAPPING SERVICE, WHICH OFFERS WORLDWIDE ORTHOGRAPHIC AERIAL AND SATELLITE IMAGERY. COVERAGE VARIES BY REGION, WITH THE MOST DETAILED COVERAGE IN THE USA AND UNITED KINGDOM. COVERAGE IN DIFFERENT AREAS WITHIN A COUNTRY ALSO VARIES IN DETAIL BASED ON THE AVAILABILITY OF IMAGERY FOR THAT REGION. AERIAL MAY HAVE DISTORTION IN AREAS.

SCALE	1"=60'
DRAWN	JB
CHECK	MDN
APPVD	
DATE	03/27/12
JOB NO.	7291.08
FIGURE	5

WETLAND DELINEATION REPORT
WETLAND PLOT MAP

GREEN DIAMOND RESOURCE COMPANY
FORMER ORICK MILL, ORICK, CA

NO.	REVISION	BY	CHK	DATE

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APPENDIX B

Wetland Delineation Forms

✓

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 12/1/11
Applicant/Owner: CRG State: CA Sampling Point: NW1U
Investigator(s): DMM, GSL, LBH Section, Township, Range: ____
Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): none - flat Slope (%): <1
Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ____)			
1. Lolium perenne	40	✓	FAC*
2. Trifolium pratense	40	✓	FACU*
3. Bellis perennis	10		NL
4. Ranunculus repens	10		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	40	x 3 =	120
FACU species	40	x 4 =	160
UPL species	10	x 5 =	50
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: NW1 U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
1-16"	10YR3/2			0				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 12/1/11
Applicant/Owner: CRC State: ______ Sampling Point: NW 2W
Investigator(s): DWM, KSL, LRH Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): none - flat Slope (%): 0
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: PEM 1C NWI classification: Freshwater emergent
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
= Total Cover			

Herb Stratum (Plot size: 3' x 3')	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex obnupta	20	✓	OBL
2. Ranunculus repens	20	✓	FACW
3. Juncus effusus	20	✓	FACW
4. Rubus discolor	20	✓	FAC
5. Rubus ursinus	10		FACU
6. Holcus lanatus	5		FAC
7. Lolium perenne	5		FAC*
8.			
9.			
10.			
11.			
= Total Cover			

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

US Army Corps of Engineers Western Mountains, Valleys, and Coast – Version 2.0

SOIL

Sampling Point: NW2W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 4/1			20				Sandy clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16
Water Table Present? Yes ______ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

hydrology assumed based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 12/1/11

Applicant/Owner: RRC State: CA Sampling Point: NW3U

Investigator(s): DWM, GSL, LRU Section, Township, Range: ______

Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): none - flat Slope (%): <1%

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______ No ✓	
Wetland Hydrology Present?	Yes ______ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 3x3)			
1. Lolium perenne	40	✓	FAC
2. Trifolium repens	40	✓	FAC.
3. Bellis perennis	10		NL
4. Ranunculus repens	10		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: NW3u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR/5/2			0				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16
Water Table Present? Yes ___ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16

Wetland Hydrology Present? **Yes** ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FORMER ORICK MILL City/County: HUMBOLDT Sampling Date: 12/1/11

Applicant/Owner: CRC State: CA Sampling Point: NW4W

Investigator(s): DWM, GSL, LRU Section, Township, Range: ______

Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): none - flat Slope (%): < 1%

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: PEM1C NWI classification: Freshwater emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	**Is the Sampled Area within a Wetland?**	Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:
Sampling Point to confirm NWI classification

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3' x 3')			
1. Trifolium repens	20	✓	FAC
2. Lolium perenne	20	✓	FAC
3. Ranunculus repens	20	✓	FACW
4. Carex obnupta	20	✓	OBL
5. Bellis perennis	10		NL
6. Plantago lanceolata	10		FAC
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	75	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: NW4W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 3/2			50%				clayish loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☑ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) **(LRR A)**
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) **(LRR A)**
☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): 16
Water Table Present? Yes ____ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

assumed based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FORMER ORICK MILL City/County: HUMBOLDT Sampling Date: 11/11/11
Applicant/Owner: CRC State: CA Sampling Point: CW1U
Investigator(s): LRU, GSL, DMM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5%
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
Herb Stratum (Plot size: 3'x3')			
1. Rumex crispus	20	✓	FACW
2. Rubus discolor	20	✓	FAC*
3. Dactylis glomerata	20	✓	FACU
4. Agrostis stolonifera	20	✓	FACW
5. Lolium perenne	20	✓	FAC*
6.			
7.			
8.			
9.			
10.			
11.			
	______ = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
16	10YR/3/3	100		0				sandy silt

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ [✓ No]

Remarks:
no structure to soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ [✓ No] Depth (inches): 16
Water Table Present? Yes ___ [✓ No] Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ [✓ No] Depth (inches): 16

Wetland Hydrology Present? Yes ___ [✓ No]

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FORMER ORICK MILL City/County: ORICK, HUMBOLDT Sampling Date: 11/7/11

Applicant/Owner: CRC State: CA Sampling Point: GW 2W

Investigator(s): DWM, GSL, LMW Section, Township, Range: ____

Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?**	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3' x 3')			
1. Carex obnupta	20	✓	OBL
2. Agrostis stolonifera	20	✓	FACW
3. Juncus effusus	20	✓	FACW+
4. Rubus discolor	20	✓	FAC+
5. Ranunculus repens	20	✓	FACW
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: CW2W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR/3/2	75		25				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16"
Water Table Present? Yes ___ No ✓ Depth (inches): 16"
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
assumed hydrology based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/11/11
Applicant/Owner: CRC State: CA Sampling Point: CW3U
Investigator(s): LRU / GSL / DNM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
Herb Stratum (Plot size: 3'x3')			
1. Anthoxanthum odoratum	20	✓	FACU
2. Lolium perenne	20	✓	FAC*
3. Trifolium repens	20	✓	FAC
4. Agrostis stolonifera	20	✓	FACW
5. Ranunculus repens	15	✓	FACW
6. Plantago lanceolata	5		FAC-
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW3U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100	N/A					sandy loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

No Redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16"
Water Table Present? Yes ___ No ✓ Depth (inches): 16"
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 1/7/11

Applicant/Owner: CRC State: ______ Sampling Point: CW4U

Investigator(s): DWM, LSL, LRH Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Alluvial Local relief (concave, convex, none): Concave Slope (%): 5

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 3'x3')			
1. Juncus effusus	20	✓	FACW+
2. Agrostis stolonifera	20	✓	FACW
3. Ranunculus repens	20	✓	FACW
4. Rubus discolor	20	✓	FAC+
5. Rumex crispus	20	✓	FACW
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW44

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-16"	N/A			0				Former road bed, gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16"
Water Table Present? Yes ___ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/11/11
Applicant/Owner: CBC State: CA Sampling Point: CWSW
Investigator(s): DWM, GSL, LRM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 3' x 3')			
1. Juncus effusus	20	✓	FACW+
2. Agrostis stolonifera	20	✓	FACW
3. Rannunculus repens	20	✓	FACW
4. Rubus discolor	20	✓	FAC+
5. Rumex crispus	20	✓	FACW-
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW5W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR3/2			15				sandy loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ________________

Depth (inches): ________________

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16
Water Table Present? Yes ___ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

assumed based on soil profile and vegetation

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/11/11

Applicant/Owner: cRC State: CA Sampling Point: CWG1A

Investigator(s): DWM, GSL, LRM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No /	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 3'X3')			
1. Juncus effusus	20	✓	FACW +
2. Agrostis stolonifera	20	✓	FACW
3. Rannunculus repens	20	✓	FACW
4. Rubus discolor	20	✓	FAC+
5. Rumex crispus	20	✓	FACW
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	= Total Cover		
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW 6U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 2/2			0				

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16
Water Table Present? Yes ______ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/7/11
Applicant/Owner: CRC State: CA Sampling Point: CW7U
Investigator(s): DWM, GSL, LRM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	**Is the Sampled Area within a Wetland?**	Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓		
Wetland Hydrology Present?	Yes ______	No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	______ = Total Cover		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		

Herb Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus effusus	30	✓	FACW+
2. Agrostis stolonifera	30	✓	FACW
3. Trifolium repens	20	✓	FAC
4. Ranunculus repens	10		FACW
5. Rubus discolor	10		FAC+
6.			
7.			
8.			
9.			
10.			
11.			
	______ = Total Cover		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW34

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR3/2			0-5				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___
Water Table Present? Yes ___ No ✓ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former brick Mill City/County: Humboldt Sampling Date: 11/7/11
Applicant/Owner: CRC State: CA Sampling Point: CW 8W
Investigator(s): DMM, GSL, LRM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ✓
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3'x3')			
1. Juncus effusus	40	✓	FACW+
2. Agrostis stolonifera	20	✓	FACW
3. Ranunculus repens	20	✓	FACW
4. Rubus discolor	20	✓	FAC+
5. Rumex crispus	20	✓	FACW-
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	5	(A)
Total Number of Dominant Species Across All Strata:	5	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: CW3W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR/3/2			50				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16
Water Table Present? Yes ______ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

assumed based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Brick Mill City/County: Humboldt Sampling Date: 11/9/11

Applicant/Owner: CRC State: ____ Sampling Point: CW9U

Investigator(s): DNM, LSI, LRM Section, Township, Range: ____

Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ____	No ✓
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		

Sapling/Shrub Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		

Herb Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species?	Indicator Status
1. Juncus effusus	20	✓	FACW+
2. Agrostis stolonifera	20	✓	FAC
3. Anthoxanthum odoratum	20	✓	FACU
4. Trifolium repens	20	✓	FAC
5. Ranunculus repens	15		FACW
6. Plantago lanceolata	5		FAC-
7.			
8.			
9.			
10.			
11.			
	____ = Total Cover		

Woody Vine Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	____	x 1 =	____
FACW species	____	x 2 =	____
FAC species	____	x 3 =	____
FACU species	____	x 4 =	____
UPL species	____	x 5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: CW94

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR3/2			<5				

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16
Water Table Present? Yes ___ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former brick Mill City/County: Humboldt Sampling Date: 11/11/11
Applicant/Owner: CRC State: ______ Sampling Point: CW10U
Investigator(s): DWM, LSL, LRU Section, Township, Range: ______
Landform (hillslope, terrace, etc.): alluvial Local relief (concave, convex, none): concave Slope (%): 10
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ✓	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 3'x3')			
1. Sequoia sempervirens	70	✓	NI
2.			
3.			
4.			
= Total Cover	70		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3'x3')			
1. Rubus discolor	40	✓	FAC+
2. Trifolium repens	30	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW104

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 3/2			5			crumbly	sandy/clayey

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16

Water Table Present? Yes ______ No ✓ Depth (inches): 16

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/16/11

Applicant/Owner: CRC State: CA Sampling Point: CW11W

Investigator(s): DWM, GSL, LRH Section, Township, Range: ____

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): Concave Slope (%): 10

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3'x3')			
1. Rannunculus repens	35	✓	FACW
2. Juncus effusus	35	✓	OBL
3. Rubus discolor	20	✓	FAC+
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: CW 11W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	2.5YR 2.5/1			0			gley	very moist, saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16
Water Table Present? Yes / No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Brick Mill City/County: Humboldt Sampling Date: 11/11/11
Applicant/Owner: CRC State: CA Sampling Point: CW12W
Investigator(s): DKM, GSL, LRM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Concave Slope (%): 10
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3'x3')			
1. Trifolium repens	20	✓	FAC
2. Rumex crispus	20	✓	FACW
3. Lolium perenne	20	✓	FAC+
4. Rubus discolor	20	✓	FAC+
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: LW 12W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-16"	10YR 3/2			10			clayish sandy loam	slight ribbon, crumbly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☑ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) **(LRR A)**
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) **(LRR A)**
☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): 16
Water Table Present? Yes ____ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

hydrology assumed based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former on Ac Mill City/County: Humboldt Sampling Date: 11/11/11

Applicant/Owner: CRC State: CA Sampling Point: CW13W

Investigator(s): DMM, GSL, LRM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Herb Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species?	Indicator Status
1. Ranunculus repens	30	✓	FACW
2. Rubus discolor	30	✓	FAC+
3. Agrostis stolonifera	30	✓	FACW
4. Trifolium repens	10		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: CW13W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-16	10YR/3/2			10				clay sandy loam strait ribbon

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________
Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16
Water Table Present? Yes ______ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

hydrology assumed based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former brick Mill City/County: Humboldt Sampling Date: 11/1/11
Applicant/Owner: C2C State: CA Sampling Point: CW144
Investigator(s): DWM, GSL, LRM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓		
Wetland Hydrology Present?	Yes ____ No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3'x3')			
1. Trifolium repens	30	✓	FAC
2. Rubus discolor	20	✓	FAC+
3. Anthoxanthum odoratum	30	✓	FACU
4. Rumex crispus	10		FACW-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: CW144

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-16"	10YR3/2			0				

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ______ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16

Water Table Present? Yes ______ No ✓ Depth (inches): 16

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16

Wetland Hydrology Present? **Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/11/11
Applicant/Owner: CRC State: CA Sampling Point: SW 1U
Investigator(s): DWM, GSL, LRU Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
Herb Stratum (Plot size: 3' x 3')			
1. Trifolium repens	20	✓	FAC
2. Ranunculus repens	20	✓	FACW
3. Rumex crispus	20	✓	FACW
4. Lolium perenne	20	✓	FAC*
5. Anthoxanthum odoratum	10		FACU
6. Plantago lanceolata	5		FAC
7. Bellis perennis	5		NI
8.			
9.			
10.			
11.			
	______ = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	______ = Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: SW1 e1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 4/2			<1				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16"
Water Table Present? Yes ______ No ✓ Depth (inches): 16"
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16"

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Former Orick Mill City/County: Humboldt Sampling Date: 11/11/11

Applicant/Owner: ______ State: CA Sampling Point: SW 2W

Investigator(s): ______ Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave & convex Slope (%): 5

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓	No ______	
Wetland Hydrology Present?	Yes ✓	No ______	

Remarks: hydrology assumed based on soil & vegetation

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 3' x 3')			
1. Trifolium repens	20	✓	FAC
2. Ranunculus repens	20	✓	FACW
3. Rumex crispus	20	✓	FACW-
4. Lolium perenne	20	✓	FAC*
5. Anthoxanthum odoratum	5		FACU
6. Plantago lanceolata	5		FAC-
7. Bellis perennis	5		NI
8. Plantago major	5		FAC
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: SW2W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR/4/2			20				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☑ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ✓ No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) **(LRR A)**
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) **(LRR A)**
☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16
Water Table Present? Yes ___ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ✓ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

hydrology assumed based on soil profile

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FORMER BRICK MILL City/County: HUMBOLDT Sampling Date: 2/9/12

Applicant/Owner: CRC State: CA Sampling Point: TP1 U

Investigator(s): ______ Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ✓
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 3X3')			
1. Lolium perenne	30	✓	FAC*
2. Trifolium repens	30	✓	FAC
3. Ranunculus repens	30	✓	FACW
4. Rumex crispus	10		FACW-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: TP1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-16"	10YR 3/2			<2				

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ______

Water Table Present? Yes ___ No ___ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ______

Wetland Hydrology Present? **Yes** ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FRMER ORICK MILL City/County: HUMBOLDT Sampling Date: 11/11/11
Applicant/Owner: CRC State: ______ Sampling Point: TP2U
Investigator(s): DWM, GSL, LRG Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ALLUVIAL Local relief (concave, convex, none): concave Slope (%): 5
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ______ No ✓

Is the Sampled Area within a Wetland? **Yes** ______ **No** ✓

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 3' x 3')			
1. lolium perenne	40	✓	FAC*
2. Trifolium repens	20	✓	FAC
3. Ranunculus repens	20	✓	FACW
4. Plantago lanceolata	10		FAC-
5. Rumex crispus	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ______

Remarks:

SOIL

Sampling Point: TP2U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 3/2			15			Crumbly	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): 16
Water Table Present? Yes ___ No ✓ Depth (inches): 16
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): 16

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

[illegible]

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FORMER ORICK MILL City/County: HUMBOLDT Sampling Date: 11/11/11

Applicant/Owner: CRC State: ______ Sampling Point: TP31A

Investigator(s): DAM, GSL, LRM Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ______ No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 3' x 3')			
1. Lolium perenne	30	✓	FAC*
2. Trifolium repens	20	✓	FAC
3. Ranunculus repens	20	✓	FACW
4. Plantago lanceolata	3		FAC-
5. Rumex crispus	5		FACW-
6. Circium arvense	2		FAC-
7. Alnus rubra	5	✓	FACW
8. Salix lasiolepis	5	✓	FACW
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: TP3U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 3/1			15				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16

Water Table Present? Yes ______ No ✓ Depth (inches): 16

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 14

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: FORMER ORICK MILL City/County: HUMBOLDT Sampling Date: 11/11/11
Applicant/Owner: CRC State: ______ Sampling Point: TP4U
Investigator(s): DMM, GSL, LRM Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Flat Slope (%): <1
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ______ No ✓
Hydric Soil Present?	Yes ______ No ✓		
Wetland Hydrology Present?	Yes ______ No ✓		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
Herb Stratum (Plot size: 3' x 3')			
1. Bellis perennis	20	✓	NL
2. Plantago lanceolata	20	✓	FAC*
3. Trifolium repens	20	✓	FAC
4. Hypochaeris radicata	20	✓	FACU
5. Rumex acetosella	20	✓	FAC-
6.			
7.			
8.			
9.			
10.			
11.			
	______ = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	______ = Total Cover		
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 60% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: TP4U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR3/1			0				

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): 16"
Water Table Present? Yes ______ No ✓ Depth (inches): 16"
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): 16"

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C

Selected Site Photographs

Selected Site Photographs
Orick Mill Site
APN 520-012-013 & 519-231-018

Photo 1 - Barn built circa 1940

Photo 2 - View of 40-acre Asphalt Cap

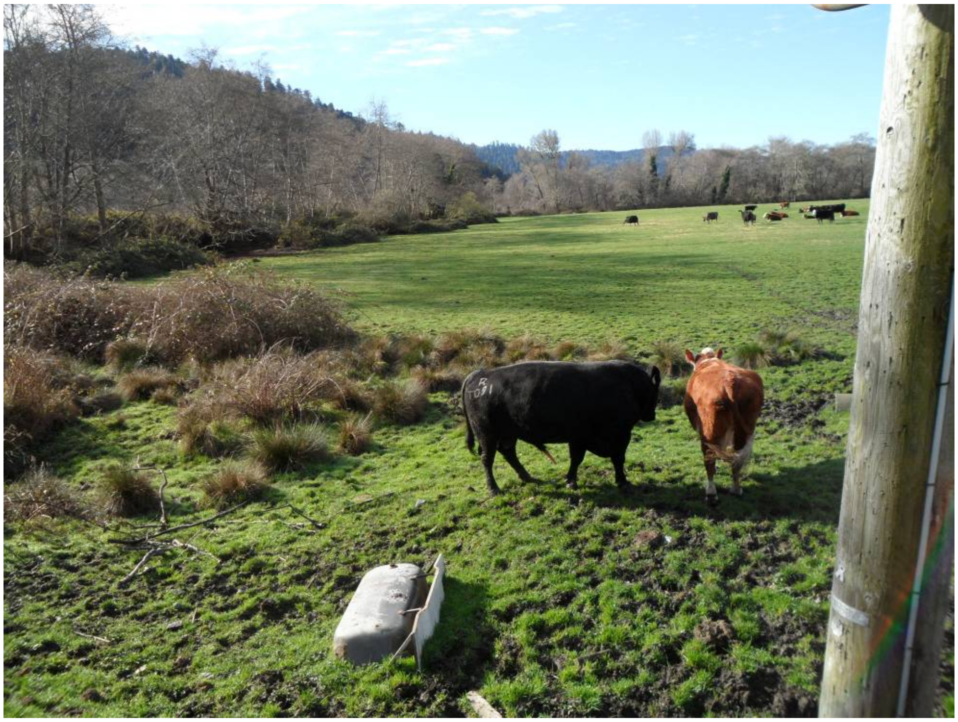

Photo 3 - South entrance to grazing area. Note atypical situation due to cattle grazing and wetlands to the left.

Photo 4 - Remnants of old Bald Hills Road which washed out during the 1964 flood.

Photo 5 - South Meadow

Photo 6 - North Meadow

Photo 7 - North Meadow October 28, 2011

Photo 8 – North Meadow after storm event of January 19, 2012

Photo 9 - Drainage ditch along Bald Hills Road (Riparian)

Photo 10 - Prairie Creek Riparian Zone

Photo 11 - Typical 3-Parameter Wetland in North Meadow

Appendix E – NHE OHWM Technical Memorandum

Northern Hydrology and Engineering
PO Box 2515, McKinleyville, CA 95519
Telephone: (707) 839-2195; email: nhe@northernhydrology.com
Engineering – Hydrology – Geomorphology – Water Resources

TECHNICAL MEMORANDUM

Date: 11 September 2018

To: Christine Aralia
Senior Manager of Conservation

Save the Redwoods League
11 Sutter Street, 11th Floor
San Francisco, CA 94104

From: Jeffrey K. Anderson, P.E, Bonnie Pryor, Corin Pilkington, and Brian Draeger

Re: Prairie Creek Ordinary High Water Estimate in Support of the Prairie Creek Restoration Project, Humboldt County, CA

Introduction

The purpose of this technical memorandum (memo) is to summarize Northern Hydrology and Engineering (NHE) estimate of ordinary high water (OHW) along a reach of Prairie Creek in support of the Prairie Creek Restoration and Project (Project). The Project is located on property owned by Save the Redwood League just north of Orick, CA (Figure 1).

Ordinary high water mark (OHWM) is defined in US Army Corps of Engineers Regulations 33 CFR 328.3(e) as:

> "The term *ordinary high water mark* means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas."

Methods

In perennial, humid, temperate climates with relatively low interannual stream flow variability (compared to arid regions), the OHWM is commonly reported to be within the 1- to 2-year flood recurrence interval (Wohl, 2016). The 1.05- and 2-year flood flows are approximately 820 to 3,300 cfs, respectively, within the project reach based on a flood frequency analysis (FFA) conducted by NHE as part of the Project (NHE, 2014; NHE et al., 2016). NHE maintains a stream gage (Highway 101 Gage) on Prairie Creek at the upstream end of the Project area (Figure 1). Annual peak flows during the 3-year stream gage record (WY 2016-2018) range from 793 to 3,129 cfs, which are in close agreement with the estimated 1.05- and 2-year recurrence interval flood flows.

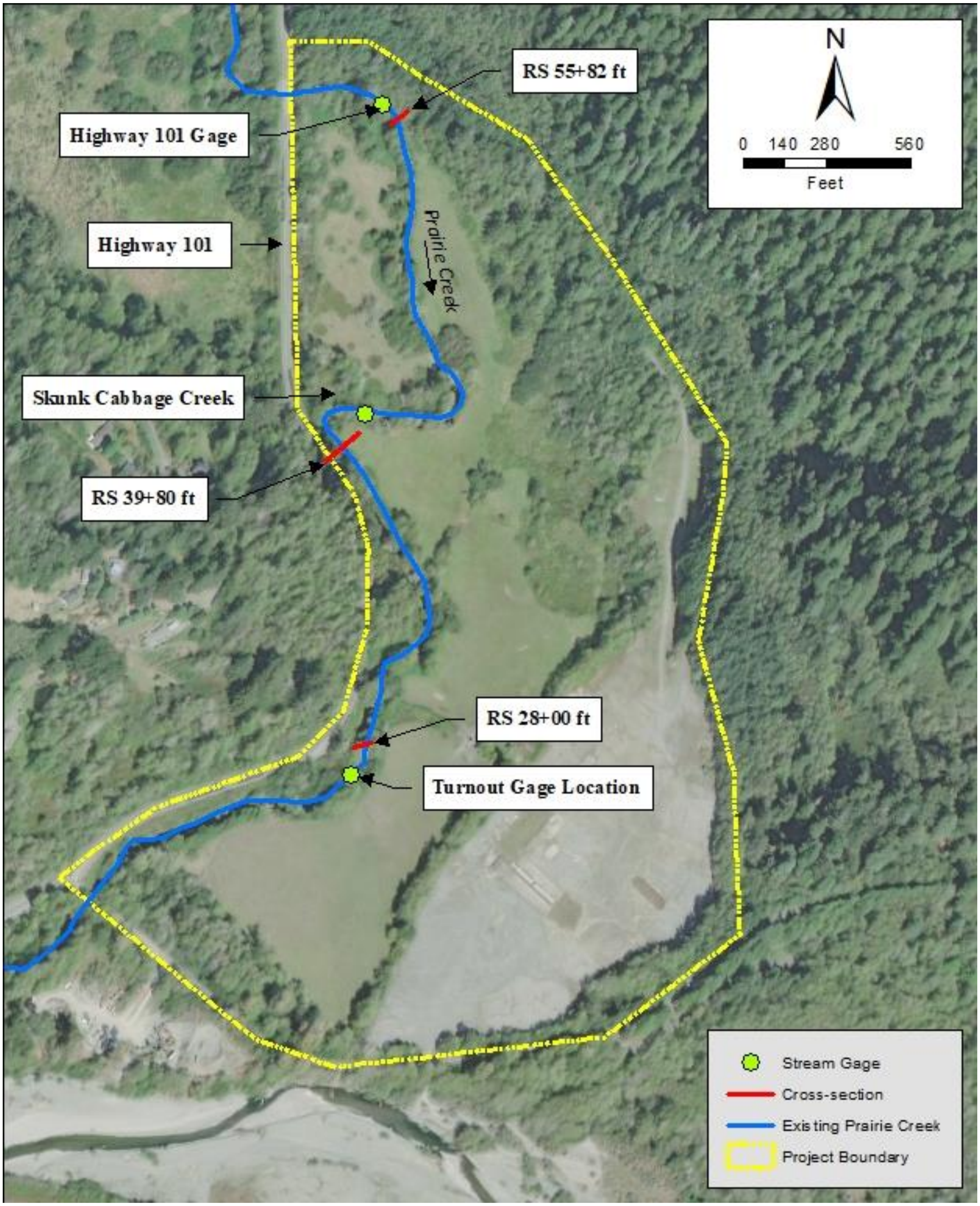

Figure 1. Prairie Creek Restoration Project area and ordinary high water observation locations.

Hydraulic analysis of the site (NHE et al., 2016) indicates that the 1.05-year flow is contained within the channel, while the 2-year flow inundates the adjacent floodplain (Figure 2).

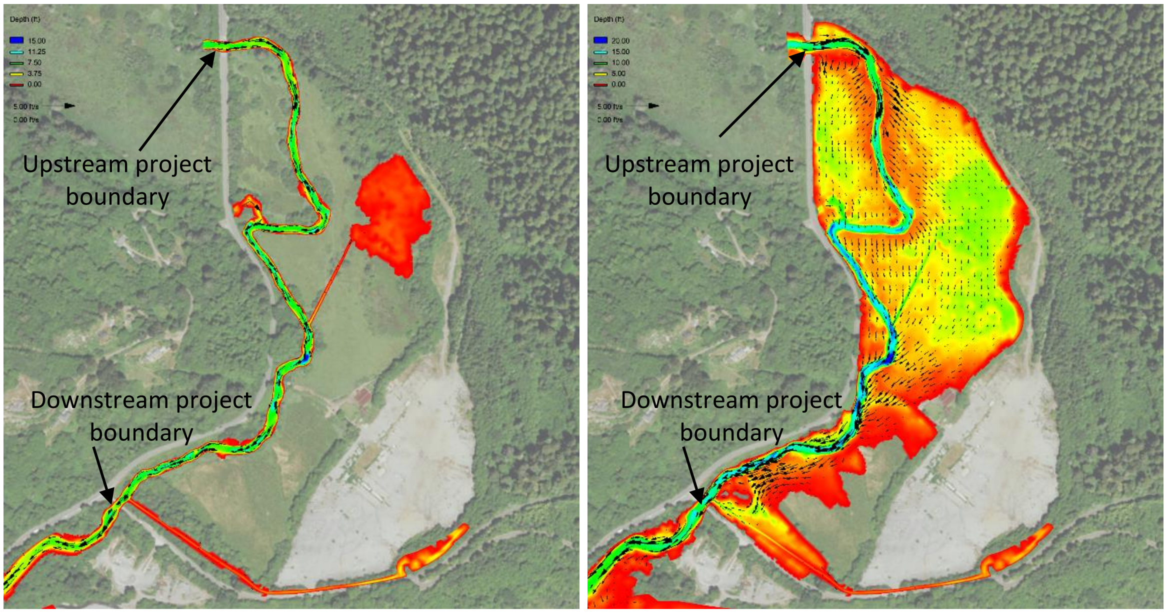

Figure 2. Inundation at the 1.05-year (left) and 2-year (right) recurrence interval flow within the Project area.

Delineation of OHW is typically based on geomorphic and vegetative indicators. Indicators below, at, and above OHW, as defined by Wohl (2016), were recorded in the channel on July 26, 2018. Additional analysis regarding secondary flow paths and larger scale depositional features were interpreted from LiDAR data, hydraulic modeling, aerial photography, and high flow observations. Estimates of OHWMs were compared to the flood frequency analysis to eliminate any potential spurious indicators, as described by Gartner (2016).

Results

Field measurements of potential OHWMs were collected at two cross sections in proximity to stream gages (Figure 1): 1) approximately 65 ft downstream of the Highway 101 Gage site (hereafter referred to as RS 55+82); and 2) approximately 90 ft upstream of the Turnout Gage site (hereafter referred to as RS 28+00). Physical indicators observed at the two cross sections include: tops of point bars, river erosion (e.g., shelving), and vegetation destruction (Table 1, Figure 3, Figure 4, and Figure 5). These indicators were generally clustered around a water level that occurs at 150 cfs, significantly lower than the 1.05-year recurrence interval flow of ~820 cfs (Figure 6 and Figure 8).

A second set of indicators were identified based on geomorphic features that are typically located above OHW. These features are located significantly further up the bank from the tops of the point bars and vegetation changes surveyed at the cross-sections. These indicators include soil development, depositional (rounded) topography, and secondary drainage development, and were identified from aerial photos, high flow observations, and LiDAR data. Indicators identified at the RS 39+80 cross-section line shown in Figure 1 were determined using these methods. Indicators above OHW occur at a bank inflection, where natural sediment levees are formed, and across the adjacent floodplain. These features generally occur above the 800-cfs flow extent (Figure 6 and Figure 7), which is close to the 1.05-year recurrence interval flow.

Table 1. Physical and vegetative indicators of Prairie Creek OHW within the Prairie Creek Restoration Project area.

Location	Below OHW	At OHW	Above OHW
RS 55+82	Instream bedforms (bars). Evidence of bedload transport. Evidence of river erosion (scour around obstructions).	Natural line impression on the bank. Destruction of terrestrial vegetation on river left. Top of point bar.	No destruction of terrestrial vegetation. Natural sediment levees. Secondary flow paths. Soil development.
RS 28+00	Instream bedforms (bars). Evidence of bedload transport. Evidence of river erosion (scour around obstructions).	Exposed root hairs below intact soil layers. Natural line impression on the bank. Changes in vegetation patterns.	No destruction of terrestrial vegetation. Natural sediment levees. Secondary flow paths. Soil development.

It is possible that other geomorphic indicators were not visible further up the channel banks; dense bank vegetation was present during the field survey, and relatively low flow energy may have made potential indicators difficult to distinguish. Organic litter from three storms that had occurred during the preceding winter (ranging between 726 and 793 cfs) was unnoticeable during the survey effort.

Based on the geomorphic indicators and flood frequency analysis, OHW is estimated to occur when flows are roughly 800 cfs and occupies approximately 12.25 acres of the Project area (Figure 9) and includes the Prairie Creek channel and all connected tributaries and wetlands. The 12.25-acre inundation footprint is based on results from the Prairie Creek hydrodynamic model of the Project area (NHE et al., 2016) at a Prairie Creek upstream boundary condition flow of approximately 800 cfs. The various tributary flow (e.g. Skunk Cabbage Creek) boundary conditions in the model were based on scaling the 800 cfs flow by the ratio of watershed areas. The inundation area of OHW within the Prairie Creek channel only is 5.22 acres.

Figure 3. Point bar at RS 55+82.

Figure 4. Change in vegetation on river left at RS 55+82.

Figure 5. Exposed root hairs and on river left at RS 28+00.

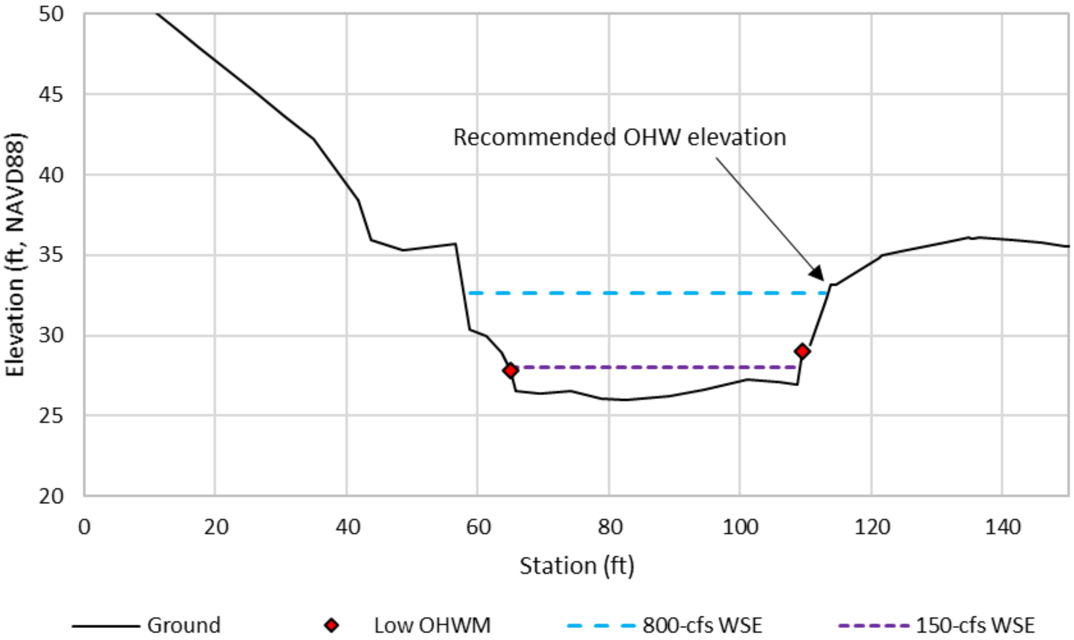

Figure 6. Ordinary high water at RS 55+82. Rounding of bank topography and depositional surfaces (natural sediment levees) begin to occur at flows above 800 cfs (~1.05-year RI). Top of bars and destruction of vegetation occur near the 150-cfs water surface elevation.

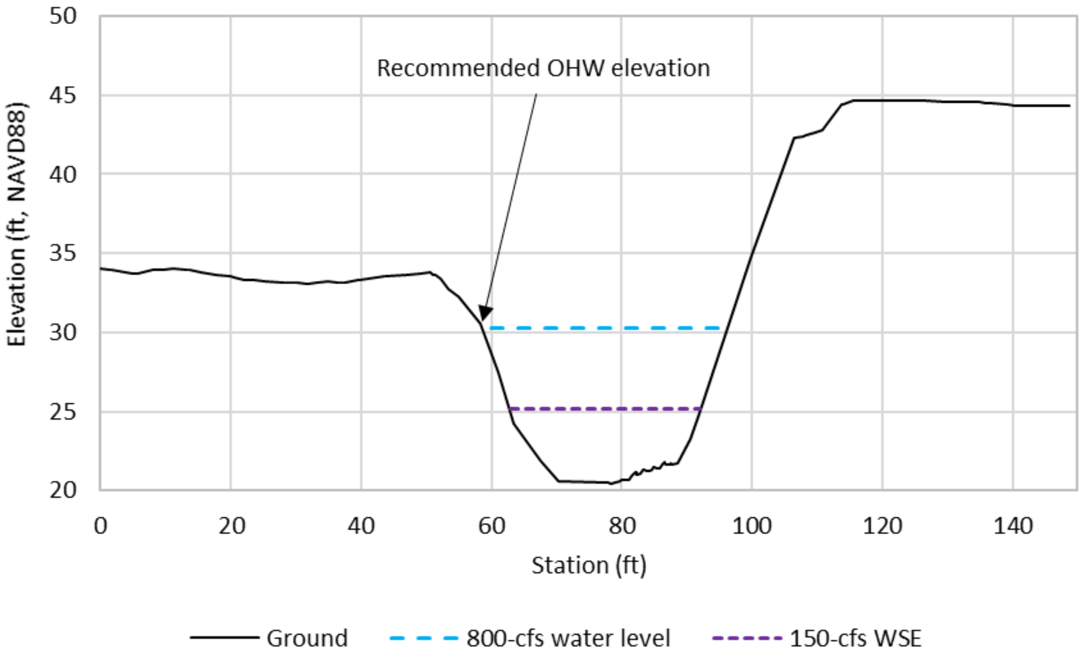

Figure 7. Ordinary high water at RS 39+80. Rounding of bank topography and depositional surfaces (natural sediment levees) occur near the 800-cfs (~1.05-year RI) water level.

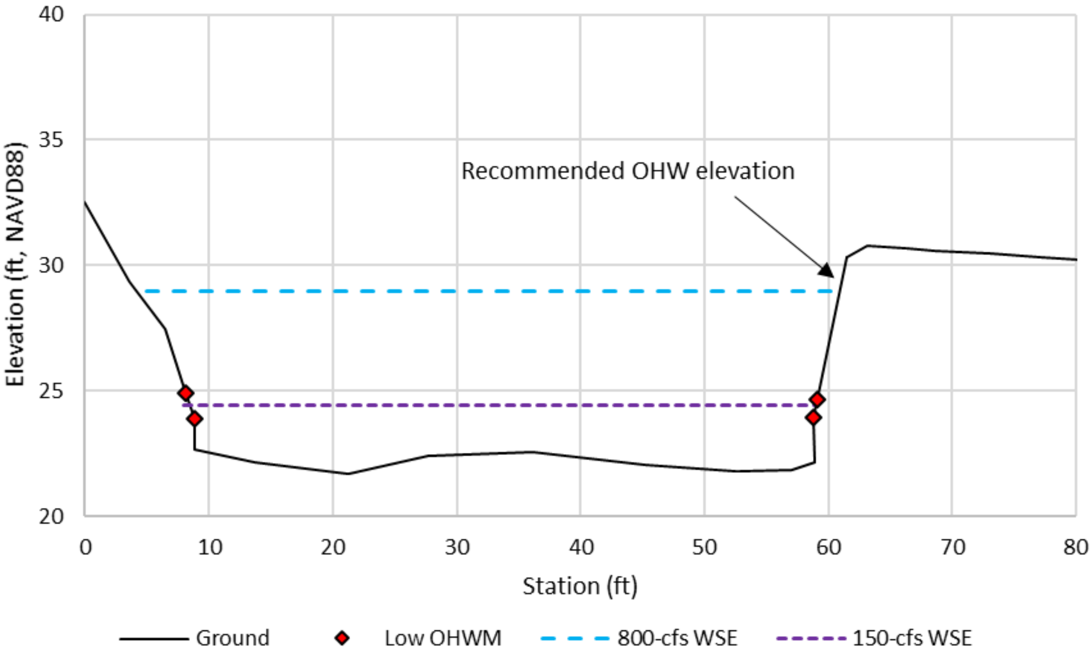

Figure 8. Ordinary high water at RS 28+00. Rounding of bank topography and depositional surfaces (natural sediment levees occur near the 800-cfs (~1.05-year RI) water level. Exposed roots, shelving on the banks, and changes in vegetation patterns occur near the 150-cfs water surface elevation.

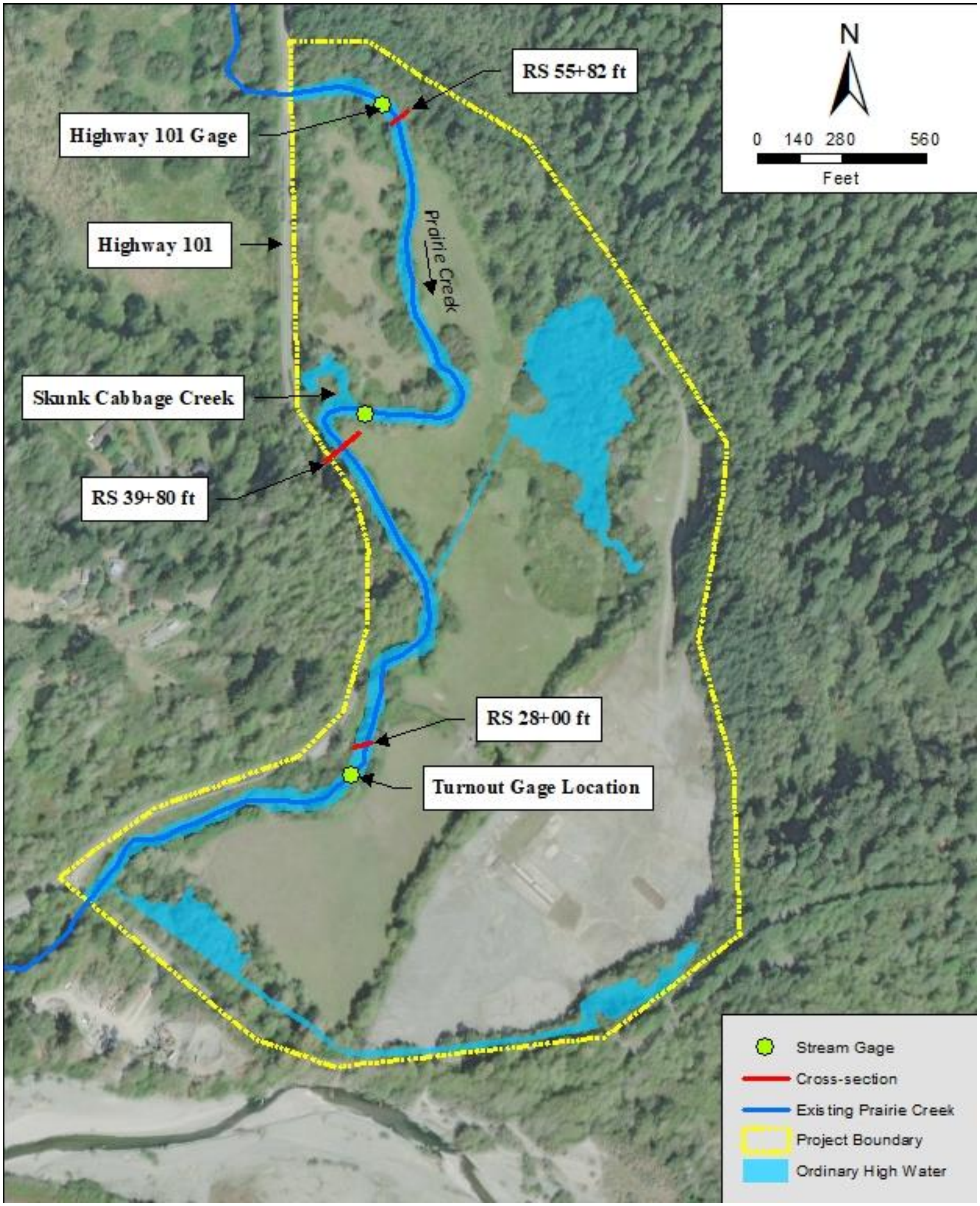

Figure 9. Prairie Creek OHW delineation with the Prairie Creek Restoration Project area.

References

Gartner, J.D., Mersel, M.K., Lefebvre, L.E., and Lichvar, R.W. 2016. The Benefits and Limitations of Hydraulic Modeling for Ordinary High Water Mark Delineation. U.S. Army Corps of Engineers. ERDC/CRREL TR-16-1. 47 p.

Northern Hydrology and Engineering (NHE). 2014.Technical Memorandum: Flood Analysis of the Orick Mill Site Property, Humboldt County, CA. Prepared for Save the Redwoods League. NHE, McKinleyville, CA.

Northern Hydrology and Engineering (NHE), McBain Associates, Lang, Railsback & Associates, Redwood Sciences Laboratory, and Caltrout. 2016. Prairie Creek Restoration Conceptual Design Project. Prairie Creek Technical Review Committee #4 Presentation. 11 August 2016.

Wohl, E., Mersel, M.K., Allen, A.O., Fritz, K.M., Kichefski, S.L., Lichvar, R.L., Nadeau, T., Topping, B.J., Trier, P.H., Vanderbilt, F.B. 2016. Synthesizing the Scientific Foundation for Ordinary High Water Mark Delineation in Fluvial Systems. U.S. Army Corps of Engineers. ERDC/CRREL S4-16-5, 217 p.

www.ghd.com

Appendix I – Redwood National and State Park Visitor Center and Restoration Project, Basis of Revegetation Design Report, McBain Associates 2019

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Redwood National and State Park Visitor Center and Restoration Project
Basis of Revegetation Design Report

Prepared for:

Save the Redwoods League
111 Sutter Street, 11th Floor
San Francisco, CA 94104

Prepared by:

McBain Associates
980 7th Street
Arcata, CA 95521

Draft Report

May 24, 2019

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1 INTRODUCTION

Prairie Creek is a tributary to Redwood Creek located just north of Orick in northern California. Some of the largest remaining old growth coast redwood stands are located along Prairie Creek in Redwood National and State Parks. The project area is located at the downstream end of Prairie Creek near the confluence of Prairie Creek and Redwood Creek. Save the Redwoods League (SRL) purchased the project area in 2013, which is now known as the Redwood National and State Park Visitor Center and Restoration project (project area, Figure 1). The project area is approximately 120 acres and includes the asphalt area in the southwest corner of the project area where the old mill was located, asphalt roads accessing the mill area from the north, a barn foundation, pasture, and Prairie Creek. SRL, in cooperation with Federal and State Agencies, is currently developing plans to build a visitor center in a portion of the asphalt area. The portion of the property that was historically cleared and drained for agriculture has been identified for ecological rehabilitation in coordination with the development of the property as a National Park Service (NPS) visitor center. The ecological rehabilitation portion of the project area has been defined by an approved project extent (APE), which includes 89.2 acres and will be hereafter referred to as the “project site.”

Prairie Creek flows from north to south along the eastern boundary of the project site, adjacent to Highway 101 (Figure 1). Libby Creek is a small tributary that flows onto the project site from the northwest and has been channelized and disconnected from Prairie Creek at moderate and lower streamflows. Libby Creek and other smaller drainages currently support a large wetland on the northeastern side of the project area and influence groundwater conditions across the project site during wetter times of the year.

Before widespread European settlement, it is likely that annual sediment yields, valley slope, and frequent in-channel and floodplain disturbance created conditions where some portion of the project site would have deciduous riparian vegetation interspersed between ancient Sitka spruce, Douglas-fir, and redwood. Mainstem Prairie Creek channel morphology simplified as land management practices and site development related to a lumber mill changed floodplain connectivity and sediment delivery and transport.

Between 1930 and 1940, riparian vegetation within the project site was a combination of coniferous and deciduous riparian forests which would have regularly contributed trees larger than 36 inches in diameter to both Prairie Creek and Redwood Creek just downstream. Deciduous woody plant recruitment would have been then, as now, episodic and patchy, and could have resulted in riparian vegetation patterns that were notably large and complex. In the 1940s and 1950s, the removal of riparian vegetation and large wood further facilitated channel simplification. Woody plants that grew on higher floodplain elevations were cleared first for fuel and to make room for houses, barns, and pastures. Logging began with early settlement, as did grazing. European settlers also brought new plant species to grow at their homesteads. The cumulative effect of channelization, grade control structures, channel simplification, and sediment deposition changed the riparian vegetation character, distribution, species dominance, and habitat structure within the project site.

The Prairie Creek channel alignment has remained the same since at least 1960, and few changes are evident within the project site between 1960 and 2010 with the exception of riparian vegetation encroaching into the managed pasture. The project area served the dual purpose of a lumber mill on the eastern portion of the property and an active cattle ranch on the western portion of the property. The lumber mill started operations in 1954 and processed redwoods for nearly 60 years before closing in October 2009 and selling the property to SRL in 2013. Green Diamond Resource Company removed the lumber mill and conducted site clean-up, with the exception of an asphalt slab. Cattle grazing ended in 2016.

Riparian vegetation currently grows where there is sufficient and extended shallow groundwater exchange. Emergent and riparian vegetation rely on constantly available groundwater, suggesting that some portions of the project site already supply the environmental conditions needed to recover these vegetation types over a larger portion of the area than they currently grow. Future rehabilitation and revegetation will rely on seasonally variable streamflow and groundwater elevation and will bring the ground surface closer (via grading) to shallow groundwater over portions of the project site.

Vegetation assessments conducted from 2016 to 2019 evaluated channel and riparian corridor evolution since the 1930s, contemporary planning efforts, and existing hydrologic, groundwater, and riparian vegetation characteristics. Results from the assessment were used to develop revegetation designs for the portion of the project area that will be rehabilitated (i.e., the project site as defined by the APE). Conceptual revegetation designs were developed so that initial project-related evaluations and a preferred alternative could be selected.

The overarching project goal is to enhance geomorphic processes to regain channel and floodplain function and provide complex aquatic habitat that evolves over time to benefit multiple species and to significantly increase salmonid abundance by increasing rearing and spawning habitat to the extent possible. A secondary project goal is to remove NIS plants and discourage future re-establishment before, during, and after construction.

Specific overall project objectives include:

- Develop species-rich, structurally complex, self-maintaining riparian vegetation;
- Increase number of off-channel wetland complexes;
- Increase topographic and hydraulic diversity (i.e., increased variability in channel width and depth);
- Increase diversity (=quality) and quantity of adult spawning and juvenile anadromous fish rearing habitats;
- Increase accessibility to the floodplain and off-channel wetland complexes by adult and juvenile anadromous fish;
- Increase in-channel, wetland, emergent, and riparian vegetation area;
- Increase complexity, quality, and quantity of aquatic and riparian habitats;
- Increase complexity and variability within terrestrial wildlife habitats associated with the transitional ecotone between the riparian and upland zones;
- Preserve or minimize disturbance of existing high-quality vegetation within the project site;
- Reduce or minimize the disturbance footprint wherever feasible; and
- Increase area of ground surface that can support aquatic, emergent, and riparian vegetation.

Where proposed construction will create a ground disturbance that could favor the establishment of disturbance-dependent, non-native invasive plant species (NIS), tradeoffs are being continually assessed and planting recommendations developed to reduce the impact that NIS plants could have after the project is completed. Diverse riparian vegetation will be maintained and rehabilitated via:

- Preserving as much of the existing riparian vegetation as possible and minimizing ground disturbance;
- Constructing topographic surfaces/benches at hydrologically suitable elevations to encourage natural riparian woody plant regeneration;

- Planting a variety of species in a simple arrangement based on vegetation associations found within the project site (see Section 3); and
- Conducting post-project maintenance to remove invasive plants that may establish within the project footprint after construction.

The purpose of this report is to describe existing vegetation in the project site, evaluate shallow groundwater dynamics in the project site, define relationships between existing vegetation cover types and height above groundwater to use as a basis for revegetation designs, and present CEQA-level (approximately 30%) revegetation designs for post-construction vegetation rehabilitation of the topographic design surface.

The first part of this report (Section 1 to Section 3) presents results from the vegetation assessment and the basis of revegetation designs, including watershed background to describe changes in riparian vegetation structure and patterns since 1931, and a description of existing vegetation within the project site. Vegetation assessments included the collection of groundwater data and an evaluation of current vegetation patterns, ground surface heights above a late fall streamflow, and the relationship of current vegetation patterns to ground surface height.

The second part of this report (Section 4) describes how the revegetation design was developed using data presented in the first part of the report. The revegetation design was developed using the integrated site grading plan. Conceptual revegetation design development included defining revegetation goals and objectives, describing the overall revegetation design approach, and identifying plant species and plant materials that could be used for implementation.

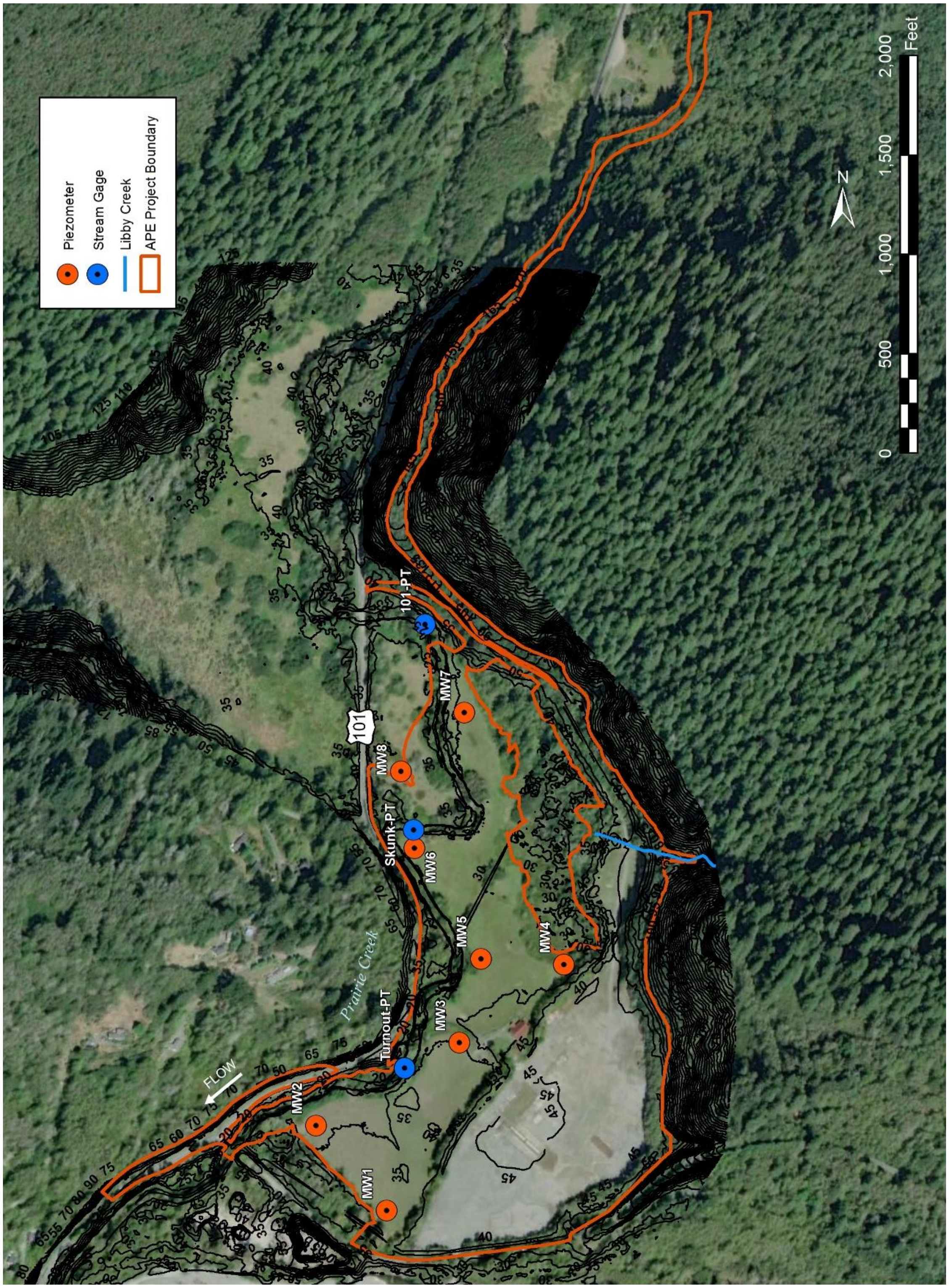


Figure 1. Redwood National and State Park Visitor Center and Restoration project area showing piezometers, locations where stream water surface elevations were collected with data loggers, and ground surface contours used in the 2016 through 2019 riparian assessments. The restoration project site as defined by the approved project extent (APE) is shown by the red line.

2 SHALLOW GROUNDWATER

To support the CEQA-level design development, groundwater assessments focused on identifying the minimum measured groundwater elevation, comparing groundwater contours between a period of low flow and high flow, and a comparison of the groundwater elevation to Prairie Creek streamflow elevations during the data period collected. In addition, the relative distribution of riparian vegetation cover types in relation to ground surface height above the shallow groundwater can be used to identify planting zones for revegetation designs. Riparian vegetation generally decreases in planform area with increasing distance from the river edge and increasing ground surface height above the summer river water surface (an approximation of the summer shallow groundwater elevation). The vegetation gradient between aquatic, emergent, riparian, and upland zones occurs in the riparian corridor. Riparian corridors have been defined as those areas where the groundwater is in excess of precipitation alone (Warner and Hendrix 1984). Many riparian plant species are phreatophytes that rely on a shallow zone of constant saturation. Decreases in riparian vegetation are directly related to a decrease in available soil moisture and increase in groundwater depth. Riparian and wetland vegetation may persist in locations where there is more drainage from the valley wall, or lower elevation ground surfaces (e.g., old channel traces). Wetlands and Jurisdictional Waters of the U.S. within the project site have been delineated (LACO 2012, GHD 2019).

Streamflows, hillslope runoff, and tributaries all contribute to shallow groundwater adjacent to Prairie Creek. Groundwater typically gets deeper with distance from the channel in the summer when there is little lateral water contribution to the valley floor from adjacent hillslopes and tributaries. Shallow groundwater sustains soil moisture through capillarity with a high degree of seasonal, spatial, and vertical variability. Seeds falling from nearby riparian trees require specific soil moisture conditions near or at the ground surface for a period before the ground surface dries. The roots of young seedlings must grow to a depth where they will survive daily temperature and moisture fluctuations at the surface yet can also grow a primary root fast enough to follow the receding capillary fringe and shallow groundwater table as the watershed drains and streamflows recede to fall baseflows.

Eight piezometers were installed in October 2015 throughout the pastures in the project site (LACO Associates 2015). Piezometers were installed to reduce uncertainty about site-specific groundwater response to seasonal changes in hillslope, tributary, and mainstem groundwater contributions. Groundwater depth at the driest time of the year provides an estimate of how deep plant roots must grow to reach sustained soil moisture and perennial water. Groundwater depth is used to develop design ground surfaces that establish a direct connection with groundwater and streamflows and informs revegetation designs by ensuring appropriate species are planted in locations where they can survive, given the species' growth patterns and moisture requirements.

2.1 Methods

Eight piezometers were installed throughout the pasture within the project site (Figure 1). On October 22, 2015, six of the eight piezometers were instrumented with pressure transducers and data loggers that recorded groundwater elevation at 15-minute intervals. A single barometric pressure transducer and data logger was also installed on site to correct the groundwater pressure transducers for changes in atmospheric pressure. Continuous groundwater elevation data have been collected since 2015, with a data gap between June 4 and December 20, 2016. Data collected from October 2015 to September 2017 are presented in this report.

Periodically McBain Associates staff manually measured groundwater depths at all piezometers, including the date and time for each manual measurement. Surface water elevations (stage) at three monitoring stations (101 station, Skunk station, and Turnout station) on Prairie Creek were measured and provided by Northern Hydrology and Engineering (Yarnell et al. 2013) to correlate with groundwater measurements. Groundwater conditions within the project site were summarized and evaluated using all available data within the 2015–2017 period of record. Data loggers have remained installed in piezometers and continue to record groundwater elevation as of spring 2019.

The maximum shallow groundwater depth (i.e., lowest shallow groundwater elevation), date, time, and daily average stage at the three Prairie Creek surface water monitoring gages were associated with the lowest shallow groundwater elevation for each piezometer during the period of record. More in-depth groundwater assessments are to occur during the next design phase. Daily average groundwater elevation data, existing ground surface elevations, and proposed ground surface elevations will be used to fully assess the seasonality, depth, and duration of groundwater relative to the ground surface at each well.

The minimum (i.e., shallowest) and maximum (i.e., deepest) groundwater depths were summarized at each piezometer and related to stream stage based on timing of diagnostic flow peaks. The lateral and longitudinal direction and depth characteristics of the highest and lowest measured groundwater were evaluated. The groundwater elevation associated with the minimum and maximum measured values was plotted as a 2-dimensional surface portrayed as a ground surface (i.e., groundwater contours).

2.2 Results

Groundwater in the project site exhibited longitudinal differences depending on valley wall and unnamed tributary surface water contribution at each piezometer and was seasonally variable. Although there were differences between piezometers, most showed similar seasonal characteristics, with shallower groundwater in the winter and spring and deeper groundwater in the summer and fall. Depending on the time of year, the depth to groundwater was dependent on distance to the wetted channel or closest tributary.

2.2.1 Minimum Groundwater Elevation at Piezometers

Shallow groundwater within the project site was evaluated using all available measurement data within the 2015–2017 period of record. The maximum (i.e., deepest) groundwater depth, date, time, and daily average stage at the closest Prairie Creek pressure transducer were associated with the lowest groundwater elevation for each piezometer during the period of record (Table 1).

Table 1. Minimum groundwater elevations at six piezometers monitored with data loggers (wells 1–4, 6, and 7) and the minimum groundwater elevations taken by spot elevation measurements at two piezometers monitored without data loggers (wells 5 & 8).

	MW1	**MW2**	**MW3**	**MW4**	**MW5**	**MW6**	**MW7**	**MW8**
Ground Surface Elevation (ft)	37.6	33.4	35.1	32.7	33.7	34.0	34.1	31.0
Minimum Groundwater Elevation (ft)	21.54	21.35	22.00	23.79	22.07	23.47	24.95	24.82
Date	10/22/15	10/22/15	10/22/15	10/27/15	10/22/15	10/17/17	11/1/15	10/17/17
Maximum Groundwater Depth (ft)	16.06	12.05	13.1	8.91	11.63	10.53	9.15	6.18

2.2.2 Relationship Between Groundwater and Streamflow at Piezometers with Data Loggers

Hydrographs for the 15-minute groundwater elevation data collected from the six monitoring wells with data loggers were plotted along with hydrographs created from the 15-minute surface water elevation data from the Prairie Creek 101 and Skunk station streamflow gages for water years 2016 through 2019 (Figure 2). The datum used to plot hydrograph elevations is California State Plane NAD83 Zone 1 (ft). Groundwater elevations at wells 1, 2, 3, and 6 corresponded best to surface water elevations at the Skunk gage (Figure 3 through Figure 6). The hydrographs show that these wells are strongly influenced by streamflow. Groundwater elevations at wells 4 and 7 corresponded best to surface water elevations at the 101 gage (Figure 7 through Figure 10). These wells are less influenced by Prairie Creek streamflow, which is likely due to their close proximity to tributaries of Prairie Creek. The hydrographs show that groundwater in wells 4 and 7 have an early recharge period and also that groundwater declines rapidly after tributary contribution stops. Wells 5 and 8 are not plotted because data loggers were not installed and therefore there is no continuous data record.

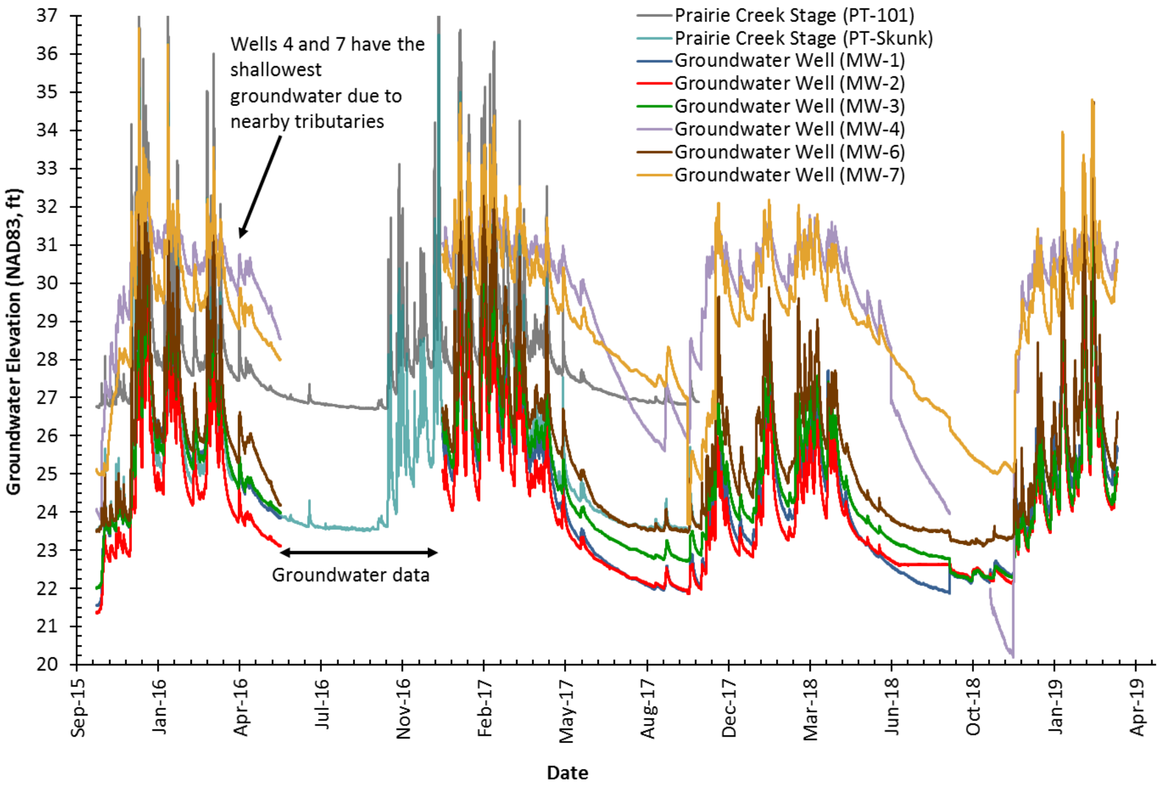


Figure 2. Overview graph of the six piezometer groundwater elevation hydrographs plotted with the Prairie Creek Highway 101 and Skunk stations streamflow stage hydrographs. Note that the streamflow data span the groundwater data gap between June and December of 2016. The monitoring wells fall into two groups: (1) wells 1-3, and 6, which are strongly influenced by Prairie Creek streamflow; and (2) wells 4 and 7, which are influenced less by Prairie Creek and more by nearby tributary contribution.

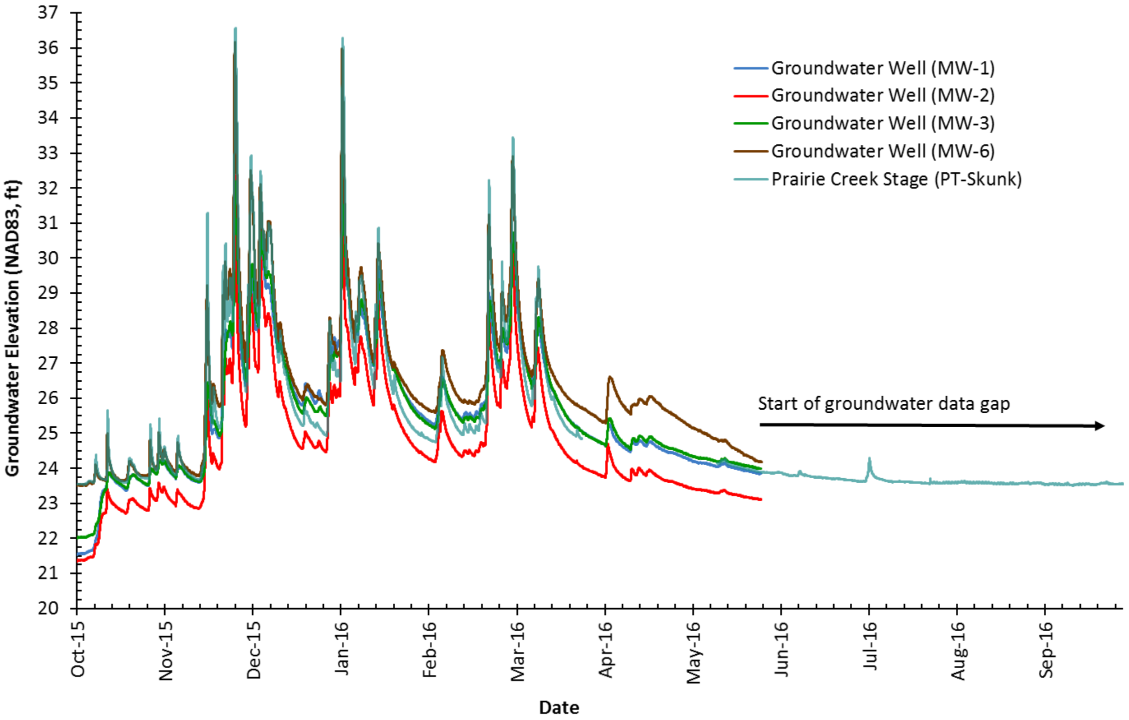


Figure 3. Groundwater elevations for wells 1, 2, 3, and 6 corresponded to surface water elevations from the Prairie Creek Skunk station gage for water year 2016. Note that the streamflow data span the groundwater data gap between June and December of 2016. These gages are strongly influenced by Prairie Creek streamflow as indicated by the immediate groundwater response to high and low streamflows.

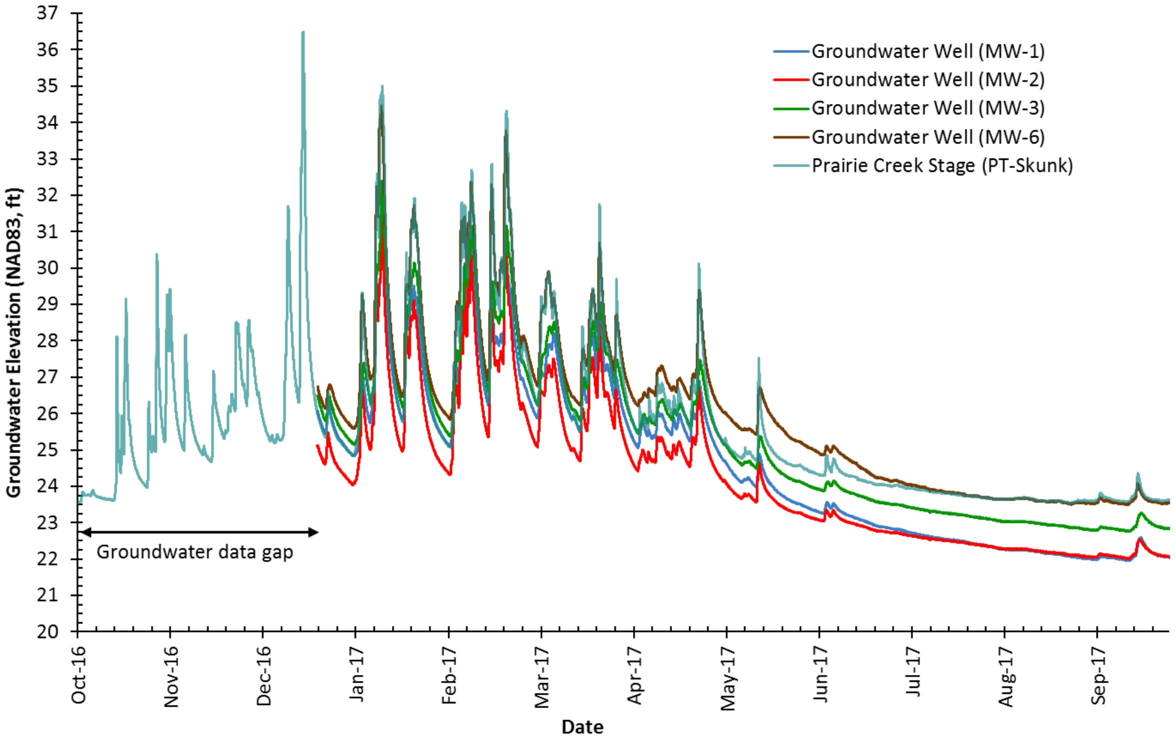


Figure 4. Groundwater elevations for wells 1, 2, 3, and 6 corresponded to surface water elevations from the Prairie Creek Skunk station gage for water year 2017. The streamflow data span the groundwater data gap between June and December of 2016.

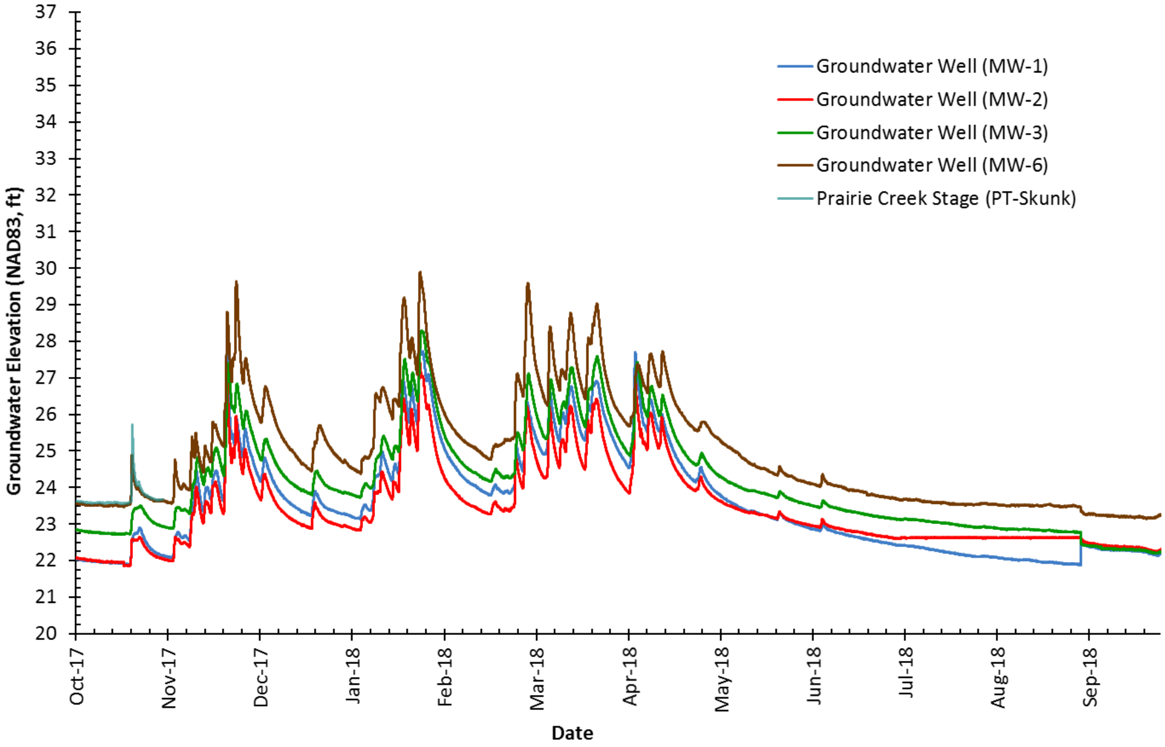


Figure 5. Groundwater elevations for wells 1, 2, 3, and 6 corresponded to surface water elevations from the Prairie Creek Skunk station gage for water year 2018. The surface water record is not available after October of 2017.

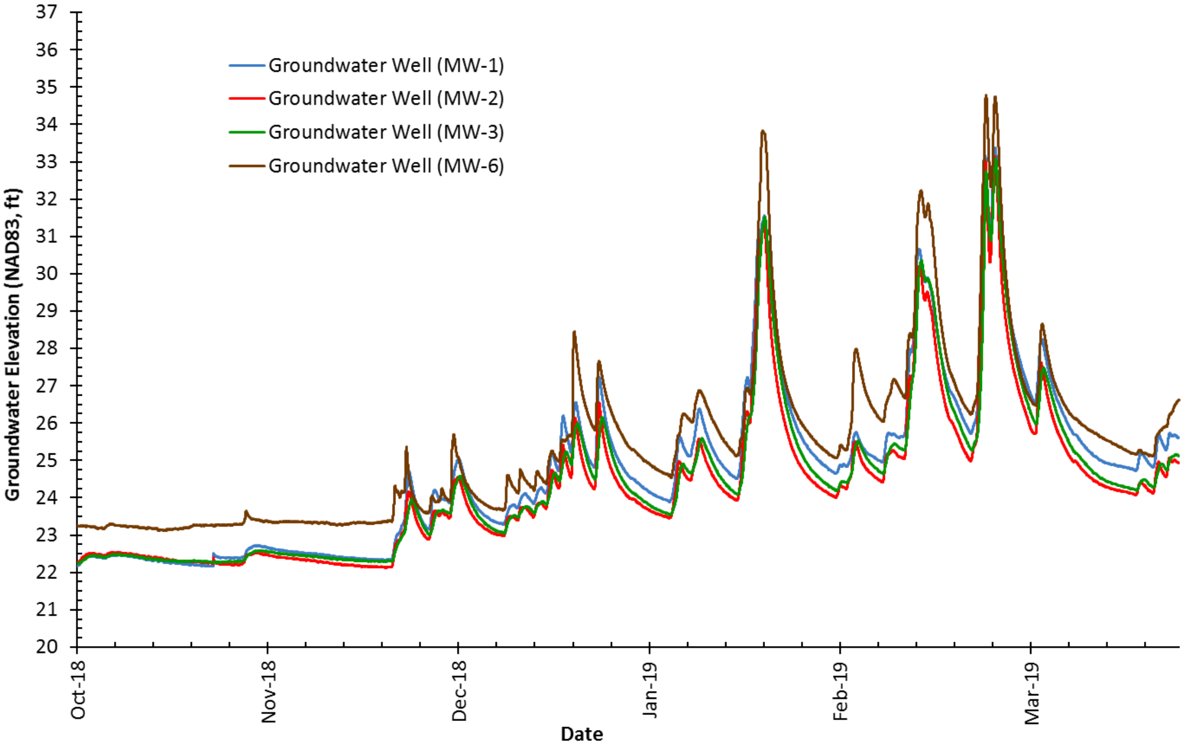


Figure 6. Groundwater elevations for wells 1, 2, 3, and 6 corresponded to surface water elevations from the Prairie Creek Skunk station gage for the data that has been collected thus far in water year 2019.

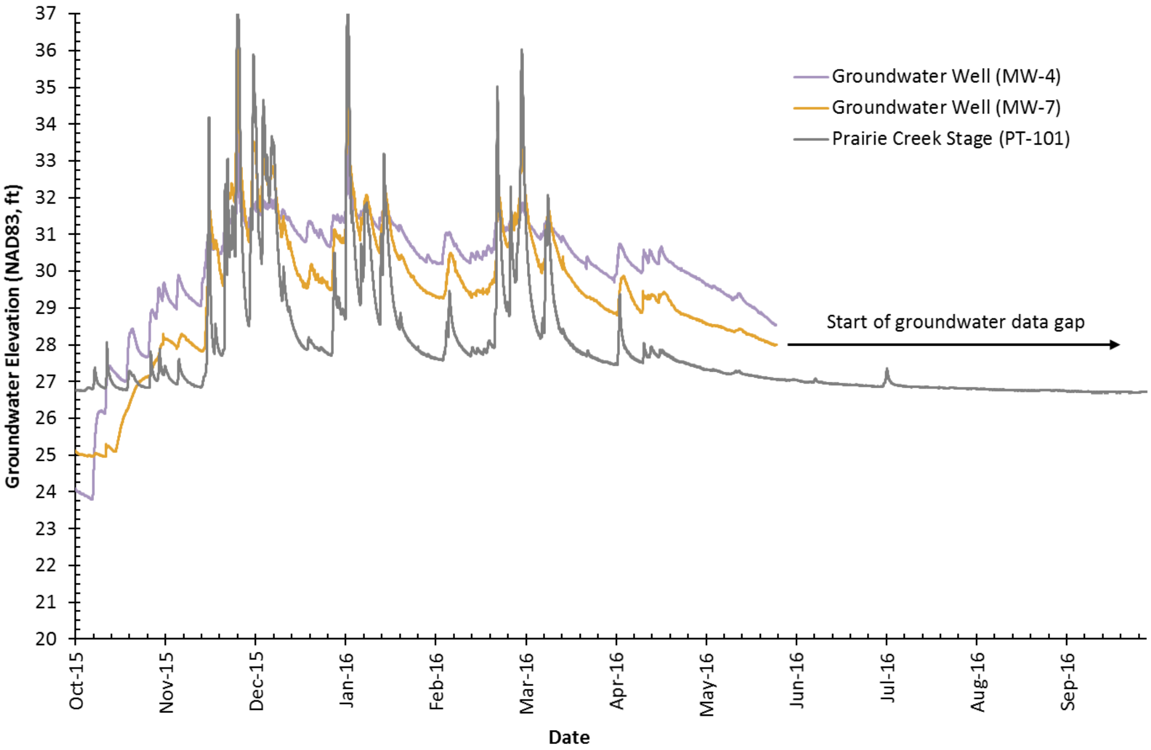


Figure 7. Groundwater elevations from wells 4 and 7 corresponded to the Prairie Creek 101 surface water gage for water year 2016.

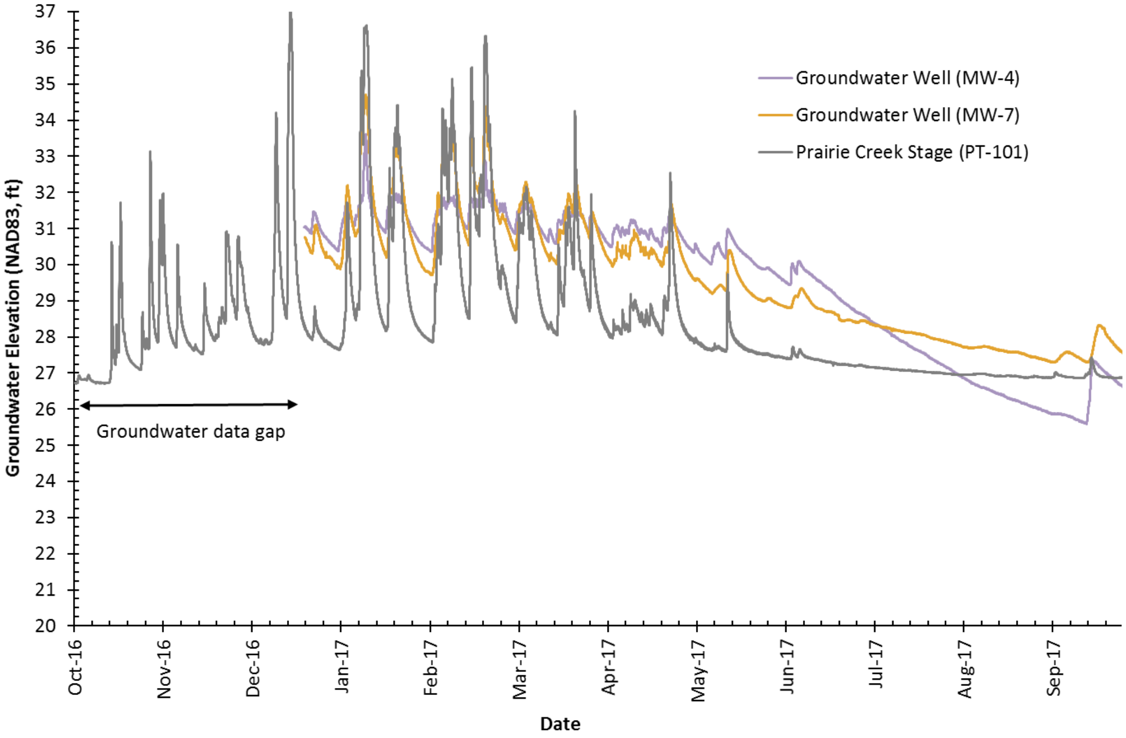


Figure 8. Groundwater elevations from wells 4 and 7 corresponded to the Prairie Creek 101 surface water gage for water year 2017. Monitoring well 4 has the most dramatic range of groundwater depth as illustrated by the steep increase in groundwater depth between February and July of 2017. This is likely because well 4 is the farthest from Prairie Creek and more influenced by tributary streamflow.

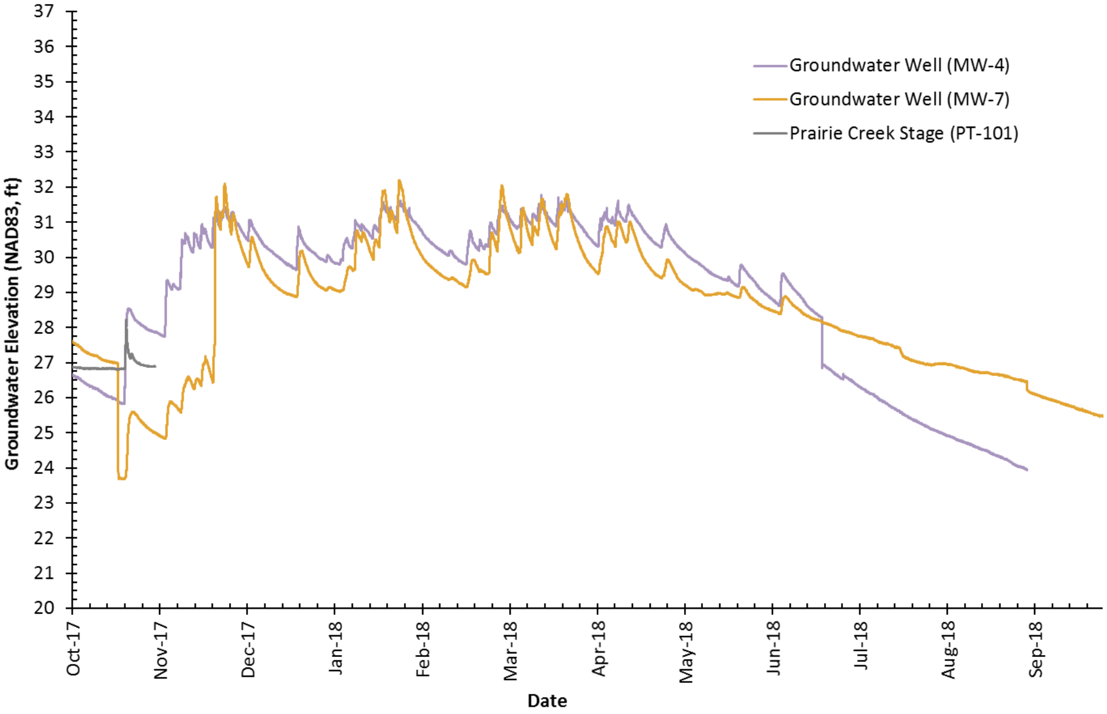


Figure 9. Groundwater elevations from wells 4 and 7 corresponded to the Prairie Creek 101 surface water gage for water year 2018. The surface water record after October 2017 is not currently available.

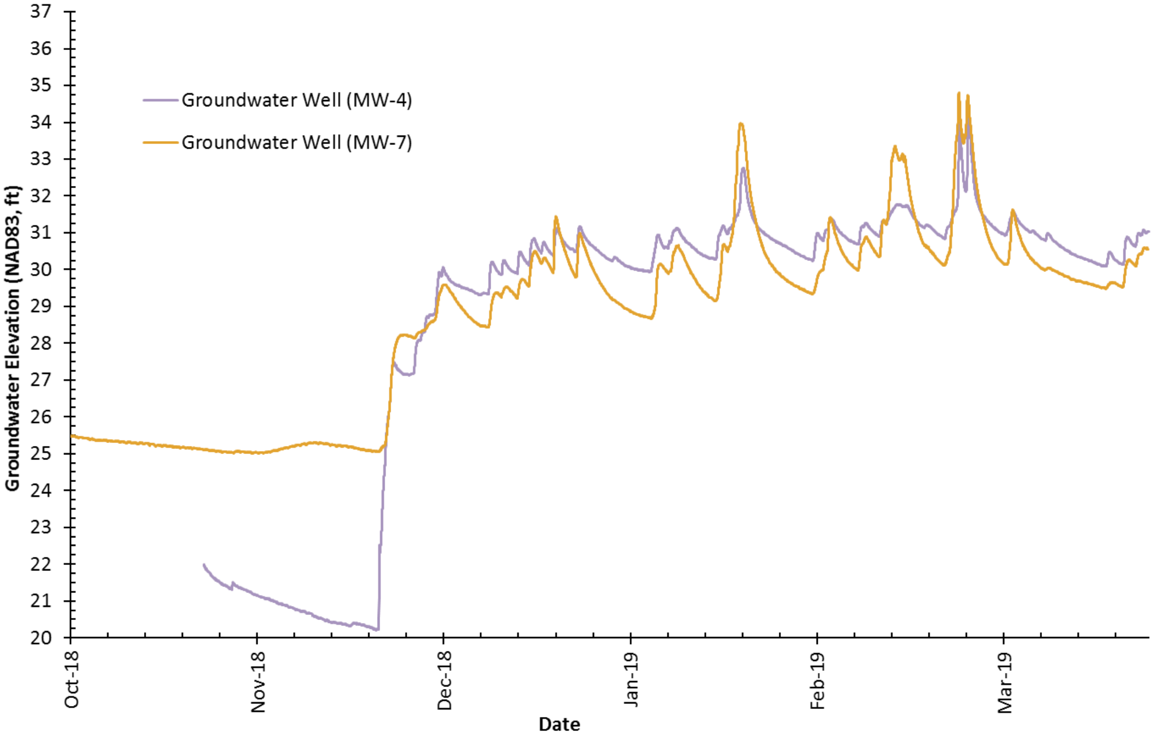


Figure 10. Groundwater elevations from wells 4 and 7 corresponded to the Prairie Creek 101 surface water gage for the data that has been collected thus far in water year 2019. There is a data gap for Well 4 from September 3, 2018 to October 23, 2018 due to the well being disturbed. The data logger had to be removed from the well and repairs made before data collection could resume. The cause of the disturbance is unknown and was limited to Well 4.

Maximum groundwater depths and streamflow minimums occur annually mid- to late-fall (Figure 2). The maximum groundwater depth was 1.5 to 2.5 ft lower than the water surface elevation in Prairie Creek, indicating that Prairie Creek is losing streamflow to the groundwater during the fall. Annual low streamflows also occur in Prairie Creek and regionally during the mid- to late-fall.

The relationship between streamflow elevation change and groundwater elevation change was qualitatively evaluated to assess how groundwater fluctuated both seasonally and with changes in streamflow. The relationship between groundwater and streamflow clearly illustrates the direct connection between Prairie Creek and shallow groundwater and the seasonal nature of the interaction (Figure 2). Prairie Creek gains water from the adjacent groundwater during the winter months when precipitation and hillslope runoff contribute to higher groundwater elevations, and it loses water to the adjacent groundwater in summer and fall when there is no precipitation and no runoff and groundwater reaches its annual minimum (Figure 11).

2.2.3 Lateral and Longitudinal Groundwater Trends

Groundwater directions on Prairie Creek are seasonally dependent, but generally flow from north to south during lower streamflows and dry periods when the stream is losing, and flow from northeast to southwest during higher streamflows when the stream is gaining (Figure 11, Figure 12, Figure 13). During high runoff periods, the valley wall runoff and tributary contribution is sufficient to change the direction of groundwater flow sub-surface from north–south to east–west.

Including Libby Creek as part of the rehabilitation project would be useful in maintaining a groundwater recharge source that would maintain shallow groundwater later into the year. The additional benefit would be that tributary realignment could increase groundwater across a greater portion of the site that is currently higher and drier (e.g., the pasture).

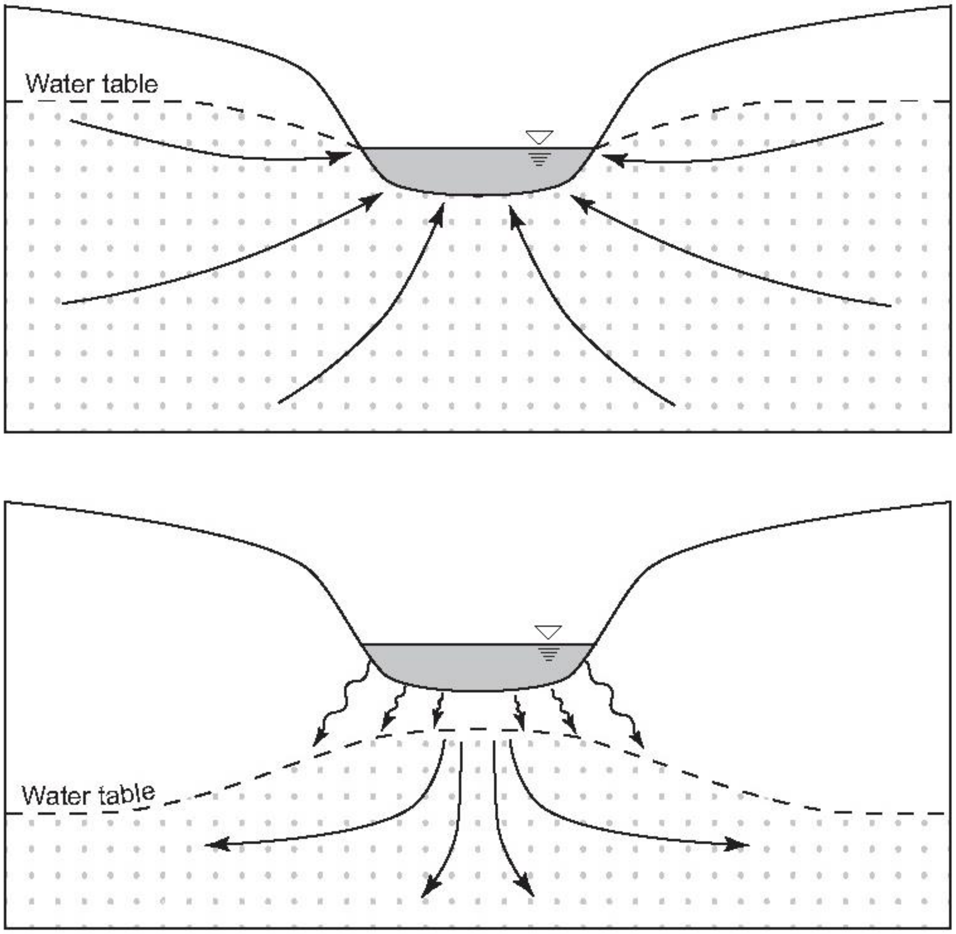
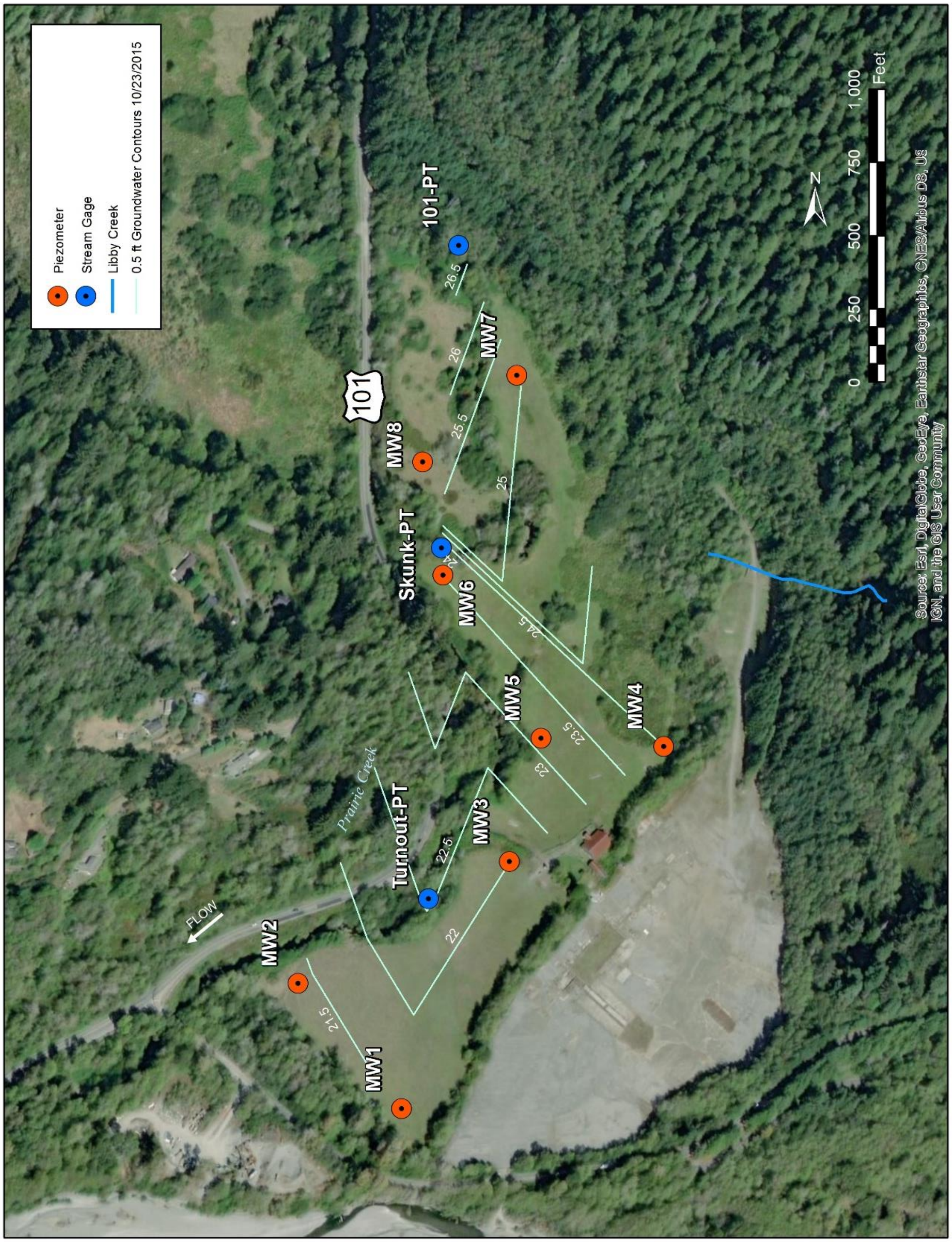


Figure 11. Conceptual cross section showing (top): Prairie Creek gaining water from high groundwater elevations during the winter, and (bottom): losing water into groundwater during summer low flow stream conditions (Lower Granite Migration Steering Committee 1993). In the upper figure, streamflow is gained from groundwater where the elevation of the water table is above the stream. Flow direction is from the ground to the stream. In the lower figure, streamflow is lost to the water table, which is located below the level of the stream.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 12. Groundwater contours (i.e., groundwater surface elevation) developed from measurements taken in piezometers on Oct 23, 2015, after an extended dry period, minimal valley wall groundwater contribution, and low mainstem Prairie Creek streamflows.

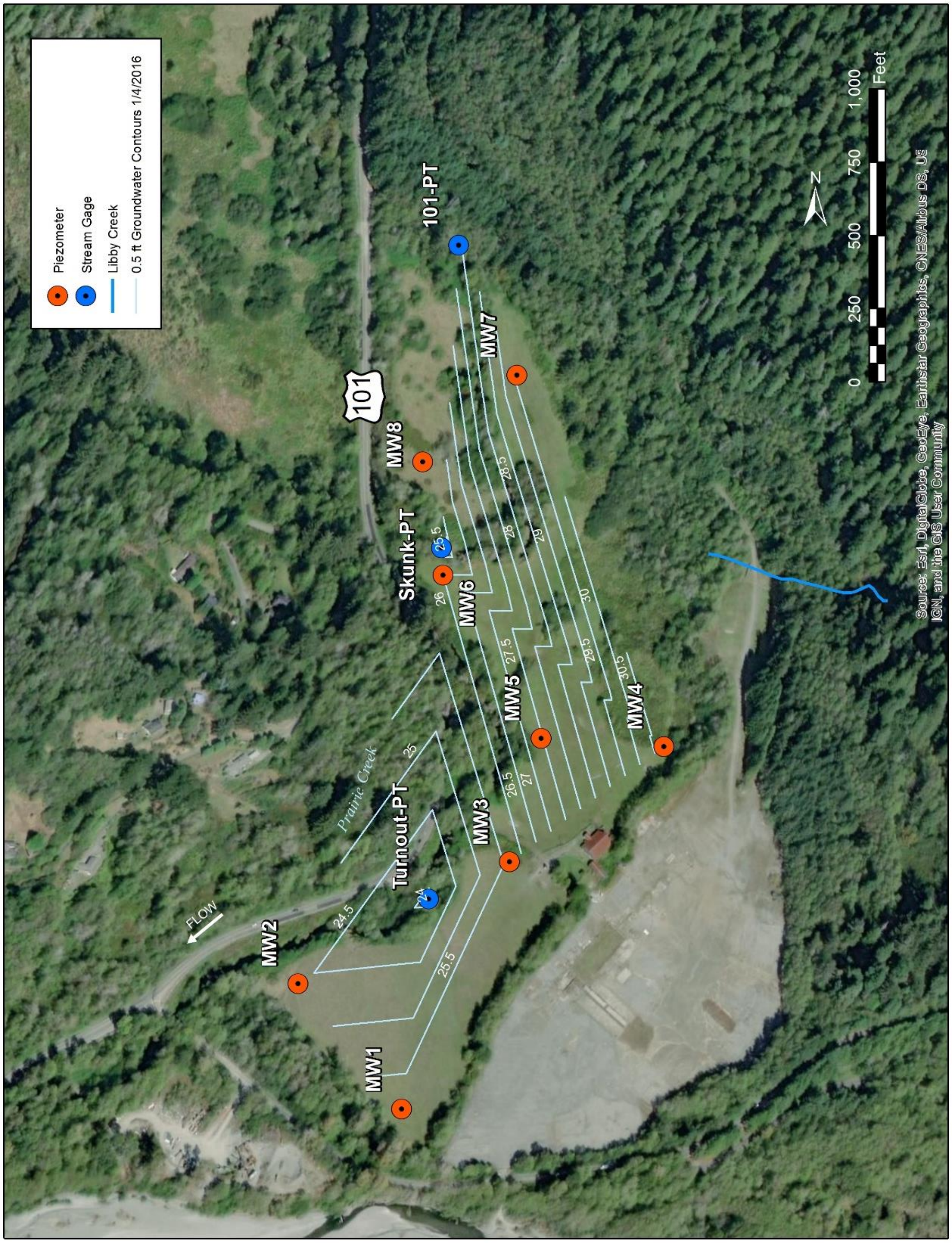


Figure 13. Groundwater contours (i.e., groundwater surface elevation) developed from measurements taken in piezometers on January 4, 2016, after an extended wet period, with valley wall/tributary groundwater contribution, and higher mainstem Prairie Creek streamflows.

3 EXISTING VEGETATION

Physical rehabilitation designs that support riparian revegetation designs need to couple topographic recontouring with current and future hydrologic patterns. The physical planform rehabilitation was intended to promote landscape-level changes in fish habitat availability and distribution, water temperature, riparian vegetation, and channel morphology. The location and complexity of the ecotone between the riparian corridor and adjacent upland habitats is expected to become more diverse with ground surface recontouring and revegetation.

The relationships between existing vegetation and ground surface height above groundwater were used to: (1) explain existing vegetation patterns, (2) to provide design criteria that would facilitate wetland and riparian vegetation types, (3) inform the development of physical designs, and (4) promote the growth of revegetated plants. A vegetation map was developed and combined with existing ground surface topography to evaluate the interrelationship of vegetation growing within the project site and the physical and hydrologic environments that support it.

Project site vegetation mapping created a high-resolution map of riparian and adjacent upland vegetation. The vegetation map served as the basis for quantifying existing vegetation patch size, patch or cover type, and overall corridor diversity within the project site. The vegetation map was also used to evaluate the vegetation patterns as a function of the ground surface height above the Prairie Creek streamflow elevation, as a basis for developing revegetation design concepts. The vegetation map could be used in the future to estimate rehabilitation-related impacts to riparian vegetation and document post-construction riparian vegetation recovery.

Vegetated and unvegetated areas in the project site were mapped in May 2016 and revisited in April 2019, between the Highway 101 crossing at the northern end of the site to the Bald Hills Road crossing at the southern downstream end of the project site (Figure 1). The vegetation mapping goal was to map all vegetated and unvegetated areas within the project site using observed plant alliances to classify vegetation. Specific objectives were to:

- Map all vegetated and unvegetated areas in the field within the project site using 2015 Google Earth and 2016 NAIP images;
- Prepare an ArcGIS-compatible 2016 vegetation layer from the field maps; and
- Quantify acreages of mapped vegetated and unvegetated areas within the project site.

3.1 Methods

Base maps used for vegetation mapping were plotted at 1:1,200 scale using 2015 Google Earth for the May 2016 field effort and 2016 NAIP color images for the April 2019 map update. Polygons were drawn on the base maps in the office and attributed with a cover type and were verified with field surveys in May 2016 and April 2019. To the extent practicable, foot surveys were used to assess the accuracy of office-mapped polygons and cover type attribution. Wherever possible, field mapping extended beyond previously defined project boundaries to assure inclusion of current and future anticipated rehabilitation activities.

3.1.1 Vegetation Mapping and Classification

Polygons were drawn to delineate boundaries around areas of homogenous composition on aerial photo base maps and classified with a land cover type attribute following similar protocols used in other riparian vegetation inventories (McBain & Trush 2005, Hoopa Valley Tribe and McBain Associates 2015). Delineated polygons were typically greater than 10 ft x 10 ft in area (McBain & Trush 2005, North State Resources 2007). Unvegetated polygons were assigned a land cover type based on visible substrate and level of human disturbance. Vegetated polygons were assigned land cover type attributes based on the dominant plant species in the canopy, which is similar to the plant alliance classification developed by Sawyer et al. (2009).

Plant alliance classifications can be useful in developing relationships between environmental factors and wildlife utilization (Miller et al. 2011). Dominant plant species observed in the canopy were used to name plant alliances (i.e., stand type) and delineate polygon boundaries, so that if there was a shift in species canopy dominance in an area, there would likely be a corresponding shift in plant alliance and a new polygon mapped. Alliances can be comprised of smaller vegetation units, called associations, that are comprised of one dominant plant species and a few associates. Associations were the smallest vegetation units mapped.

3.1.1.1 Mapping Boundary

GHD developed a boundary defining the project site and associated rehabilitation activities. The approved project extent (APE) was used in the riparian assessment (i.e., the red line shown in Figure 1). For the purposes of conducting assessments in this technical memorandum, analyses were conducted to the limit/extent of the APE (Figure 1), which had a total analysis area of 86.2 acres and included areas that are not currently considered for rehabilitation, as well as proposed grading locations where there are currently planned rehabilitation activities.

3.1.1.2 Field Map Digitization

Field maps were scanned, and Google Earth images were georeferenced. Field-mapped polygons were digitized and entered into GIS-compatible software using the California State Plane NAD83, Zone 1 (ft) coordinate system and then converted to UTM. A vegetation layer was prepared and checked for attribution accuracy and polygon completion. The GIS database was queried, and the aerial extent of different cover types was evaluated.

3.1.1.3 Data Quality Assurance and Quality Control (QA/QC)

The vegetation mapping data were checked for completeness to ensure that the defined project site was covered. Data were also checked to ensure that attributes assigned to polygons met the requirements for the land cover type assigned. Topology of the data was also checked to confirm the connectivity of elements from which polygons were constructed. Additional QA/QC efforts included a formal system-wide visual inspection of the vegetation map at a fixed scale of 1=6,000. This visual inspection was conducted with the vegetation layer symbolized by alliance. A random selection of polygons was also visually inspected and compared to the field maps to ensure that the transfer of attributes into the GIS layer from the field maps was correct.

3.1.1.4 Uncertainty and Estimation of Error

There are several sources of potential variability that may affect the accuracy of areas quantified by mapping. The accuracy of a polygon and the associated attributes were determined by many factors in the field. Human error could potentially affect how a polygon was drawn, as well as how the cover type was assigned. Mapping accuracy varies, and the effect is difficult to estimate. Results were presented in as *precise* a manner as the data allowed; however, map *accuracy* is variable depending on several factors such that the effects of how different vegetation ecologists map vegetation, base map quality, software technology, and other factors may influence the results of map comparisons in the future.

Currently there is no quantitative estimate of the amount of error associated with polygon areas. Given the inherent errors with field mapping and aerial photo interpretation, polygon areas were estimated to be 95% accurate based on professional experience and familiarity with the Prairie Creek vegetation data. If future vegetation cover monitoring occurs, the estimated differences between years should be greater than 5% in area to be considered a real change.

3.1.2 Detrended Ground Surface Digital Elevation Model

The groundwater within the Prairie Creek riparian corridor is seasonally variable, and ground surface topography also varies within the project site. When shallow groundwater is lower than the stream water surface elevation, a stream is losing water into the adjacent groundwater; when shallow groundwater is higher than the stream water surface elevation, the stream is gaining water from the adjacent hillsides (Figure 11). Riparian and wetland vegetation persist in locations where groundwater is shallow, whether created by more drainage from the valley wall, or due to lower elevation ground surfaces.

Given suitable hydrology and soils, riparian vegetation generally establishes within a fixed distance (i.e., height) from the shallow groundwater table. In many river systems with coarse substrates, groundwater can be approximated by the stream water surface, and the height above the water surface elevation can be used as a surrogate for the height above the groundwater table. A topographic map showing the ground surface height above the groundwater is a valuable tool for:

- Evaluating the elevation distribution of individual vegetation cover types above the groundwater to define vegetation zones, and
- Evaluating the extent of and location where proposed physical designs modify ground surface elevations and the vegetation types the proposed design may increase/decrease.

A Detrended Digital Elevation Model (dtDEM) was developed using the 2016 topography developed by NHE and the 4 cfs water surface elevation as determined from HEC-RAS modeling. Annual minimum streamflows of approximately 4 cfs occur in Prairie Creek during mid- to late-fall. The water surface was laterally extended using HEC-RAS model output and cross sections to construct a 4 cfs water surface digital elevation model (DEM). The Prairie Creek 4 cfs DEM points were subtracted from individual ground surface points to construct the dtDEM. Elevation values are in feet and are negative for the river bed bathymetry (i.e., water depth).

To be truly representative of a depth to groundwater, the groundwater elevation corresponding to the streamflow water surface elevation should be used to construct a height above river model. The initial dtDEM did not use groundwater data because the data were not available when the analysis was conducted, and thus used a simple planar projection of the 4 cfs water surface elevation. The relationship between vegetation and the ground height above 4 cfs water surface oversimplifies the relationship of shallow groundwater because the simple flat planar projection of the stream’s wetted edge at 4 cfs water may not portray the actual groundwater conditions at a given location, as in the tributary-influenced groundwater wells 4 and 7 (Figure 7 through Figure 10). The groundwater analysis in Section 2 indicated that groundwater within the project site was typically lower (deeper) than the streamflow water surface elevation during the fall (Table 1). A more accurate representation of the height above groundwater could be developed in the future using the existing ground surface topography subtracted from the fall groundwater elevations.

3.1.3 Analysis

The relationships between vegetated and unvegetated cover types and the 4 cfs dtDEM were evaluated. Cover types mapped in May 2016 were overlaid on the 4 cfs dtDEM. An analysis was conducted to identify the minimum and maximum elevations associated with each cover type and calculate the average and standard deviations of dtDEM pixel values within each cover type polygon. Box whisker charts were prepared using detrended elevation range, 95% confidence intervals, and mean. Cover types were ranked from smallest mean value (lowest elevation) to largest mean value (highest elevation) and vegetation zones were qualitatively assigned in 3 ft increments loosely based on asymptotes in ascending means.

3.2 Results

The riparian corridor within the project site includes areas that are in close proximity to groundwater and areas that are high above it. Mapped vegetation types dominated by wetland and riparian species tended to grow lower in ground elevation above 4 cfs streamflow elevation. Four vegetation zones and one water zone were defined and used as the basis of developing CEQA-level conceptual revegetation designs (Section 4).

3.2.1 Vegetation Mapping and Classification

Twenty-one vegetated and four unvegetated cover types were mapped in the 89.2-acre project site (Figure 14, Table 2). Human disturbance, red alder, red alder–Pacific willow, ryegrass–sweet grass, and tall fescue were the five most abundant mapped cover types. Eleven cover types made up less than 1% of the mapped area. Small areas of a cover type were usually associated with individual trees or shrubs.

Four vegetation cover types make up almost 45% of the project boundary area. Vegetation within the APE was dominated by tall fescue (13.3% of the APE), ryegrass–sweet grass (11.0% of the APE), red alder (10.7% of the APE) and red alder–Pacific willow (9.7% of the APE). A significant portion of the vegetation within the APE is currently pasture, which was composed of tall fescue in the upstream northern pasture and ryegrass–sweet grass in the downstream southern pasture; together, these non-native cover types make up 24.3% of the APE. Invasive riparian land cover classes were composed of Himalayan blackberry (4.3% of the APE) and Western manna grass (0.1% of area within the APE). Patches of reed canary grass (*Phalaris arundinacea*) were observed and included in other cover types within the project boundary, but not mapped at the 1:1,800 scale used. Twelve of the vegetated cover types are associated with California sensitive communities (Table 2) and occur in emergent, riparian and upland habitats. Human disturbance-related cover types make up 23.9% of the APE.

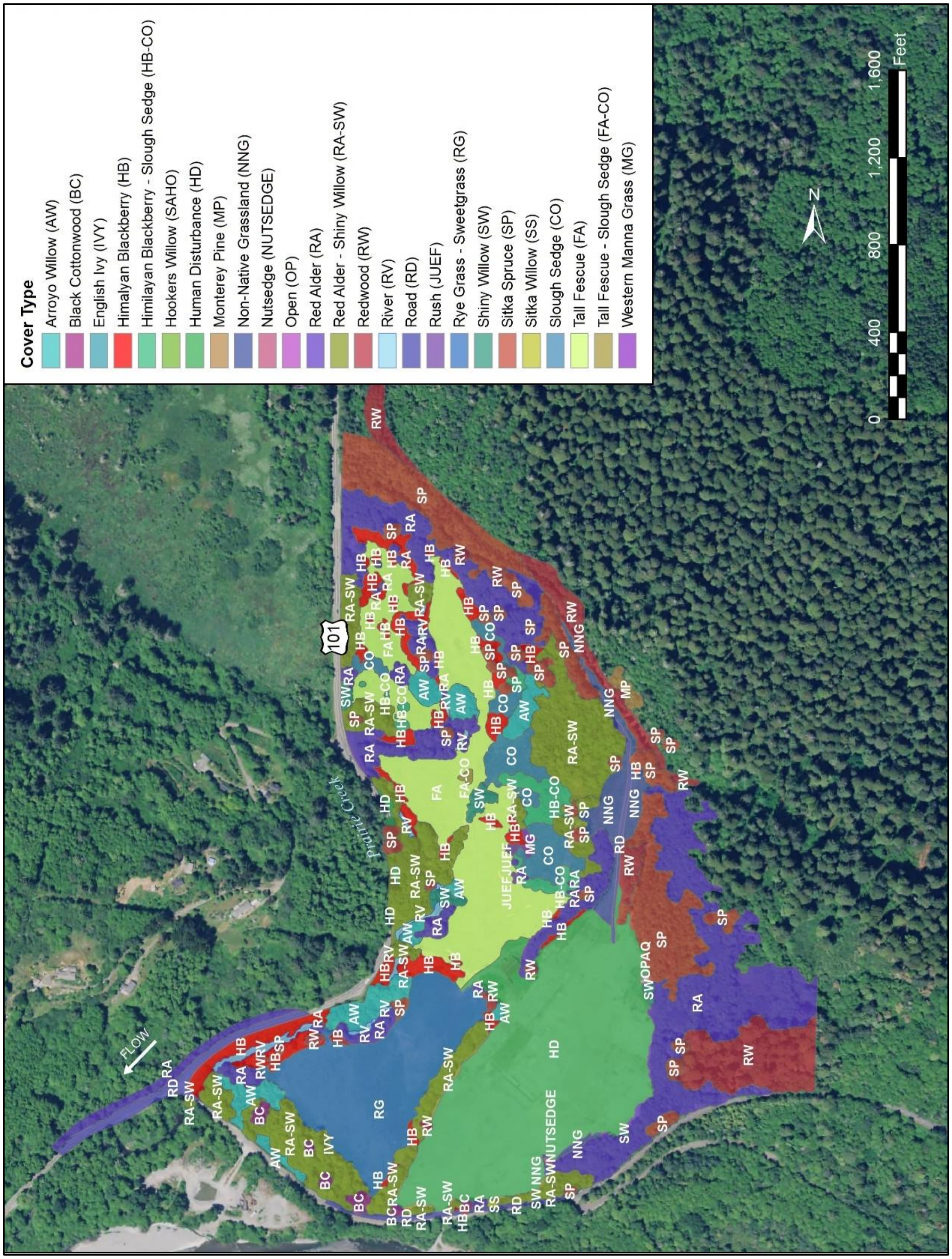


Figure 14. Existing vegetated and unvegetated cover types within the APE of the project site.

Table 2. Area of 21 vegetated and 4 unvegetated cover types within the project site APE. Cover types in red are dominated by non-native species.

Cover Type	**Vegetation Alliance**	**CDFW Sensitive Community**	**Area (ac)**
Arroyo Willow	*Salix lasiolepis* Shrubland Alliance Arroyo willow thickets	Yes	2.2
Black Cottonwood	*Populus trichocarpa* Forest Alliance Black cottonwood forest	Yes	0.3
English Ivy	no corresponding Alliance	No	0.01
Himalayan Blackberry	*Rubus armeniacus* Semi-Natural Shrubland Stands Himalayan blackberry brambles	No	3.8
Himalayan Blackberry–Slough Sedge	*Carex obnupta* Herbaceous Alliance Slough sedge swards	Yes	0.5
Hooker’s Willow	*Salix hookeriana* Shrubland Alliance Coastal dune willow thickets	Yes	0.02
Human Disturbance	no corresponding Alliance	No	21.3
Monterey Pine	*Pinus muricata–Pinus radiata* Forest Alliance Bishop pine–Monterey pine forest	No	0.02
Non-Native Grassland	several corresponding alliances	No	2.3
Nutsedge	no corresponding alliance		0.02
Open	no corresponding alliance	No	0.01
Pacific Willow	*Salix lasiandra* Woodland Alliance Shining willow groves	Yes	0.7
Red Alder	*Alnus rubra* Forest Alliance Red alder forest	Yes	9.5
Red Alder–Pacific Willow	*Alnus rubra* Forest Alliance Red alder forest	Yes	8.7
Redwood	*Sequoia sempervirens* Forest Alliance Redwood forest	Yes	7.8
River	no corresponding alliance	No	0.7
Road	no corresponding alliance	No	2.2
Rush	*Juncus effusus* Herbaceous Alliance Soft rush marshes	No	0.1
Ryegrass–Sweet Grass	*Lolium perenne* Semi-Natural Herbaceous Stands Perennial ryegrass fields	No	9.8
Sitka Spruce	*Picea sitchensis* Forest Alliance Sitka spruce forest	Yes	6.0
Sitka Willow	*Salix sitchensis* Provisional Shrubland Alliance Sitka willow thickets	Yes	0.04
Slough Sedge	*Carex obnupta* Herbaceous Alliance Slough sedge swards	Yes	1.0
Tall Fescue	*Agrostis (gigantea, stolonifera)–Festuca arundinacea* Semi-Natural Herbaceous Stands	No	11.9
Tall Fescue–Slough Sedge	*Carex obnupta* Herbaceous Alliance Slough sedge swards	Yes	0.1
Western Manna Grass	*Glyceria ×occidentalis* Provisional Herbaceous Alliance Northwest manna grass marshes	No	0.1
		Total	**89.2**

3.2.2 Detrended Digital Elevation Model

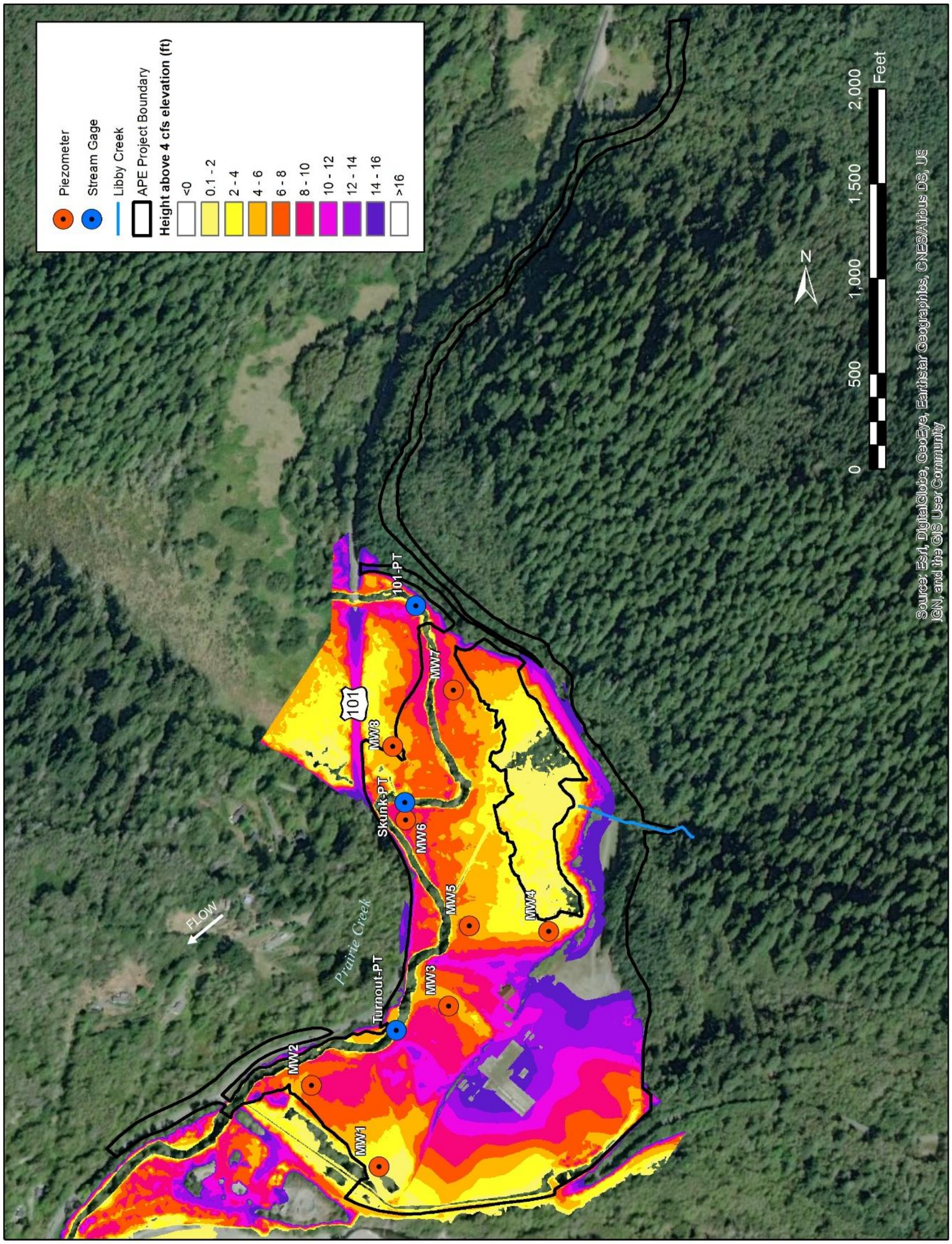
Within the 89.2-acre APE, 64.4 acres of vegetation were mapped. Six percent of the existing ground dtDEM within the project boundary was less than 3 ft above the 4 cfs Prairie Creek water surface elevation; 17% occurred between 3 and 6 ft; 25% occurred between 6 and 9 ft; and 53% occurred on ground surfaces that were greater than 9 ft (Figure 15).

3.2.3 Existing Vegetation Zonation

The riparian corridor has been defined as the zone of direct interaction between the terrestrial and aquatic system(s) or by the dominant plant species present (Gregory et al. 1991). A riparian corridor is an area where the gradient from 100% aquatic habitat to 100% upland habitat occurs. Many definitions of riparian areas (or corridors) consider the present channel location, and adjacent land only where the stream sustains a higher, off-channel groundwater table than would be available from local precipitation alone. But the riparian corridor should also include those areas the channel once occupied and might in the future occupy. Often a riparian corridor is bounded by adjacent valley walls or high terraces. The California State Water Resources Control Board (SWRCB) has developed a working definition for riparian areas, which is based in part on Brinson et al. (2002):

> *Riparian areas are areas through which surface and subsurface hydrology interconnect aquatic areas and connect them with their adjacent uplands (Brinson et al. 2002). They are distinguished by gradients in biophysical conditions, ecological processes, and biota. They can include wetlands, aquatic support areas, and portions of uplands that significantly influence the conditions or processes of aquatic areas.* (SFEI and ACC 2012).

Physical and hydrologic gradients within the riparian corridor exert a strong influence in vegetation patterns adjacent to streams and water bodies. Closer to the water, hydrophytic and emergent plants may thrive, whereas riparian plants may dominate vegetation a little further and higher from the water (Figure 16). Vegetation zonation created by hydrologic and physical gradients has been used in the past as a basis of revegetation design (Hoag and Landis 2001, 2002, Bair et al. 2003, Sullivan and Bair 2004, M&T 2006, HVT et al. 2011, HVT et al. 2015).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, US
IGN, and the GIS User Community

Figure 15. Detrended Digital Elevation Model (dtDEM) of the project area.

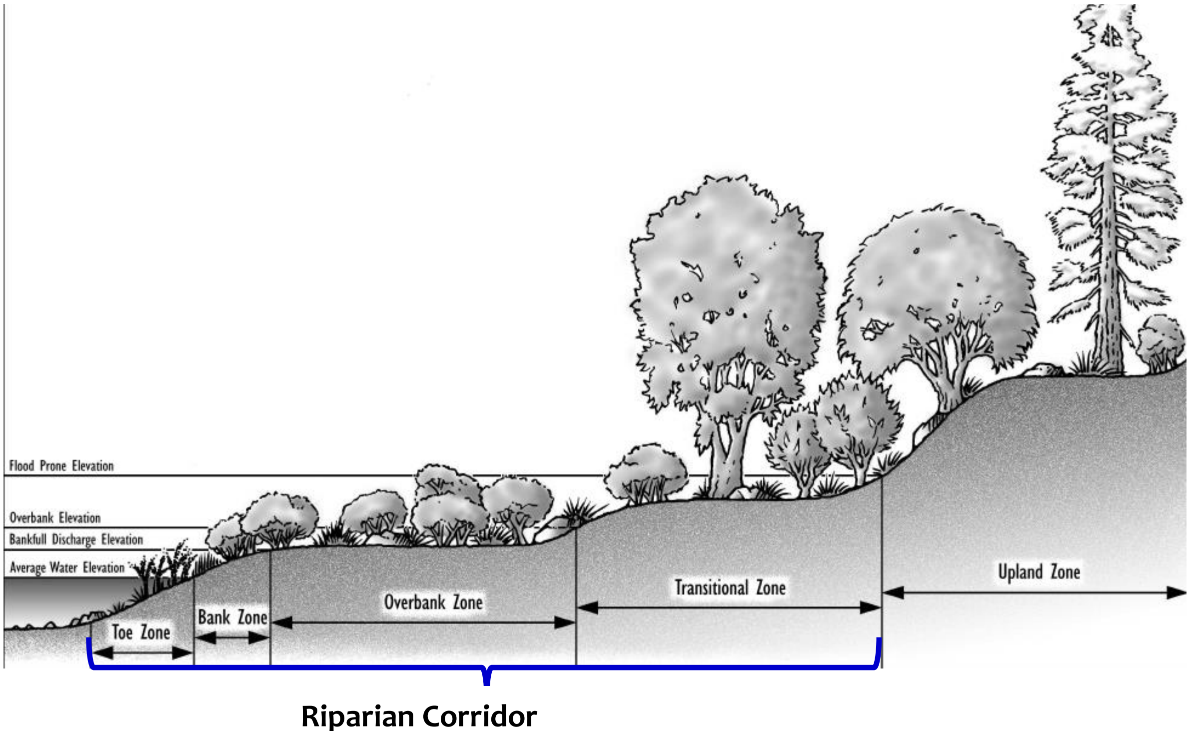


Figure 16. Vegetation zones used as a basis for design, from Hoag and Landis (2002).

Four vegetation zones and one in-channel zone were defined based on the average elevations of different cover types (Table 3, Figure 17). Zonal boundaries were based on the interpretation of the box plot data (Figure 17). Each zone is defined as an elevation above the 4 cfs water surface elevation. Different plant species are associated with each zone and form the basis of species that were included in the plant palette chosen for revegetation designs. The areas for each vegetation zone vary in size and location (Table 4, Figure 18).

Table 3. Four vegetation zones and one water zone defined using the height above 4 cfs water surface analysis.

Vegetation Zone	Height Above 4 cfs Water Surface	Annual Inundation Duration	Description
In-channel	< 0 ft	All year	This zone is inundated constantly and is one source of shallow groundwater throughout the year
Emergent	0–3 ft	All year to multiple months	This zone is in constant contact with the shallow groundwater through capillarity or direct inundation
Riparian	3–6 ft	Many weeks to days	This zone is in frequent contact with the shallow groundwater through capillarity or direct inundation
Transition	6–9 ft	Days to hours	This zone is infrequently in contact with the shallow groundwater through capillarity or direct inundation
Upland	> 9 ft	Hours to never	This zone is rarely in contact with the shallow groundwater through capillarity or direct inundation

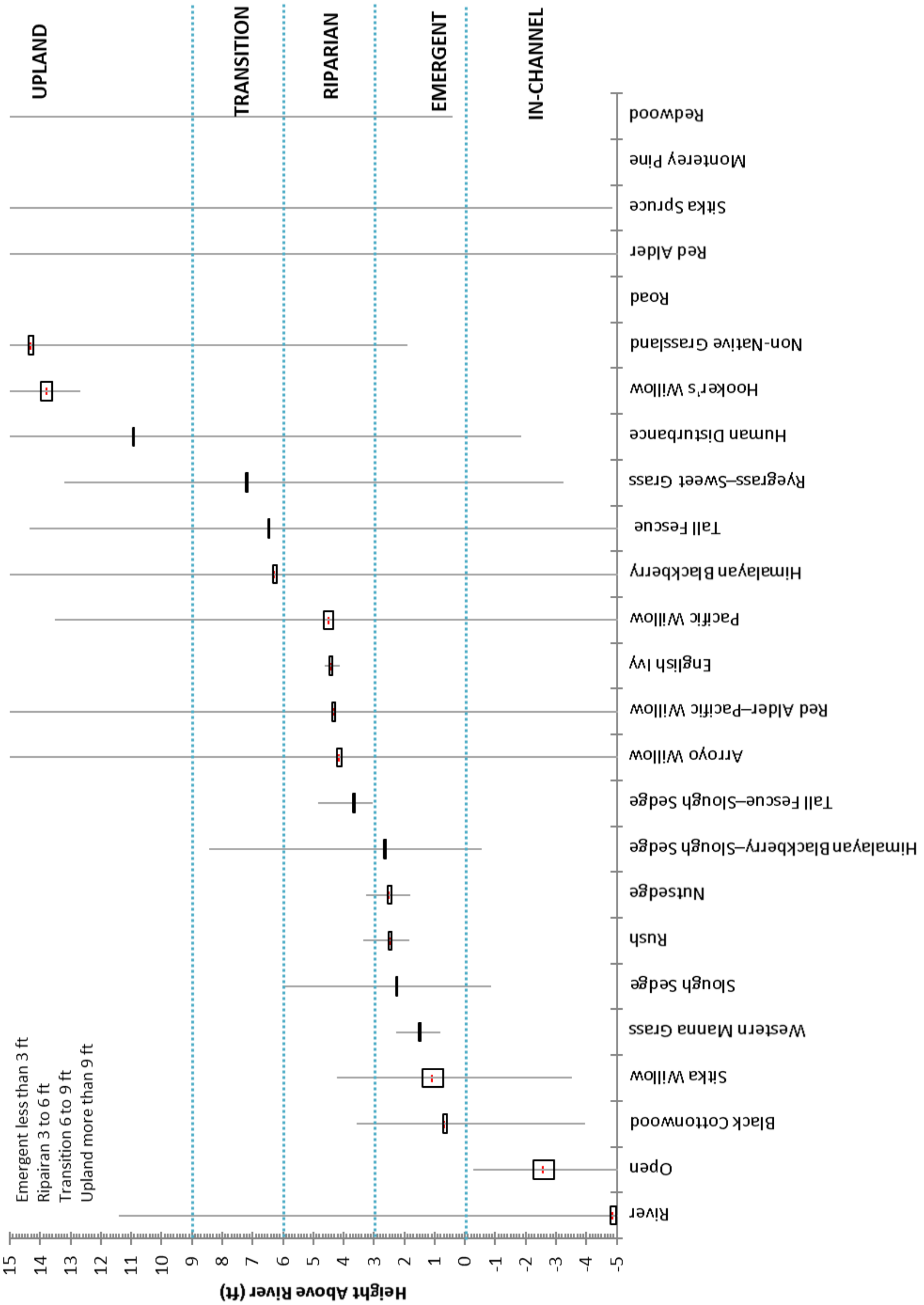


Figure 17. Box plots illustrating the average height and range of heights above water for mapped cover types. The red dot is the average elevation of the cover type. The box is defined by the 95% confidence interval, and the grey lines show the range in data between minimum and maximum height above 4 cfs values. The height in the chart is truncated to 15 ft. Additional upland cover types occurred more than 15 ft above the groundwater surface and are not shown.

Table 4. Percent area of existing vegetation zones within the project site APE.

Zone	Acres	Percent of Project Site
In-channel	4.5	5.0%
Emergent	7.9	8.9%
Riparian	11.6	13.0%
Transition	15.2	17.0%
Upland	50.0	56.1%
Total	**89.2**	**100%**

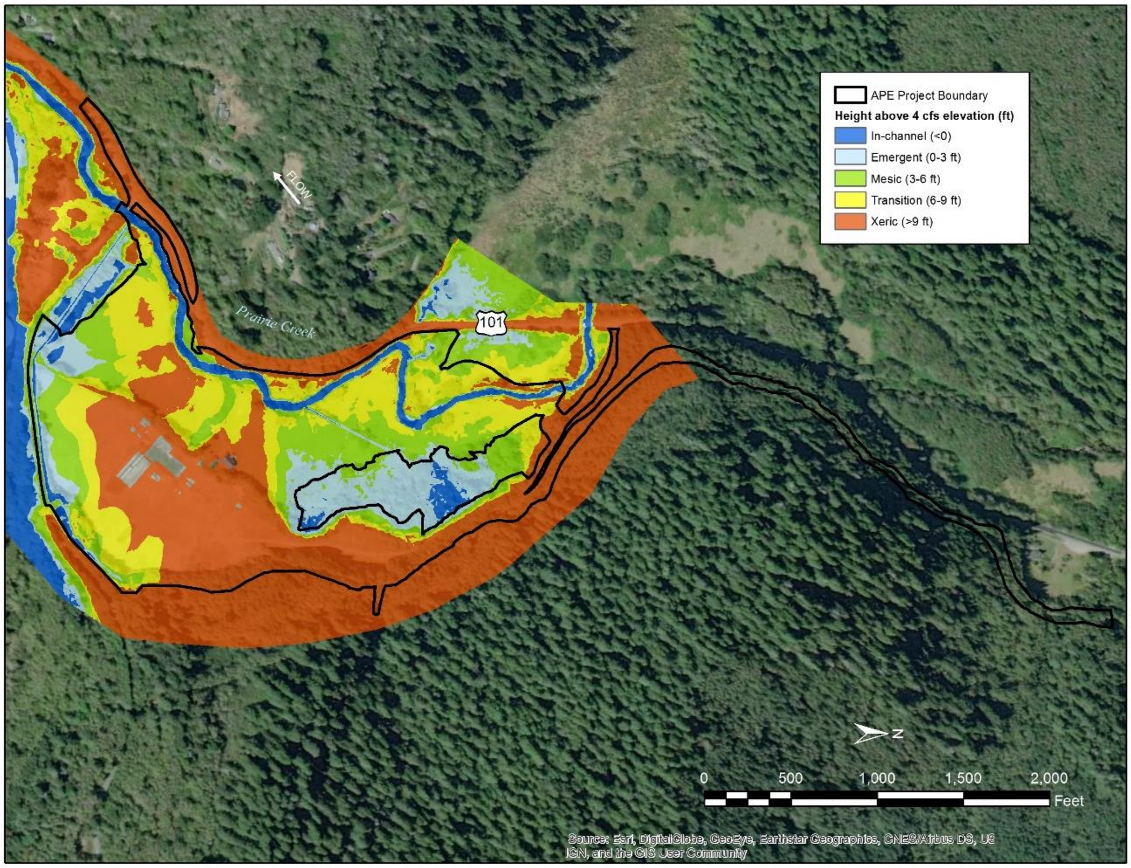


Figure 18. Existing vegetation zonation within the project area.

3.2.4 Sensitive Natural Communities within Vegetation Zones

Vegetated cover types that are associated with CDFW listed sensitive natural communities occur within the emergent, riparian, and upland zones in the project site. No sensitive natural communities were observed within the transition zone.

3.2.4.1 Emergent Zone

Emergent zones were dominated by plants associated with non-tidal freshwater habitats. Emergent zones occurred along the margins of Prairie Creek, Libby Creek, and various seasonal and perennial freshwater bodies (e.g., ponds) within an elevation of 3 ft above the fall water surface

(Figure 17). All emergent-related cover types are dominated by obligate or wet facultative wetland indicator species. Seven cover types occurred within this zone that collectively covered 2.4% of the APE (Figure 14; Table 2).

Four sensitive natural communities were mapped in the emergent zone: slough sedge swards (*Carex obnupta* Herbaceous Alliance), soft rush marshes (*Juncus effusus* Herbaceous Alliance), Sitka willow thickets (*Salix sitchensis* Provisional Shrubland Alliance), and black cottonwood forest (*Populus trichocarpa* Forest Alliance).

Slough sedge (*Carex obnupta*) is the dominant plant in the slough sedge swards. This alliance was commonly associated with perennial freshwater bodies. Slough sedge often grows in dense monotypic stands. Slough sedge is an obligate wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in this alliance are: common rush species (*Juncus effusus* and *J. patens*) and Himalayan blackberry (*Rubus armeniacus*). Three cover types were associated with slough sedge swards and covered 1.8% of the APE (Table 2, Figure 14).

Common rush (*Juncus effusus*) is the dominant plant in the soft rush marshes (*Juncus effusus* Herbaceous Alliance). This alliance was commonly associated with infrequently inundated grazed pastures. Common rushes are wet facultative wetland indicator species (Reed 1988). The species richness in this cover type was typically high, though many of the associated species are introduced, invasive exotic species. Species that may commonly occur as associates or as co-dominants in this alliance: creeping rush (*J. patens*), velvet grass (*Holcus lanatus*), annual bluegrass (*Poa annua*), water foxtail (*Alopecurus geniculatus*), sweet vernal grass (*Anthoxanthum odoratum*), annual ryegrass (*Lolium* sp.), colonial bent grass (*Agrostis tenuis*), creeping bent grass (*Agrostis stolonifera*), dandelion (*Taraxacum officinale*), perennial trefoil (*Lotus corniculatus*), buttercup (*Ranunculus repens*), curly dock (*Rumex crispus*), and creeping white clover (*Trifolium repens*). One cover type was associated with the soft rush marshes and covered 0.09% of the APE (Table 2, Figure 14).

Sitka willow is the dominant woody plant in the Sitka willow thickets (*Salix sitchensis* Provisional Shrubland Alliance). This alliance was commonly associated with stream margins and perennial and seasonal freshwater wetlands. Sitka willow is a wet facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in this alliance are: red alder (*Alnus rubra*), arroyo willow (*Salix lasiolepis*), Hooker’s willow (*Salix hookeriana*), small-fruited bulrush (*Scirpus microcarpus*), cascara (*Frangula purshiana*), California blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus armeniacus*), yellow skunk cabbage (*Lysichiton americanus*), and water parsley (*Oenanthe sarmentosa*). One cover type was associated with the Sitka willow thickets and covered 0.04% of the APE (Table 2, Figure 14).

Black cottonwood (*Populus trichocarpa*) is the dominant woody plant in the black cottonwood forests (*Populus trichocarpa* Forest Alliance). This alliance was commonly associated with stream margins and seasonal freshwater wetlands. Black cottonwood is a facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates or co-dominants in this cover type are: red alder, arroyo willow, Pacific willow (*Salix lasiandra*), Hooker’s willow, small-fruited bulrush, cascara, California blackberry, Himalayan blackberry, yellow skunk cabbage, water parsley, and stinging nettle (*Urtica dioica*). One cover type was associated with the black cottonwood forest and covered 0.33% of the APE (Table 2, Figure 14).

3.2.4.2 Riparian Zone

The riparian zone was dominated by woody plants associated with terrestrial freshwater habitats. Riparian zones occurred along the margins of Prairie and Libby creeks and freshwater bodies (both perennial and seasonal) between 3 and 6 ft above the fall water surface (Figure 17). Riparian woodlands were most often dominated by wet facultative wetland indicator species. Seven cover types occurred within this zone that covered 23.8% of the APE (Figure 14; Table 2).

Four sensitive natural communities were mapped in the riparian zone: red alder forest (*Alnus rubra* Forest Alliance), coastal dune willow thickets (*Salix hookeriana* Shrubland Alliance), shining willow groves (*Salix lasiandra* Woodland Alliance), and arroyo willow thickets (*Salix lasiolepis* Shrubland Alliance). The understory plant species found in the riparian zone habitats were very similar to those found in the woody plant alliances of the emergent zone. Common understory species in the sensitive natural communities of the riparian zone included small-fruited bulrush, cascara, California blackberry, Himalayan blackberry, yellow skunk cabbage, water parsley, red elderberry (*Sambucus racemosa*), and stinging nettle.

Red alder and Hooker’s willow cover types were associated with riparian habitat and removed from the upland habitat defined in the box whisker analysis. The largest red alder patches and the Hooker’s willow patch both occur away from Prairie Creek and are in the upland zone due to limitations of the water surface elevation plane used to construct the dtDEM and conduct the zonal analysis.

Red alder is the dominant woody plant in the red alder forest (*Alnus rubra* Forest Alliance). This alliance was commonly associated with stream margins and perennial and seasonal freshwater wetlands. Red alder is a wet facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates or co-dominants in the canopy of this alliance are: black cottonwood, arroyo willow, Pacific willow, and Hooker’s willow. Two cover types were associated with the red alder forests and covered 20.4% of the APE (Table 2 Figure 14).

Hooker’s willow is the dominant woody plant in the coastal dune willow thickets (*Salix hookeriana* Shrubland Alliance). This alliance receives its common name from Hooker’s willow, which is a coastal species often found in abundance on coastal dunes. This alliance was commonly associated with stream margins, and perennial and seasonal freshwater wetlands. Hooker’s willow is a wet facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in the canopy of this alliance are: red alder, arroyo willow, and Sitka willow (*Salix sitchensis)*. One cover type was associated with the coastal dune willow thickets and covered 0.02% of the APE (Table 2 Figure 14).

Pacific willow is the dominant woody plant in the shining willow groves (*Salix lasiandra* Woodland Alliance). This alliance was commonly associated with stream margins, and perennial and seasonal freshwater wetlands. Pacific willow is a wet facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in the canopy of this alliance type are: red alder, black cottonwood, Sitka willow, and Hooker’s willow. One cover type was associated with the shining willow groves and covered 0.8% of the APE (Table 2, Figure 14).

Arroyo willow is the dominant woody plant in the arroyo willow thickets (*Salix lasiolepis* Shrubland Alliance). This alliance was commonly associated with stream margins and perennial and seasonal freshwater wetlands. Arroyo willow is a wet facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in the canopy of this alliance are: red alder, black cottonwood, Sitka willow, and Hooker’s willow. One cover type was associated with the arroyo willow thickets and covered 2.5% of the APE (Table 2, Figure 14).

3.2.4.3 *Upland Zone*

The upland zone is dominated by coniferous plants associated with non-wetland habitats. Vegetation alliances associated with the upland zone were not inundated for long periods of time, if at all. The upland zone occurs at elevations greater than 9 ft above the fall water surface (Figure 17). Vegetated cover types associated with the upland zone may have some wetland indicator species but many of the plants associated with these cover types are facultative wetland or upland plants. Five cover types occurred within this habitat that covered 21.4% of the APE (Figure 14; Table 2).

Three sensitive natural communities were mapped in the upland zone: redwood forest *Sequoia sempervirens* Forest Alliance), Sitka spruce forest (*Picea sitchensis* Forest Alliance), and Bishop Pine– Monterey Pine forest (*Pinus muricata–Pinus radiata* Forest Alliance). Monterey pine is a rare species that occurs in three native populations in California. However, it is often planted because it grows quickly. The Monterey pine forest in the project site does not occur natively and therefore does not warrant the same consideration as other sensitive natural communities in the project site.

Coast redwood (*Sequoia sempervirens*) is the dominant woody plant in the redwood forest (*Sequoia sempervirens* Forest Alliance). Coast redwood is not a wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in this cover type are: Sitka spruce (*Picea sitchensis*), hemlock (*Tsuga menziesii*), red elderberry, Douglas iris (*Iris douglasii*), redwood sorrel (*Oxalis oregana*), evergreen huckleberry (*Vaccinium ovatum*), sword fern (*Polystichum munitum*), and salal (*Gaultheria shallon*). One cover type was associated with redwood forest and covered 8.8% of the APE (Table 2, Figure 14).

Sitka spruce is the dominant woody plant in the Sitka spruce forest (*Picea sitchensis* Forest Alliance). Sitka spruce is a facultative wetland indicator species (Reed 1988). Other species that may commonly occur as associates (but not co-dominants) in this cover type are: coast redwood, hemlock, Douglas iris, redwood sorrel, evergreen huckleberry, sword fern, and salal. One cover type was associated with Sitka spruce forest and covered 6.7% of the APE (Table 2, Figure 14).

4 Integrated Project CEQA Level Revegetation Design

A revegetation design was prepared from the integrated site grading plan developed by NHE for the project site. The proposed revegetation approach is intended to recreate larger patches of emergent and riparian vegetation similar, albeit smaller in area, to what was historically present at the site prior to 1940. To varying extents, the design selectively converts upland and transitional zones into in-channel, emergent, and riparian zones. The project should be self-mitigating, since an overall increase in emergent and riparian vegetation is expected. Additionally, it is expected that future cohorts of tree species will voluntarily colonize some areas within the project footprint, creating a self-sustaining dynamic riparian system that is directly linked to the functional integrity of the channel and associated floodplains. Where proposed construction will create a ground disturbance that could favor the establishment of disturbance-dependent, non-native invasive plant species (NIS), tradeoffs are being continually assessed and planting recommendations developed to reduce the impact that NIS plants could have after the project is completed. Diverse riparian vegetation will be maintained and rehabilitated via:

- Preserving as much of the existing riparian vegetation as possible and minimizing ground disturbance;
- Constructing topographic surfaces/benches at hydrologically suitable elevations to encourage natural riparian woody plant regeneration;
- Planting a variety of species in a simple arrangement based on vegetation associations found within the project site (see Section 3); and
- Conducting post-project maintenance to remove invasive plants that may establish within the project site after construction.

The overarching project goal is to enhance geomorphic processes to regain channel and floodplain function and provide complex aquatic habitat that evolves over time to benefit multiple species and to significantly increase salmonid abundance by increasing rearing and spawning habitat to the extent possible. A secondary project goal is to remove NIS plants and discourage future re-establishment before, during, and after construction.

Specific overall project objectives include:

- Develop species-rich, structurally complex, self-maintaining riparian vegetation;
- Increase number of off-channel wetland complexes;
- Increase topographic and hydraulic diversity (i.e., increased variability in channel width and depth);
- Increase diversity (=quality) and quantity of adult spawning and juvenile anadromous fish rearing habitats;
- Increase accessibility to the floodplain and off-channel wetland complexes by adult and juvenile anadromous fish;
- Increase in-channel, wetland, emergent, and riparian vegetation area;
- Increase complexity, quality, and quantity of aquatic and riparian habitats;
- Increase complexity and variability within terrestrial wildlife habitats associated with the transitional ecotone between the riparian and upland zones;
- Preserve or minimize disturbance of existing high-quality vegetation within the project site;
- Reduce or minimize the disturbance footprint wherever feasible; and
- Increase area of ground surface that can support aquatic, emergent, and riparian vegetation.

Rehabilitation efforts that incorporate variation in channel structure that is connected to the contemporary flow regime and sediment input are intended to promote sustainable fish and wildlife populations. Additionally, fish and wildlife will benefit from a variety of environmental conditions only available through the interplay of intra- and inter-annual flow variation after the project is implemented.

4.1 Revegetation Goal and Objectives

A primary revegetation goal was to take advantage of proposed topographic variability that can support aquatic or near aquatic plant assemblages to increase native wetland, emergent, and riparian vegetation area. Another revegetation goal was to arrange planting materials to form the primary components of wildlife and fish habitat and the basis of large wood and allochthonous detritus that could be utilized by benthic macroinvertebrates. The final revegetation goal was that the project be self-mitigating for wetlands, waters of the U.S., and riparian biological resources. Future floods will likely disturb and transform revegetated areas into more topographically complex areas with a range of vegetation age classes, structural variation, and plant and animal species. Revegetation efforts are intended to work in concert with topographic design elements, which in turn are intended to restore a dynamic stream channel. Revegetation objectives include:

- Use the relationship of vegetation zones to flood frequency and height above water concepts to guide the revegetation designs;
- Increase native plant species richness over existing conditions in the aquatic, emergent, and riparian vegetation zones;
- Plant salvaged materials and nursery stock at high densities that will rapidly shade the site, provide aquatic cover, and inhibit non-native species over all disturbed areas;
- Plant large container stock where needed to also jump-start the shading process;
- Salvage larger living willows and other trees to plant around the backwater/off channel features that will jump-start the shading processes needed to suppress reed canary grass;
- Maintain continuous corridors of riparian vegetation with a more variable transitional ecotone between the riparian and upland zones;
- Include native species that will diversify the overall native plant richness and increase vertical diversity in the riparian zone;
- Remove reed canary grass wherever possible and disposing of it appropriately;
- Remove large areas of Himalayan blackberry and disposing of it appropriately;
- Investigate alternatives that could inhibit seeds and propagules from re-colonizing the site from upstream sources (i.e., booms);
- Establish a vegetation management plan to ensure project success in removing targeted NIS plants and inhibiting future recolonization;
- Constructing and planting wetlands at a rate greater than 1:1 for wetlands being filled or eliminated;
- Construct and plant Ordinary High Water areas (creek, waters) at a rate greater than 1:1 for creek beds that are filled; and
- Construct and plant riparian areas at a rate greater than 1:1 for riparian areas that are removed or eliminated.

4.2 Revegetation Design Strategy

To date, considerable time and effort has been spent collaborating, guiding, and coordinating the topographic designs, fine-tuning the hydraulic and hydrologic performance of specific design features, and integrating revegetation designs. Ground surface elevations and groundwater–streamflow relationships described in previous sections were considered and incorporated into the physical designs wherever feasible. Overall, the physical designs and revegetation are well suited to adjust and evolve with Prairie Creek.

One revegetation design was developed for the Redwood National and State Park Visitor Center and Restoration project, to illustrate how vegetation would respond to the proposed grading plan, which integrates the restoration area with other project elements. Generally, plantings associated with restoration will include species that grow into trees, shrubs, forbs, vines, and grasses/sedges to provide a multilayered canopy upon maturity while also providing habitat diversity when the plantings are establishing and maturing. A tree species and a shrub species will be included in each revegetation type to maximize vertical structural diversity as the plantings mature.

A new Redwood National Park visitor center will be built on some portion of the currently paved area within the project area. The future visitor center will be landscaped, and a specific landscaping design will be developed. The visitor center landscaping design and the rehabilitation project revegetation will be coordinated. Viewsheds have been identified as part of the current visitor center architectural design, although future revegetation efforts conducted as part of the rehabilitation could potentially grow large enough to obstruct views and reduce the visitor experience. Plants that were proposed for restoration have been classified by height at maturity so that in the next phases of revegetation design when the planting layouts are developed, shorter plants can be located where they will not grow to block viewsheds and will not detract from the rehabilitation because they are still providing the ecological services that are appropriate to rehabilitated areas. Shorter herbaceous plants typically grow less than 10 ft tall at maturity. Semi-woody and woody plants that are short typically grow to heights less than 30 ft tall at maturity. Tall woody or semi-woody plants may grow more than 30 ft tall at maturity. Depending on the location within the site, tall woody plants could block viewsheds considered important for the visitor center but may still be appropriate for other locations. Short woody and herbaceous plants can be used strategically to create and maintain viewsheds around the visitor center and used elsewhere to create habitat heterogeneity.

The CEQA-level revegetation design is meant to guide design refinement and planning. The relationship between vegetation and height above Prairie Creek 4 cfs water surface elevation described in Section 3.2 (Figure 17, Table 4) served as a basis for the Redwood National and State Park Visitor Center and Restoration Project revegetation designs. The CEQA-level design was intended to portray the post-project extent and location of vegetation zones but not provide the layout, details, or specifications for those plantings. A coarse plant material estimate was developed for the CEQA-level designs. The CEQA-level revegetation design was not intended to be implemented at this stage but will be used as a tool to guide later design revisions and to provide data that quantify how construction could affect the distribution and types of vegetation growing within the project boundary for inclusion in a CEQA analysis.

4.3 Predicted Vegetation Zone Response to Future Site Conditions

The restoration area within the project area has been designed to include variable ground surface elevations that will be seasonally inundated at different streamflows for varying lengths of time. Plantings are proposed within the project footprint to establish plants and cover disturbed ground surfaces. In-channel areas would not be planted unless the threat of invasive plant colonization and establishment is considered to be high. Areas designated would be planted depending on proximity to the main channel, intended hydrologic function, and threat of invasive plant species recolonization.

When compared to existing conditions, the proposed changes represented in the integrated design topography within the project site will change the area and distribution of vegetation zones when the project is completed. The vegetation zone boundaries defined using existing vegetation (Table 3) were used to evaluate how proposed design topography would change existing zonation patterns. The beginning and ending detrended elevations (i.e., height above the 4 cfs Prairie Creek water surface elevation) associated with different vegetation zones (Table 3) under existing conditions were applied to the CEQA-level design surface. The area of individual vegetation zones within each proposed design alternative was tabulated and used to quantify the effects that proposed restoration actions would have on vegetation zone area. The proposed physical designs increase the length of mainstem channel and area of ponded water, emergent, and riparian zones. In the project site, 1.2 acres of the riparian–upland transition zone and 10.8 acres of upland/human disturbance will be converted to water, emergent, and riparian zones (Figure 19, Table 5).

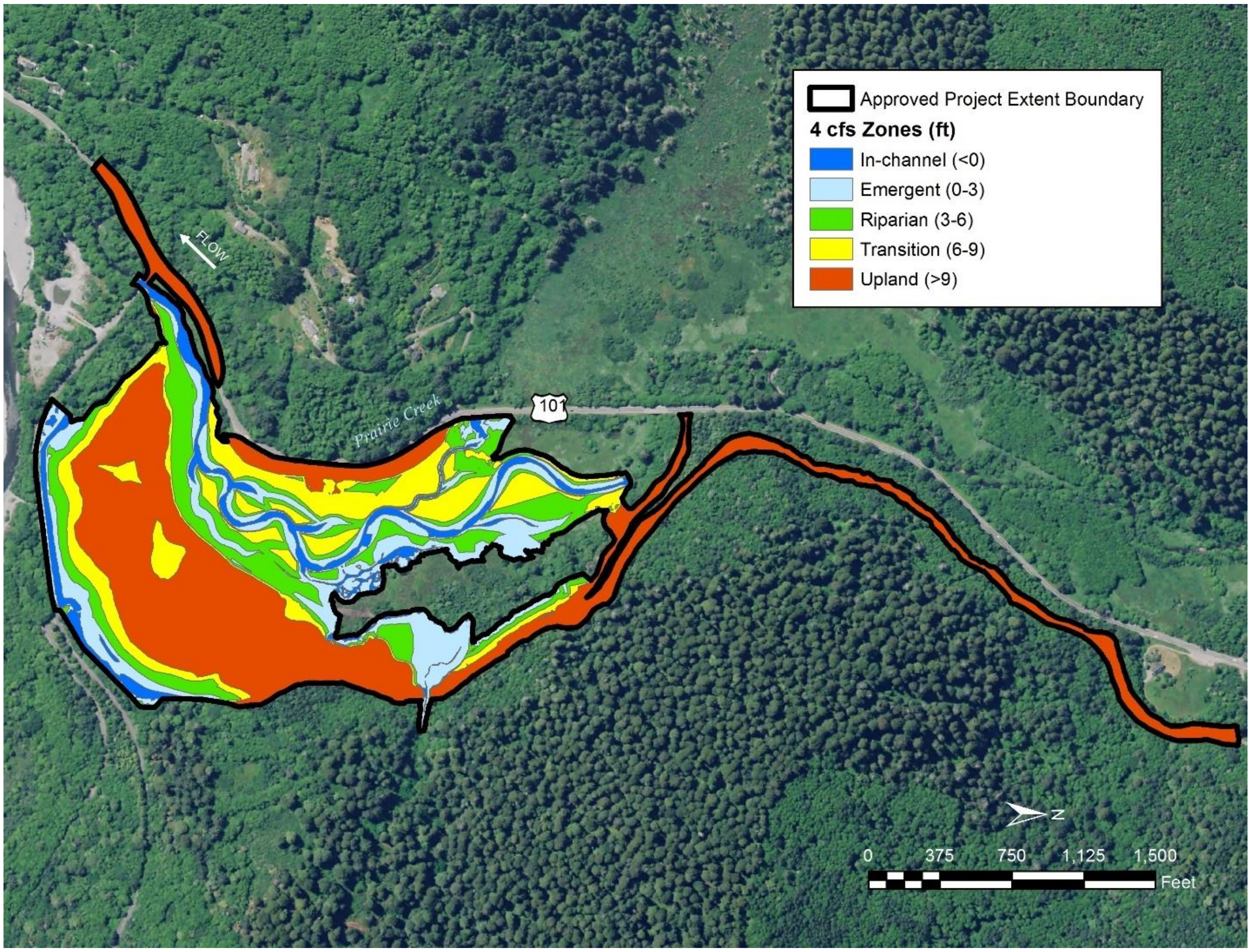


Figure 19. Project site proposed CEQA-level revegetation design based on vegetation zones defined by ground height above the Prairie Creek 4 cfs water surface elevation.

Table 5. The project site vegetation zone area comparison under existing conditions and with the proposed CEQA level revegetation design.

Zone	Existing conditions (acres)	CEQA Level Design (acres)	Difference (acres)
In-channel	4.5	6.0	+1.5
Emergent	7.9	14.7	+6.8
Riparian	11.6	15.2	+3.6
Riparian–Upland Transition	15.2	14.0	−1.2
Upland	50.0	39.2	−10.8
Total	**89.2**	**89.2**	**0.0**

4.3.1 Plants Used in Revegetation

Revegetation zones portrayed in the Redwood National and State Park Visitor Center and Restoration CEQA-Level Revegetation Design should be planted with different combinations of herbaceous, shrub, and tree species to maximize habitat structure. Ideally, all plant material required for restoration would be propagated from material found and collected within the Prairie Creek watershed. Emergent zone plantings should be installed at least 1.5 ft apart or at a density of approximately 22,350 plants per acre. Riparian and transitional zone plantings should be installed approximately 4–8 ft apart, which is approximately 1,400 plants per acre. Upland plantings should be installed approximately 9–12 ft apart, which is approximately 500 plants per acre. Mature willow shrubs and trees will be salvaged and planted in lower velocity areas, locations where reed canary grass could persist, and any alcoves, to jump-start the shading process.

Not all plants associated with a vegetation zone will be appropriate for all locations within that vegetation zone. Aside from vegetation zonation, many species show an affinity for soils with specific textures and drainage rates. Soil descriptions from well logs developed during piezometer installation describe a north-south gradient in soil composition, with clayey fine-textured soils to the north and gravelly sandy soils to the south. During future design phases, a combination of site location, soil textures, and vegetation zonation will be used to guide plant selection for different areas within the site.

The in-channel zone is composed of the Prairie Creek low flow channel. No revegetation is currently proposed for the in-channel zone of Prairie Creek, unless invasive plant colonization is thought to be a threat. In those cases, native rhizomatous species should be planted (Table 6).

The emergent zone is the ecotone between the aquatic environment and the woody plant dominated riparian zone. The emergent zone is often occupied by semi-open substrate, herbaceous plants, and establishing woody plants. Deeper channelbed scour and deposition periodically occurs in this zone. Many projects choose not to plant within the emergent zone because the channel will adjust after the project is constructed and plantings within the emergent zone can inhibit short term channel adjustment and potentially limit the extent to which the channel can be dynamic in the future. However, plantings in the emergent zone can limit the amount of area that disturbance-dependent non-native plants can colonize (Wisconsin Reed Canary Grass Management Working Group 2009). Plant species that could be used to revegetate areas within the emergent zone are listed in Table 6.

Table 6. Plant species that could be used to revegetate the emergent zone of the project site.

Common Name	Scientific Name	Height
slough sedge	*Carex obnupta*	< 6 ft
rush	*Juncus effusus*	< 6 ft
lady fern	*Athyrium filix-femina*	< 6 ft
skunk cabbage	*Lysichiton americanus*	< 6 ft
western crabapple	*Malus fusca*	< 30 ft
Sitka willow	*Salix sitchensis*	< 30 ft
red alder	*Alnus rubra*	< 50 ft
black cottonwood	*Populus trichocarpa*	> 100 ft
western redcedar	*Thuja plicata*	> 100 ft
Sitka spruce	*Picea sitchensis*	> 100 ft

The riparian zone is often occupied by a multi-layered vegetation that is dominated by woody plants. The riparian zone is inundated annually to semi-annually during the winter and early spring and is generally depositional. Tree and shrub species should be planted together and near each other to create a heterogeneous canopy structure that benefits neotropical birds (RHJV 2004). Plants that could be used to revegetate areas within the riparian zone are listed in Table 7.

Table 7. Plant species that could be used to revegetate the riparian zone of the project site.

Common Name	Scientific Name	Height
slough sedge	*Carex obnupta*	< 6 ft
Pacific reed grass	*Calamagrostis nutkaensis*	< 6 ft
rush	*Juncus effusus*	< 6 ft
California blackberry	*Rubus ursinus*	< 6 ft
cascara	*Frangula purshiana*	< 30 ft
western crabapple	*Malus fusca*	< 30 ft
Sitka willow	*Salix sitchensis*	< 30 ft
Pacific willow	*Salix lasiandra*	<40 ft
red alder	*Alnus rubra*	< 50 ft
black cottonwood	*Populus trichocarpa*	> 100 ft
western redcedar	*Thuja plicata*	> 100 ft
Sitka spruce	*Picea sitchensis*	> 100 ft

The transition zone is the ecotone between the woody plants found in the riparian zone and the more drought tolerant plants found in the upland zone. Upland and riparian plants co-mingle in the transition zone, which is inundated infrequently, or about one or two times every five years. Plants that could be used to revegetate areas within the transition zone are listed in Table 8.

Table 8. Plant species that could be used to revegetate the transition zone of the project site.

Common Name	Scientific Name	Height
slough sedge	*Carex obnupta*	< 6 ft
California brome	*Bromus carinatus*	< 6 ft
blue wildrye	*Elymus glaucus*	< 6 ft
beardless wildrye	*Elymus triticoides*	< 6 ft
meadow barley	*Hordeum brachyantherum*	< 6 ft
California oat grass	*Danthonia californica*	< 6 ft
Pacific reed grass	*Calamagrostis nutkaensis*	< 6 ft
rush	*Juncus effusus*	< 6 ft
California blackberry	*Rubus ursinus*	< 6 ft
sword fern	*Polystichum munitum*	< 6 ft
cascara	*Frangula purshiana*	< 30 ft
red elderberry	*Sambucus racemosa*	< 30 ft
arroyo willow	*Salix lasiolepis*	< 30 ft
Sitka willow	*Salix sitchensis*	< 30 ft
red alder	*Alnus rubra*	< 50 ft
bigleaf maple	*Acer macrophyllum*	> 100 ft
black cottonwood	*Populus trichocarpa*	> 100 ft
redwood	*Sequoia sempervirens*	> 100 ft

The upland zone is rarely if ever inundated and is composed of more drought tolerant plant species. Plants that could be used to revegetate areas within the upland zone are listed in Table 9.

Table 9. Plant species that could be used to revegetate the upland zone of the project site.

Common Name	Scientific Name	Height
sword fern	*Polystichum munitum*	< 6 ft
evergreen huckleberry	*Vaccinium ovatum*	<10 ft
red elderberry	*Sambucus racemosa*	< 30 ft
red alder	*Alnus rubra*	< 50 ft
grand fir	*Abies grandis*	> 100 ft
Douglas-fir	*Pseudotsuga menziesii*	> 100 ft
redwood	*Sequoia sempervirens*	> 100 ft

4.4 Managing NIS Plants

As mentioned in Section 3.3.1, reed canary grass was observed throughout the project site. Reed canary grass is a California native species (Jepson Flora Project 2018) that also grows rapidly, especially in riparian areas, causing many land managers to treat it as invasive (Apfelbaum and Sams 1987). Due to long-term cultivation of non-native genotypes in North America, it is possible that current populations of reed canary grass may include non-native strains or hybrids between native and non-native strains (Waggy 2010). This species quickly forms dense monocultures, similar to cattails (Typha spp.), and often occurs on lower ground surfaces adjacent to streams. Reed canary grass grows easily from stem and root fragments and a single plant can produce more than 600 seeds annually. Creeping rhizomes can choke seasonal stream channels and can prevent other “more desirable” species from establishing. Reed canary grass is difficult to remove and control due to an extensive and persistent root network. If reed canary grass is not actively managed within the project site prior to construction, it could negatively affect rehabilitation outcome and long-term project goals.

There are several methods that have been shown to be effective at controlling reed canary grass infestations (Tu 2004, Wisconsin Reed Canary Grass Management Working Group 2009, DiTomaso et al. 2013). Reed canary grass control is a multi-year process and the prevention of new infestations has been shown to be the best defense against reed canary grass invasion. A simple way to prevent future reed canary grass infestations within the project site is to minimize ground disturbance associated with the rehabilitation project. In areas where the ground will be disturbed, the rehabilitation project will need to use a combination of control methods to reduce current reed canary grass infestations within the project boundary and to inhibit re-establishment after the project is completed.

Reed canary grass management and removal should begin one or two years before the rehabilitation project is constructed. Small patches can be removed by hand. Larger patches can be excavated, and the removed material hauled away, or placed at depth in fill. Removed material must be handled and disposed of carefully to ensure that new infestations are not created. Follow up visits and removal may be needed to control smaller infestations. Tilling and soil cultivation in combination with longer hydroperiods and follow up hand removal have been effective at suppressing infestations (Tu 2004; Wisconsin Reed Canary Grass Management Working Group 2009). Timing of actions directed at controlling reed canary grass should be carefully evaluated and implemented to maximize control, reduce the impacts associated with removal, and maximize recovery of native vegetation. If successful, the proposed rehabilitation should recover historic aquatic and riparian ecologic functions that historically existed within the project boundary prior to its conversion to pasture and a lumber mill in the 1940s and 1950s.

4.5 Managing Roosevelt Elk

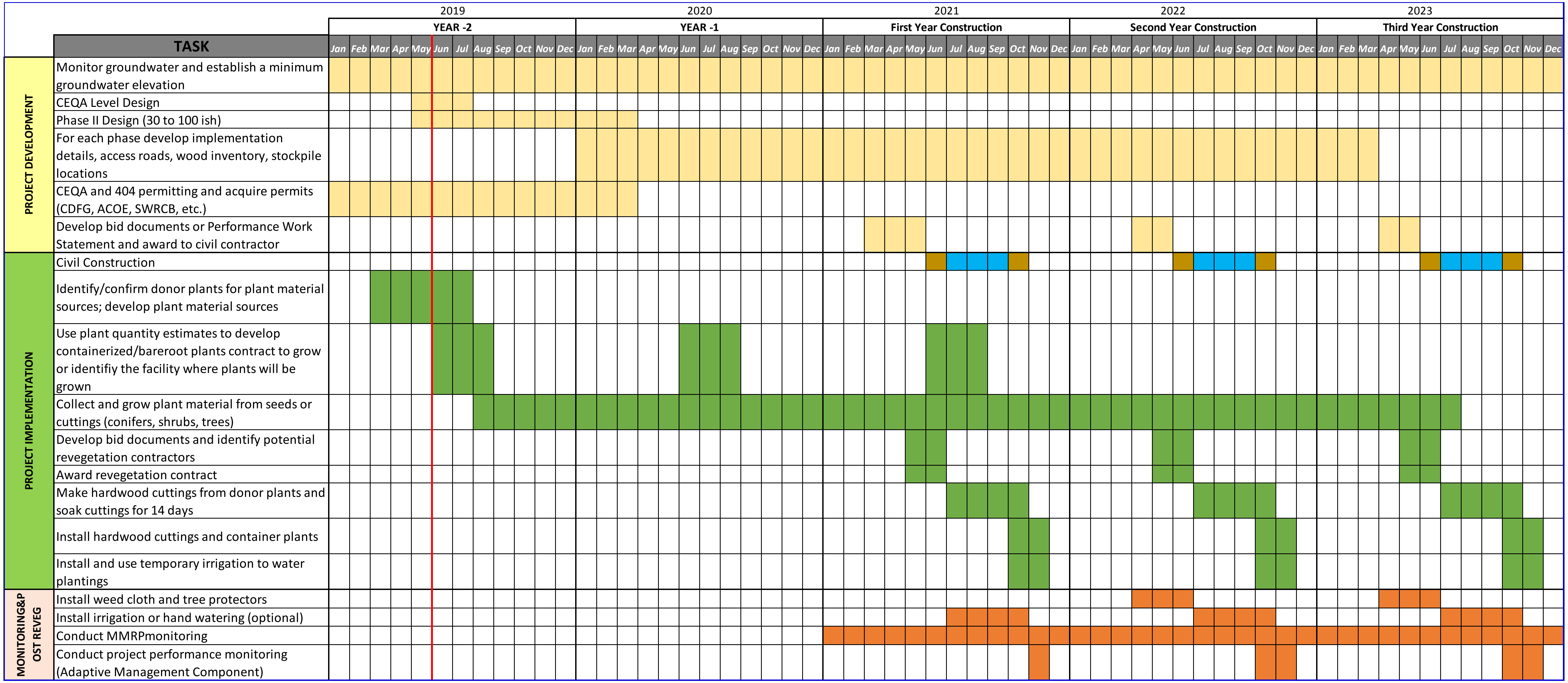
Roosevelt elk herd management is a National Park Service (NPS) priority and has the potential to affect the visitor experience at a future visitor center. The Davidson elk herd has been using the project area for rest and forage more frequently since cattle grazing ended in 2016. One concern is that changes in pasture area and forage quality due to the rehabilitation project will negatively affect the Davidson elk herd size. Currently there are approximately 23.5 acres of pasture within the project boundary where rehabilitation could occur (Table 2). The existing pasture is dominated by non-native grass species, and forage consists of sweet vernal grass and ryegrass in the southern pasture and tall fescue to the north. Velvet grass is another common non-native grass found in both pastures, and reed canary grass is also present to a lesser extent. The quality of forage should be considered. It is possible to seasonally improve forage quality such that smaller areas could provide the same amount of forage as larger areas. Forage could be improved through the reduction of species area and abundance with poor forage value (e.g., tall fescue, reed canary grass) and the planting of native perennial grasses such as California oat grass (*Danthonia californica*) and Pacific reed grass (*Calamagrostis nutkaensis*) where suitable. The physical design, revegetation, and visitor center landscaping will be coordinated with elk biologists with knowledge of the Davidson herd population demographics, population ecology, and forage, to develop goals, objectives, and monitoring metrics as part of adaptive management specific to elk.

4.6 Revegetation Schedule

The revegetation schedule relies on design, permitting, and construction tasks being accomplished within an estimated time frame (Figure 20). It is expected that site construction will occur in three phases during three consecutive years. Construction is expected to occur between June and October, with the instream work limited to the July, August, and September period. Construction phasing is still to be determined and the draft schedule shown in Figure 20 will be adjusted as more information becomes available.

Donor stock for seeds and cuttings should be identified through reconnaissance and mapping during the summer or spring two or three years before implementation. Identifying donor stock well in advance of collection makes the implementation process run smoother, as the timing of revegetation is critical for success. Conifers, cascara, red alder, huckleberry and other nursery-grown trees and shrubs are more successful if planted as two-year-old seedlings. If watershed-specific materials are required, then seeds or cuttings for the specified trees and shrubs need to be collected with enough time to grow two-year-old plants. Revegetation implementation in many areas is not limited to the channel construction period and often may occur after September 15 as long as access is available (Figure 20).

Some portion of revegetation may rely on pole cuttings. The planting of pole cuttings is typically most successful at two times of the year: (1) in the late fall after dormancy (November–December), and (2) late winter when bud swell begins (February–March). If pole cuttings are planted too early, before dormancy or the growing season ends, they may desiccate and not survive over winter. If planted too late after buds have broken and leaves start emerging, cuttings may desiccate. Hardwood pole cuttings and herbaceous material installation should begin no later than December 1 and be completed by January if done in the fall, and no later than March 1 and be completed by April if done in the late winter. Nursery-grown containerized plants can be planted at any time of year and are commonly used in revegetation; however, they may require irrigation. Herbaceous bareroot material and hardwood poles should be used if planting can be delayed until November. Plant protection and maintenance should be conducted in the spring immediately following revegetation after March 1. A more specific and detailed revegetation plan will be developed in a future design phase.



		2019											
		YEAR -2											
	TASK	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PROJECT DEVELOPMENT	Monitor groundwater and establish a minimum groundwater elevation	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA Level Design					🟨	🟨	🟨					
	Phase II Design (30 to 100 ish)					🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	For each phase develop implementation details, access roads, wood inventory, stockpile locations												
	CEQA and 404 permitting and acquire permits (CDFG, ACOE, SWRCB, etc.)	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	Develop bid documents or Performance Work Statement and award to civil contractor												
PROJECT IMPLEMENTATION	Civil Construction												
	Identify/confirm donor plants for plant material sources; develop plant material sources			🟩	🟩	🟩	🟩	🟩					
	Use plant quantity estimates to develop containerized/bareroot plants contract to grow or identifiy the facility where plants will be grown						🟩	🟩	🟩				
	Collect and grow plant material from seeds or cuttings (conifers, shrubs, trees)								🟩	🟩	🟩	🟩	🟩
	Develop bid documents and identify potential revegetation contractors												
	Award revegetation contract												
	Make hardwood cuttings from donor plants and soak cuttings for 14 days												
	Install hardwood cuttings and container plants												
	Install and use temporary irrigation to water plantings												
MONITORING&POST REVEG	Install weed cloth and tree protectors												
	Install irrigation or hand watering (optional)												
	Conduct MMRPmonitoring												
	Conduct project performance monitoring (Adaptive Management Component)												

		2020											
		YEAR -1											
	TASK	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PROJECT DEVELOPMENT	Monitor groundwater and establish a minimum groundwater elevation	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA Level Design												
	Phase II Design (30 to 100 ish)	🟨	🟨	🟨									
	For each phase develop implementation details, access roads, wood inventory, stockpile locations	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA and 404 permitting and acquire permits (CDFG, ACOE, SWRCB, etc.)	🟨	🟨	🟨									
	Develop bid documents or Performance Work Statement and award to civil contractor												
PROJECT IMPLEMENTATION	Civil Construction												
	Identify/confirm donor plants for plant material sources; develop plant material sources												
	Use plant quantity estimates to develop containerized/bareroot plants contract to grow or identifiy the facility where plants will be grown						🟩	🟩	🟩				
	Collect and grow plant material from seeds or cuttings (conifers, shrubs, trees)	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Develop bid documents and identify potential revegetation contractors												
	Award revegetation contract												
	Make hardwood cuttings from donor plants and soak cuttings for 14 days												
	Install hardwood cuttings and container plants												
	Install and use temporary irrigation to water plantings												
MONITORING&POST REVEG	Install weed cloth and tree protectors												
	Install irrigation or hand watering (optional)												
	Conduct MMRPmonitoring												
	Conduct project performance monitoring (Adaptive Management Component)												

		2021											
		First Year Construction											
	TASK	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PROJECT DEVELOPMENT	Monitor groundwater and establish a minimum groundwater elevation	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA Level Design												
	Phase II Design (30 to 100 ish)												
	For each phase develop implementation details, access roads, wood inventory, stockpile locations	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA and 404 permitting and acquire permits (CDFG, ACOE, SWRCB, etc.)												
	Develop bid documents or Performance Work Statement and award to civil contractor			🟨	🟨	🟨							
PROJECT IMPLEMENTATION	Civil Construction						🟫	🟦	🟦	🟦	🟫		
	Identify/confirm donor plants for plant material sources; develop plant material sources												
	Use plant quantity estimates to develop containerized/bareroot plants contract to grow or identifiy the facility where plants will be grown						🟩	🟩	🟩				
	Collect and grow plant material from seeds or cuttings (conifers, shrubs, trees)	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Develop bid documents and identify potential revegetation contractors					🟩	🟩						
	Award revegetation contract					🟩	🟩						
	Make hardwood cuttings from donor plants and soak cuttings for 14 days							🟩	🟩	🟩	🟩		
	Install hardwood cuttings and container plants										🟩	🟩	
	Install and use temporary irrigation to water plantings										🟩	🟩	
MONITORING&POST REVEG	Install weed cloth and tree protectors												
	Install irrigation or hand watering (optional)							🟧	🟧	🟧	🟧		
	Conduct MMRPmonitoring	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
	Conduct project performance monitoring (Adaptive Management Component)											🟧	

		2022											
		Second Year Construction											
	TASK	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PROJECT DEVELOPMENT	Monitor groundwater and establish a minimum groundwater elevation	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA Level Design												
	Phase II Design (30 to 100 ish)												
	For each phase develop implementation details, access roads, wood inventory, stockpile locations	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA and 404 permitting and acquire permits (CDFG, ACOE, SWRCB, etc.)												
	Develop bid documents or Performance Work Statement and award to civil contractor				🟨	🟨							
PROJECT IMPLEMENTATION	Civil Construction						🟫	🟦	🟦	🟦	🟫		
	Identify/confirm donor plants for plant material sources; develop plant material sources												
	Use plant quantity estimates to develop containerized/bareroot plants contract to grow or identifiy the facility where plants will be grown												
	Collect and grow plant material from seeds or cuttings (conifers, shrubs, trees)	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Develop bid documents and identify potential revegetation contractors					🟩	🟩						
	Award revegetation contract					🟩	🟩						
	Make hardwood cuttings from donor plants and soak cuttings for 14 days							🟩	🟩	🟩	🟩		
	Install hardwood cuttings and container plants										🟩	🟩	
	Install and use temporary irrigation to water plantings										🟩	🟩	
MONITORING&POST REVEG	Install weed cloth and tree protectors				🟧	🟧	🟧						
	Install irrigation or hand watering (optional)							🟧	🟧	🟧	🟧		
	Conduct MMRPmonitoring	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
	Conduct project performance monitoring (Adaptive Management Component)										🟧	🟧	

		2023											
		Third Year Construction											
	TASK	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PROJECT DEVELOPMENT	Monitor groundwater and establish a minimum groundwater elevation	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
	CEQA Level Design												
	Phase II Design (30 to 100 ish)												
	For each phase develop implementation details, access roads, wood inventory, stockpile locations	🟨	🟨	🟨									
	CEQA and 404 permitting and acquire permits (CDFG, ACOE, SWRCB, etc.)												
	Develop bid documents or Performance Work Statement and award to civil contractor				🟨	🟨							
PROJECT IMPLEMENTATION	Civil Construction						🟫	🟦	🟦	🟦	🟫		
	Identify/confirm donor plants for plant material sources; develop plant material sources												
	Use plant quantity estimates to develop containerized/bareroot plants contract to grow or identifiy the facility where plants will be grown												
	Collect and grow plant material from seeds or cuttings (conifers, shrubs, trees)	🟩	🟩	🟩	🟩	🟩	🟩	🟩					
	Develop bid documents and identify potential revegetation contractors					🟩	🟩						
	Award revegetation contract					🟩	🟩						
	Make hardwood cuttings from donor plants and soak cuttings for 14 days							🟩	🟩	🟩	🟩		
	Install hardwood cuttings and container plants										🟩	🟩	
	Install and use temporary irrigation to water plantings										🟩	🟩	
MONITORING&POST REVEG	Install weed cloth and tree protectors				🟧	🟧	🟧						
	Install irrigation or hand watering (optional)							🟧	🟧	🟧	🟧		
	Conduct MMRPmonitoring	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
	Conduct project performance monitoring (Adaptive Management Component)										🟧	🟧	

Figure 20. Proposed revegetation implementation schedule during project development, implementation, post-project wrap-up, and monitoring.

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Appendix J – Geotechnical Investigation, SHN 2019a

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Geotechnical Investigation Report

Proposed RNSP Visitor Center and Prairie Creek Restoration Project
545 Bald Hills Road, Orick, California
APNs 519-231-018 & 520-012-013

Prepared for:

Save the Redwoods League

July 2019
018015

SHN 812 W. Wabash Ave., Eureka, CA 95501-2138 707-441-8855
Civil Engineering, Environmental Services, Geosciences, Planning & Permitting, Surveying

Reference: 018015

July 29, 2019

Jessica Carter
111 Sutter Street, 11th Floor
San Francisco, CA 94104

Subject: Geotechnical Investigation Report, Proposed RNSP Visitor Center and Prairie Creek Restoration Project, 545 Bald Hills Road, Orick, California; APNs 519-231-018 and 520-012-013

Dear Jessica Carter:

This geotechnical investigation report presents the results of SHN's subsurface geotechnical field exploration and laboratory testing program for the proposed Redwood National and State Parks (RNSP) Visitor Center and Prairie Creek Restoration project to be constructed at the former Simpson Lumber Mill in Orick, California. SHN's investigation is limited to the RNSP Visitor Center component only. Included with this report are SHN's geotechnical recommendations for the design and construction of both shallow and deep foundation support of the new buildings, water tanks, treatment plant building, and elevated canopy walk, as well as site grading and earthwork recommendations. Design and construction recommendations related to the Prairie Creek restoration component are to be provided by others and are not included with this report.

We appreciate this opportunity to work with you on this project. If you have any comments or concerns regarding the content of this report, or if we can be of further service, please call either of us at (707) 441-8855.

Sincerely,

SHN

G. A. Va

Giovanni A. Vadurro, CEG
Engineering Geologist

GAV:lms

Enclosure: Report

Reference: 018015

Geotechnical Investigation Report

Proposed RNSP Visitor Center and Prairie Creek Restoration Project

545 Bald Hills Road, Orick, CA

APNs 519-231-018 & 520-012-013

PROFESSIONAL GEOLOGIST
GIOVANNI ANTHONY VADURRO
7/30/19
No. 2554
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Giovanni A. Vadurro, CEG

Prepared for:
Save the Redwoods League
111 Sutter Street, 11th Floor
San Francisco, CA 94104

Prepared by:

SHN

812 W. Wabash Avenue
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707-441-8855

July 2019

QA/QC:JHD__

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Appendices

List of Illustrations

Abbreviations and Acronyms

g	acceleration of gravity
mm	millimeter
pcf	pounds per cubic foot
pci	pounds per cubic inch
psf	pound per square foot
psi	pounds per square inch
sec	seconds

ASCE	American Society of Civil Engineers
ASTM	ASTM -International
B	width beneath column or bearing wall
BGS	below ground surface
CIDH	cast-in-drilled hole
CISS	cast-in-steel shell
CME	Central Mining Equipment
CRR	cyclic resistance ratio
CSR	cyclic stress ratio
CSZ	Cascadia Subduction Zone
F_{PGA}	site amplification factor
H:V	horizontal to vertical
ID	internal diameter
K_S	subgrade modulus
K_V	modulus/coefficient of subgrade reaction
M	magnitude
MCE_G	earthquake geometric mean
MCE_R	risk targeted maximum considered earthquake
N	standard penetration resistance (blow count)
NR	no reference
OSHA	Occupational Safety and Health Administration
OSHPD	California Office of Statewide Health Planning and Development
PGA	peak ground acceleration
PGA_M	modified PGA
R-19-#	rotary wash boring-2019-number
SDC	seismic design category
SEAOC	Structural Engineers Association of California
SPT	standard penetration test
USGS	U.S. Geological Survey

1.0 Introduction

1.1 General

This report provides the results of the SHN's geotechnical field and laboratory investigation associated with the proposed RNSP Visitor Center and Prairie Creek Restoration project at the former Simpson lumber mill located in Orick, California. A project site location map is provided as Figure 1 (Appendix 1). Included in this report are engineering recommendations for earthwork, shallow and deep foundation support, and the design and construction for the proposed visitor center buildings, water storage tanks, water treatment plant, and canopy walk. Also included are recommendations for site preparation and earthwork that will comprise a significant component of this project. Recommendations regarding the design and construction of the Prairie Creek Restoration component are being performed by others.

This document has been prepared for Save the Redwoods League and its design consultants. The information contained in this report is intended to be used for final design and construction of the proposed project improvements.

1.2 Scope of Services

The scope of services for this geotechnical investigation included drilling and sampling nine geotechnical borings at the locations indicated on Figures 2 and 3 (Appendix 1). Five of the borings were located in the field based on the Revised 100% Schematic Design dated October 8, 2018, and provided to SHN by the client's architect. Four additional borings were drilled in the general locations of the proposed elevated canopy walk structure in the vicinity of the Centennial Redwood Tree.

The geotechnical borings were drilled and sampled to depths determined to be sufficient to identify soil and bedrock conditions suitable for support of both shallow and deep foundation support for the new buildings and structures.

In addition to supervising the drilling of geotechnical borings our work scope included performing the following tasks and providing the following recommendations:

- Review of background data, including project-related plans, unpublished client reports prepared by others, aerial and historical photographs, and published geologic maps and literature
- Performance of a geologic field reconnaissance to evaluate potential slope instability hazards
- Description of soil, bedrock, and groundwater conditions interpreted from on our field exploration, laboratory testing, and review of existing geotechnical information
- Assessment of potential geologic/geotechnical hazards, including strong earthquake ground shaking, liquefaction, and differential settlement, and discussion of possible mitigation measures, as necessary
- Seismic design parameters including site soil classification, seismic design category, and spectral response accelerations
- Recommendations for earthwork, including site and subgrade preparation, fill material, placement and compaction requirements, and criteria for temporary excavation support

- Recommendations regarding shallow and deep foundation support
- Recommendations for observation of foundation installation, materials testing and inspection, and other construction considerations

This report was prepared in general accordance with Section 1803, Chapter 18–Geotechnical Investigations, of the 2017 California Building Code (2016), to meet the design standards and permit requirements of the project.

1.3 Project Description

Based on a review of site plans and architectural drawings, proposed project improvements include two separate single-story Visitor Center buildings, multiple welded-steel or bolted-steel fire suppression and potable water storage tanks, a water treatment building, and an elevated canopy walk. We understand that the type of building construction being considered for the Visitor Center buildings include wood- and/or metal-framed structures. We expect that the water treatment plant will be metal-framed or possibly constructed with concrete masonry units. It is assumed that foundations for the building will support relatively light to moderate structural loads and that there will be no below-grade levels. Locations of the proposed improvements are as shown on Figure 2 (Appendix 1).

Extensive earthwork is planned within the entire site development area in order to raise site grades several feet in elevation. A significant portion of the fill material to be used to raise the site grades is to be derived from excavations within the neighboring Prairie Creek restoration project. Although a characterization of this material has not yet been undertaken, we expect that earth materials derived from the restoration project excavations will be composed of a heterogeneous mix of clay, silt, and fine sand. These predominantly fine-grained soils should be anticipated to require extensive soil moisture conditioning and possibly treatment with lime by the earthwork contractor in order to achieve a properly compacted and stable subgrade across the site.

Within all building and water storage tank footprints, we recommend that the site grades be raised with multiple compacted layers of crushed rock and geogrid reinforcement to allow for the use of conventional shallow foundations.

The proposed Visitor Center buildings will be located in the areas formerly used as a log deck to the north of the former lumber mill building foundations. We understand that all asphalt paving within the location of the proposed Visitor Center buildings will be removed and that the site grades will be raised up to 6 feet above existing grade. The proposed water treatment building, the 5,000- or 10,000-gallon potable water storage tank, and two, 30,000-gallon fire suppression water storage tanks will be located in the southern portions of the site in an area that was formerly used as a log deck.

Additional proposed project improvements include the construction of concrete flatwork, asphalt concrete paved access roads and parking areas, pedestrian trails, a stormwater retention basin, and a subsurface wastewater disposal system.

2.0 Geotechnical Investigation

Geotechnical field exploration and laboratory testing were performed for the investigation as summarized below. Detailed descriptions and results of the field and laboratory programs are presented in Appendices 2 and 3, respectively.

2.1 Field Exploration

Geotechnical test borings were excavated under the supervision of an SHN certified engineering geologist on January 29-31, 2019, at the approximate locations shown on Figures 2 and 3. Geotechnical boring logs are included in Appendix 2. The borings were located to provide a representative cross-sectional view of the subsurface conditions at the proposed building sites. The subsurface investigation for proposed canopy walk included 60-foot exclusion zone around the Centennial Tree in order to minimize the potential for root disturbance during drilling. The exclusion zone was marked in the field prior to drilling by a local forest specialist from Save the Redwoods League. Adherence to the exclusion zone was verified by the SHN engineering geologist during drilling operations and after consultation with the forest specialist.

The borings were drilled and sampled to depths of up to 61.5 feet with a truck-mounted Central Mining Equipment (CME)-55 drilling rig using 4-inch solid flight augers and rotary wash drilling methods operated by Taber Drilling of West Sacramento. Upon the completion of drilling, borings were backfilled with bentonite chips, and finished with gravel or asphalt cold patch depending on ground surface conditions.

During drilling, representative samples were obtained using modified California (2.5-inch inside diameter [ID]) and standard penetration test (1.4-inch ID) split spoon samplers. The samplers were driven into the soil a distance of 18 inches using a 140-pound auto-hammer dropped from a height of 30 inches. The number of blows required for each 6-inch increment of sampler drive was recorded. The blow counts for each 6-inch drive and the sampler types are noted on the boring logs.

The earth materials encountered were logged and field classified in general accordance with the Manual-Visual Classification Method (ASTM-International [ASTM] D 2488). The final soil profile logs were prepared based on the field logging, examination of samples in the laboratory, and the results of laboratory testing.

2.2 Laboratory Testing

Selected soil samples were tested in SHN's certified soils testing laboratory in Eureka, California, to determine index and strength properties of the subsurface materials. The laboratory testing program included analysis of dry density, in-place moisture content, percent fines passing the No. 200 sieve, Atterberg Limits and plasticity index, unconfined compressive strength tests, and unconsolidated undrained triaxial shear strength tests. Laboratory test data results are provided in Appendix 3 and are noted on the corresponding sample depths on the geotechnical boring logs.

3.0 Site Conditions

3.1 General

The project site is located at the southern end of the Prairie Creek valley near its confluence with the much larger Redwood Creek. The Prairie Creek valley is a relatively broad low-gradient, meandering alluvial valley flanked by moderately steep slopes to the east and west that are underlain by the Redwood Creek schist bedrock. The majority of the project site is surfaced with asphalt paving that is underlain by as much as 10 feet river-run gravel fill. Concrete foundations that formerly supported the lumber mill buildings remain within the west portion of the site. The eastern and southern boundaries of the site contain a drainage path, which will remain as part of the project.

Topographically, the project site slopes very gently toward the south-southwest and toward the lower elevations of Bald Hills Road. The existing paved areas onsite are gently undulating to direct surface runoff from the former log decks and toward the drainage ditch at the eastern and southern boundaries of the site.

3.2 Geologic Setting

A geologic map of the project site vicinity compiled by the California Geological Survey (2012) is included as Figure 4 (Appendix 1). The mapping indicates the project site is underlain by Holocene-age (<11,000 years old) alluvium composed predominantly of silt-rich overbank flood deposits and sandy to gravelly fluvial deposits associated with aggradation of Prairie Creek and Redwood Creek valleys during the recent and ongoing post-glacial warming period. The alluvial deposits that comprise the basin fill sediments are in turn underlain by early Cretaceous to Late Jurassic-aged Redwood Creek Schist bedrock, which outcrops on the slopes bordering the stream valleys.

The total thickness of the alluvial sediments within the central portions of the stream valley is unknown. The minimum thickness, however, can be estimated from well drillers' log completed by Rich Well Drilling for the existing water well at the project site, and by Lake's Well Drilling for a well located 6,000 feet north of the project site. The project site well that formerly supplied water to the mill and remains operational was completed to a final depth of 118 feet and perforated from a depth of 110 to 115 feet. The well screen is presumably within the alluvial water-bearing zone. The driller's log for the supply well located 6,000 feet north of the project site at another former lumber mill indicates sand and gravel alluvium to a depth of at least 114 feet. The thickness of the valley fill sediments is, therefore, at least about 115 feet.

3.3 Subsurface Conditions

Soil and bedrock conditions were explored by SHN by advancing five rotary wash borings, denoted as R-19-001 through R-19-005, and 4 auger borings denoted as A-19-006 through A-19-009 at the locations indicated on Figures 2 and 3, respectively. A descriptive key along with the final boring logs of these geotechnical explorations are presented in Appendix 2.

All of the currently paved areas are underlain by moderately compact gravel and sand fill materials that vary in thickness from 2.5 feet to 10 feet. We understand that the fill material was placed during the initial construction of the lumber mill to raise the site grades and bridge the underlying soft silty alluvial soils. Native earth materials underlying the imported fill consists of soft or loose alluvial soils that extend to considerable depths in most places. Relatively denser fluvial sands and gravels underlie these less competent soils. The depth to these denser granular materials varies considerably within the project area. The subsurface conditions at the south end of the project site differ significantly from those at the north end in that the denser fluvial sands and gravels exist at relatively shallower depths. Decomposed bedrock was encountered in the borings located on the upper and lower logging roads near the toe of the hillslope and in the vicinity of the proposed canopy walk.

A brief discussion of the subsurface conditions encountered beneath the proposed water storage tanks and water treatment building, and Visitor Center buildings within the formerly developed mill site are discussed in the following sections. Discussion of the subsurface conditions encountered beneath the proposed canopy walk structure is provided separately due to differing conditions.

3.3.1 Proposed Redwood Visitor Center Areas

A. Historical Fill

The layer of surficial fill underlying the currently paved areas is at least 2.5 feet thick at the south end of the site, up to as much as 10 feet thick in the vicinity of the Visitor Center building footprints at the north end of the paved areas. Fill materials consist of a mix of well-graded gravel containing some cobbles based on the size of freshly fractured rock observed in the split-spoon sampler. Lesser amounts of fine grained fill soils include medium stiff to stiff sandy silt and gravelly clay and were observed below the gravelly fill materials. Standard penetration test (SPT) resistance (N-values) ranged from less than 10 blows per foot to more than 50 blows per foot, with most values ranging from 10 to 20 blows per foot. The thickness of the fill materials generally increases to the north and away from Bald Hill Road.

B. Fine-Grained Alluvium

The fill directly overlies fine-grained alluvial deposits consisting of very soft silt grading to medium stiff sandy silt with layers of abundant woody debris. The uppermost soft silt deposit is about 12 to 40 feet thick, with the thickest section occurring in boring R-19-005 at the location of the eastern Visitor Center building. These deposits are very soft to soft, even at considerable depths, and typically display no to weak cementation with low to medium plasticity. Based on the borings, the thickness of the soft fine-grained material generally increases toward the northern project areas. We interpret these sediments to represent geologically young fine-grained overbank flood deposits associated with Redwood Creek and Prairie Creek.

C. Coarse-Grained Alluvium

The upper fine-grained alluvial soils are underlain by alternating sequences of coarse-grained alluvium composed predominantly of well-graded sand and well-graded gravel. These coarse-grained deposits occur at depths starting from about 20 feet to more than 30 feet below the existing ground surface (BGS). The alluvium generally consists of loose to medium dense sand and silty sand, and medium dense to dense sandy gravel. The relative density of the granular material generally increases with depth. We interpret these coarse grained materials to represent older fluvial deposits associated with the paleo-channel of Redwood Creek and to a lesser extent Prairie Creek.

3.3.2 Proposed Canopy Walk Area

A. Historical Fill

As much as 15 feet of mostly fine-grained, low-density, and poorly compact fill is present at the Canopy Walk boring locations, located at the outboard edges of the former upper and lower log hauling roads. Based on the slope topography, we suspect that the fill is limited to the outer half of the roadways and is wedge-shaped in cross section. Fill materials are composed of a heterogeneous mix of lean clay, silt, silty gravel, and sandy gravel. The poorly compact nature of these materials as attested to by the relatively low SPT blow counts, indicating that these materials are unsuitable to support shallow foundations.

B. Residual Soil

The fill directly overlies fine-grained colluvium and/or residual soil consisting generally of soft to medium stiff silt and lean clay. The thickness of these fine-grained native soils typically range from 10 to 20 feet and extend to depths of up to 25 feet BGS at the boring locations. Like the overlying fill materials, these fine-grained native soils appear unsuitable to support shallow foundations, as well as deep foundations, based on their relative low density and high potential for consolidation settlement under newly applied structural loads.

C. Decomposed Bedrock

Redwood Creek Schist bedrock underlies the colluvium and residual soils and was encountered in each of the four borings drilled at the upslope and downslope canopy walk locations. The depth to bedrock ranges from 15 to 25 feet BGS, with greatest depth occurring at the upper south edge of the canopy walk footprint. No borings were drilled on the midslope areas due to access limitations. However, we interpret the surface of the bedrock to generally parallel the original sloping ground surface and, therefore, be likely to be shallower at the inboard edge of the road, where a cut slope is present.

Bedrock consists of weathered fine-grained schist that is moderately to highly decomposed. SPT N-values indicate bedrock to be generally medium dense to dense. In hand sample, the material is similar in texture and appearance to a hard fine-grained soil due to its degree of decomposition. Unconsolidated undrained triaxial shear tests conducted on samples collected below a depth of 20 feet indicate the material's shear strength to range from about 2,700 to 4,000 pounds per square foot (psf).

3.4 Groundwater

The presence or lack of shallow groundwater was assessed for each borehole location by initially using solid flight augers to drill an open borehole before switching to mud rotary drilling.

A. Water Storage Tanks and Water Treatment Building

No groundwater was encountered within the upper 16.5 feet of the ground surface at borings R-19-001 and R-19-002 at the south end of the site in the location of the proposed water treatment plant and water storage tanks. The use of drilling fluids below a depth of 16.5 feet to stabilize the borehole and remove drill cuttings precluded the direct measurement of the groundwater surface elevation.

B. Visitor Center Buildings

Perched groundwater was observed at borings R-19-003 and R-19-005 located to the west and east of the proposed Visitor Center building footprints, respectively. We interpret this condition to be a result of these borings being drilled in proximity to the existing drainage ditches located at the edges of the pavement and former log deck areas. The drainage ditch sidewalls appear to be connected to the gravelly fill materials underlying the pavement which is resulting in stormwater surface infiltration and saturation of the near-surface gravel fill materials. The initial water surface level in these boreholes were measured to be approximately 2.5 feet to 5 feet below the paved ground surface, which coincides with the water surface elevation in the nearby drainage ditches. Following the completion of boring R-19-005, the fluid level was allowed to stabilize in the open borehole and was measured to be 15 feet BGS. The fluid level in boring R-19-003 was not measured following the completion drilling.

The depth to groundwater at boring R-19-004 located approximately equidistant from borings R-19-003 and R-19-005 and between the two proposed Visitor Center buildings was measured to be 23 feet BGS which we interpret to represent the phreatic groundwater surface elevation. We, therefore, suspect that the degree of saturation of the fill materials in the locations of borings R-19-003 and R-19-005 will diminish during the summer and fall dry season.

C. Canopy Walk

Groundwater was encountered in each of the four borings at depths of 18 feet to 20 feet. Bedrock materials encountered in the bottom of the borings were generally dry. We, therefore, suspect the zone of saturation to represent perched groundwater conditions. The elevation difference between the upper and lower road boring locations and depth to groundwater at each boring indicates the gradient of the perched groundwater surface to generally parallel the sloping forested ground surface and underlying bedrock surface.

4.0 Seismic Design Considerations

4.1 Spectral Response

Spectral response accelerations for the "Risk-Targeted Maximum Considered Earthquake" (MCE_R) were obtained from the Structural Engineers Association of California/ California Office of Statewide Health Planning and Development (SEAOC/OSHPD) *Seismic Design Maps* website (2019) for the project location coordinates of 41.3021° N latitude and -124.0411° W longitude. The code-based spectra are developed using two spectral response coefficients, S_S and S_1, corresponding to periods of 0.2 and 1.0 second. These bedrock spectral ordinates are adjusted for Site Class with the short- and long-period site coefficients, F_a and F_v, based on subsurface conditions. The Site Class was selected using the definitions in Chapter 20 of American Society of Civil Engineers (ASCE) 7-10 considering the average properties of soils encountered to the depths explored. The drilling investigation indicates an average standard penetration resistance (N) of 15 or less in the locations of the proposed Visitor Center buildings, which corresponds to Site Class E (Soft Soil) in Table 20.3-1 (ASCE 7-10).

The site coefficient values are used to adjust the mapped spectral response acceleration values to get the adjusted spectral response acceleration values for the site. The recommended site coefficient values for Site Class E are presented in Table 1.

Table 1. ASCE 7-10 Spectral Acceleration Parameters

Parameter	0.2 Second	1 Second
Maximum Considered Earthquake Spectral Acceleration (MCE_R)	$S_S = 1.727$	$S_1 = 0.75$
Site Class	E	
Site amplification factor	$F_a = 0.9$	$F_v = 2.4$
Site-modified spectral acceleration	$S_{MS} = 1.555$	$S_{M1} = 1.8$
Numeric seismic design value	$S_{DS} = 1.036$	$S_{D1} = 1.2$
Seismic Design Category (SDC)	D	
MCE_G peak ground acceleration (PGA)	0.787	
Site amplification factor at PGA (F_{PGA})	0.9	
Site modified peak ground acceleration (PGA_M)	0.709	

As discussed in this section below, the site has significant thickness of soil with a high potential to liquefy. Therefore, the above site class and corresponding site coefficient values are applicable for structures having fundamental periods of vibration equal to or less than 0.5 second (sec; ASCE 7-10), as is anticipated for this site. Site coefficient values for structures having fundamental periods of vibration greater than 0.5 sec should be determined from a site-specific response analysis.

4.2 Liquefaction

Liquefaction is a soil behavior phenomenon in which soil located below the groundwater surface temporarily loses strength during and immediately after a seismic event as a result of strong earthquake ground motions. Recently deposited materials (such as, geologically young Holocene age sediments) consisting of relatively loose, saturated, non-cemented granular materials and to a somewhat lesser degree soft, non-plastic and low-plasticity silts (such as, those present at the project site) are most susceptible. Clay-rich soils and bedrock generally are not susceptible to liquefaction.

Liquefaction occurs as seismic shear stresses propagate through a saturated soil and distort the soil structure, causing loosely packed groups of particles to contract or collapse. If drainage is impeded and cannot occur quickly, the collapsing soil structure increases the porewater pressure between the soil grains. When porewater pressures increase to a level approaching the weight of the overlying soil, the granular layer temporarily behaves as a viscous liquid rather than a solid. As strength is lost, there is an increased risk of settlement and lateral spread, particularly along river and stream banks. Liquefaction-induced settlement occurs as the elevated porewater pressures dissipate and the soil consolidates after the earthquake.

The potential for liquefaction to occur at the project site was calculated by comparing the cyclic shear stresses induced within the soil profile during an earthquake to the ability of the soils to resist these stresses. The cyclic shear stresses within the soil profile are estimated by computing the seismic response of horizontally layered soil deposits in response to the peak horizontal ground acceleration. The equivalent uniform stress profile is normalized by the vertical effective stress to develop a cyclic stress ratio (CSR) profile. The ability of the soils to resist these stresses, known as the cyclic resistance ratio (CRR), is based on soil strength as characterized by SPT N-values normalized for overburden pressures and corrected for such factors as fines content. The factor of safety against liquefaction is then defined as the ratio of CRR to CSR.

The potential for liquefaction at the site was evaluated using the simplified method based on procedures of Boulanger and Idriss (2014), which uses peak ground acceleration (PGA) to predict the cyclic shear stresses induced by the earthquake. The PGA used in liquefaction hazard evaluation is the Maximum Considered Earthquake Geometric Mean (MCE_G) PGA adjusted for site amplification and is the mapped MCE_G PGA determined from ASCE 7-10. The mapped MCE_G is based on the 2019 SEAOC/OSHPD *Seismic Design Maps* and reflects a seismic hazard of 2% probability of exceedance in 50 years. In accordance with the site response determination, the site class-adjusted MCE_G for the site is 0.79 *g* (acceleration of gravity).

Based on the U.S. Geological Survey (USGS, 2019) interactive deaggregations, an earthquake on the Cascadia Subduction Zone (CSZ) controls the seismic hazard at the site. For our liquefaction evaluation, we have considered a magnitude M8.5 CSZ earthquake with a design-level PGA 0.79 g. For the liquefaction analysis, we assumed a 20-foot depth to the phreatic groundwater surface, which corresponds to the anticipated highest groundwater level at the site.

The results of the evaluation indicate there is a high potential for liquefaction to occur in the zones of very soft to soft silts and loose to medium dense sands below the groundwater level at the site during a design-level earthquake.

4.3 Seismically-Induced Settlements

Liquefaction-induced settlement was estimated using the liquefaction analysis software LiqSVs 1.0 and is based on the empirical methodologies by Tokimatsu and Seed (1987), and Ishihara and Yoshimine (1992) for saturated soils. The liquefaction analysis reports computed for the two borings drilled at the proposed water storage tanks and water treatment plant, and the three borings drilled at the proposed Visitor Center buildings are included as Appendix 4. A plot of the factor of safety against liquefaction versus depth and cumulative settlement versus depth is provided graphically in the liquefaction reports.

Based on our analysis, potentially liquefiable soils are present down to the medium dense sands at a depth of about 50 feet BGS. The analysis conservatively indicates the potential for approximately 6 to 10 inches of liquefaction induced settlement at the ground surface in the vicinity of the proposed Visitor Center buildings, and as much as 2 inches of liquefaction induced settlement at the south end of the site in the vicinity of the water storage tanks and water treatment building. Due to the highly variable subsurface conditions (both in strength and composition), ground settlement during soil liquefaction may not be gradual, and differential liquefaction settlement on the order of about half of the total amount may be developed across the individual building footprints.

Settlements of this magnitude will likely result in vertical ground surface displacements and partial loss of bearing support. Ground improvements and foundation design construction recommendations intended to mitigate the potential for structural distress as a result of both earthquake and static induced settlements are provided in Section 7.0 of this report.

5.0 Conclusions and Geotechnical Considerations

Based on our field investigation, laboratory testing, and engineering analysis results, we conclude that the primary geotechnical issue affecting the proposed RNSP Visitor Center structures, water storage tanks, and water treatment building locations is the potential static settlement of the soft native silt below the gravel fill layers, and the liquefaction-induced settlement of the lower loose silty sand to soft sandy silt alluvium below the groundwater surface.

The primary geotechnical issue affecting the proposed elevated canopy walk structure is the potential for static settlement of the poorly compacted roadway fill materials and underlying soft native fine-grained materials. A cursory review of subsurface conditions at the canopy walk location indicates the likelihood for liquefaction to occur is negligible due the presence of bedrock at relatively shallow depths.

5.1 Consolidation Settlement

The native silt layers below the medium dense gravel fill at the proposed Visitor Center structures are of particular concern due their high compressibility potential based on the thickness and low relative densities of the materials as determined from the SPT blow counts. SHN understands that the existing gravel fill was placed on the site more than 50 years ago with no apparent settlement issues affecting the former mill buildings' foundations. However, additional engineered fills of up to about 6 feet are proposed under the new buildings and water storage tanks. Therefore, the potential for consolidation settlement of the soft silt layers under new engineered fill and structural loading is considered to be an issue at the site.

We understand that the proposed RNSP Visitor Center buildings will be relatively tall steel and/or wood-framed single-story structures that can typically tolerate some differential settlement without risk of collapse. However, in view of the relatively high magnitude of total and differential settlement determined for the site under seismic loading conditions, foundations for the new buildings should be designed to tolerate the anticipated liquefaction settlement without any life safety threat. Foundations for the fire suppression water storage tanks should be designed to remain operational following the occurrence of the design earthquake. We, therefore, recommend that all foundations for the proposed RNSP Visitor Center buildings, water treatment plant building, and water storage tanks be supported on a geogrid reinforced crushed rock mat. Use of a reinforced crushed rock mat is intended to allow the use of conventional shallow footing foundations. The placement of a geogrid–reinforced engineered-fill mat below the proposed structures is intended to minimize the estimated differential settlements caused by any settlement of the underlying liquefaction-susceptible soils that are expected to undergo volumetric strain due to post-liquefaction reconsolidation. In addition, the high tensile strength of the geogrid reinforcement is expected to reduce the potentially damaging effects associated with liquefaction-induced ground surface deformation, should they occur.

Deep foundations consisting of cast-in-drilled hole (CIDH) piers bearing on the underlying decomposed bedrock is recommended to support the elevated canopy walk structure. Alternatively, Cast-in-Steel-Shell (CISS) piles, which are driven steel pipe piles with the upper portion filled with concrete, or steel H-piles may also be considered.

5.2 Liquefaction-Induced Settlement

In addition to mitigating the risk of static settlement, the purpose of the crushed rock mat is to enhance the subgrade performance by providing resistance to the liquefaction differential settlement and provide a uniform bearing stratum for the foundation under seismic loading conditions. Additionally, to increase the foundation integrity of the buildings, we recommend that all column footings be connected with grade beams, running from column to column.

Ground improvement and foundation recommendations provided above are intended to reduce the life safety threat from damage to the structures that may occur during the design earthquake event. If a higher degree of earthquake damage resistance is desired to ensure minimum damage to the structures' foundations and operational condition following the occurrence of the considered earthquake, then a reinforced concrete mat slab foundation should be considered.

The following sections provide our recommendations regarding site and subgrade preparation, construction of the reinforced crushed rock fill mat, foundation recommendations for the buildings, water storage tanks, and elevated canopy walk, and other construction considerations pertinent to the site developments.

6.0 Grading and Earthwork Recommendations

6.1 General

We recommend that the earthwork construction within the areas of the proposed improvements at the site be performed during the dry season, if feasible. We understand that it is the owner's intent to reuse native soil material derived from the neighboring Prairie Creek restoration locations in order to raise site grades by as much as 6 feet. We expect these materials to be predominantly fine-grained soil with relatively high moisture holding capacity. If grading commences in the winter, spring, or after a period of excessive rainfall, these imported fine-grained fill soils will become overly wet or saturated and will cause extreme difficulty with spreading and compaction.

6.2 Site Preparation

6.2.1 General Site Preparation

General site preparation within all proposed foundations, new road pavement areas, and parking areas should include the demolition and complete removal of the former mill buildings' concrete foundations, existing pavements and underground utilities, and removal of any remaining construction debris created as a result of the previous demolition of the former mill site. We expect that recompaction of the existing near-surface gravel fill materials within the upper few feet will be required to improve the subgrade that will become disturbed during site preparation activities. In areas where existing foundations are removed, the excavations should be backfilled with engineered fill that is placed and compacted as described in Section 6.5.

All inactive utility lines within the construction areas should be abandoned in place or removed completely. This includes all electrical conduit, sewer lines, and water lines, and in particular the large diameter fire suppression line unless it is to be reused. Pipelines to be abandoned in place should be filled with sand-cement slurry. Where existing utilities are removed, the resulting excavations should be backfilled with properly placed and compacted engineered fill, or sand-cement slurry.

Within the elevated canopy walk footprint at the north end of the site, grubbing should be performed to remove all roots, buried logs, and stumps. Any holes created by the grubbing process in areas that will receive fill, will support a foundation, or are at or near final grade should be backfilled with properly placed and compacted engineered fill.

6.2.2 Proof-rolling/Subgrade Verification

Following site preparation and prior to placing engineered fill for foundations, building pads, or pavement sections with the roadways and parking areas, the exposed subgrade should be evaluated by proof-rolling using a fully loaded dump truck or similar heavy, rubber-tire construction equipment to identify unsuitable areas. We recommend that the project engineer or their designated representative be onsite to observe the proof-rolling and perform the subgrade verifications. Unsuitable areas indentified during the field evaluation should be compacted to a firm condition or be excavated and replaced with engineered fill. The exposed surface may then be brought to building pad and roadway subgrade elevations with placement of properly compacted and tested engineered fill.

6.3 Wet Weather Considerations

The near-surface soil within the Prairie Creek restoration areas is expected to consist mostly of silt with lesser amounts of fine sand. We expect that both light and heavy construction equipment will experience difficulty operating on the near-surface soils if excavations commence during and/or immediately following the wet season. Contactors should expect high soil moisture conditions in the near-surface soils in these areas throughout the wet season and into the late spring months following a typical winter wet season.

Beginning construction activities and earthwork immediately prior to the onset of the wet season is not advised and will likely lead to delays if measures are not taken to stabilize and protect the exposed subgrade.

Track-mounted excavating equipment will be required during and following wet weather. The contractor will be responsible for constructing an all-weather access road and staging area. The thickness of the haul road to access the site for restoration construction activities, hauling of excavated materials, and staging areas will depend on the amount and type of construction traffic. The materials used for haul roads or site access drives should be stabilization material consisting of pit or quarry run rock that is well-graded, angular, crushed rock consisting of 4- to 6-inch minus material with less than 5 percent passing the US Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material. A minimum 6- to 12-inch thick mat of stabilization material should be used for light staging areas. The stabilization material for haul roads and areas with repeated heavy construction traffic will likely need to be increased to between 12- to 18-inches. The actual thickness of haul roads and staging areas should be based on the contractor's approach to site work and the amount and type of construction traffic, and is the contractor's responsibility. The stabilization material should be placed in one lift over the prepared, undisturbed subgrade and compacted using a smooth-drum, non-vibratory roller. Additionally, a geotextile fabric should be placed as a barrier between the subgrade and stabilization material. The geotextile should meet specifications for soil separation and stabilization, such as Mirafi RS280i or equivalent.

6.4 Excavations and Temporary Shoring

Excavations should be made in accordance with U.S. Occupational Health and Safety Administration (OSHA) specifications and conditions. Excavations deeper than 4 feet BGS (or shallower if excavations appear unsafe) should be laid back to a safe slope inclination or supported by an appropriate shoring system. It should be noted that the Contractor is solely responsible for site safety and safe working conditions during construction. A temporary or permanent shoring system should be installed in a configuration that will allow vertical side slopes for deep excavations where laying back the excavation is impractical.
Excavated soils should be placed a minimum of 10 feet away from the edge of below-grade excavations to reduce surcharge loads on the temporary cut slopes. If shoring systems are used, the effects of the soil stockpile on the shoring system should be taken into account during design, if the soils are placed in the area between the top of the excavation and a 1H:1V (horizontal to vertical) projection from the toe of the excavation, to reduce the potential of a shoring failure.

Similarly, heavy equipment should be operated in a safe manner and should be kept an adequate distance from unshored excavation sidewalls to prevent a cut slope stability hazard. If shoring is used, surcharge loads from heavy equipment should be considered in the design calculations to prevent a surcharge failure during construction. For an unshored excavation, a heavy equipment exclusionary zone should be established based on soil type, depth of excavation, presence of groundwater, and configuration of the open cut. As a general guideline, heavy equipment should be excluded from a zone located between the top of the excavation and a 1H:1V projection from the bottom toe of the adjacent excavation sidewall. This may be modified in the field for specific geotechnical conditions.

6.5 Engineered Fill

Extensive site grading is planned for this site in order to raise the existing grades vertically by as much as 6 feet. Engineered fills should be placed over subgrades that have been prepared in conformance with the site preparation recommendations section of this report (Section 5.1).

Engineered fill and excavated material that will be placed on slopes steeper the 5H:1V shall be keyed/benched into the existing sloping subgrade and installed in horizontal lifts. Vertical steps between benches should be approximately 2 feet.

A qualified field technician should be present to observe fill placement and to perform field density tests in accordance with ASTM D 6938 at random locations throughout each lift to verify that the specified compaction is being achieved by the contractor.

6.5.1 Onsite Soil Derived from Prairie Creek Restoration Locations

A complete characterization of the native earth materials that will be excavated within the Prairie Creek restoration locations and that are being proposed for reuse as engineered fill for mass grading has not been conducted as of the preparation of this report. However, soil information collected during the installation of shallow groundwater monitoring wells installed by LACO (2015) in proximity to Prairie Creek provides a brief description of the earth materials encountered. Based on the soil profile logs provided in the LACO report, it appears the native earth materials within the upper 5 feet of the ground surface throughout the restoration areas are predominantly composed of non-plastic to low plasticity silt with lesser amounts of silty sand. At depths of 5 feet to as much as 20 feet below ground surface within the northern portions of the restoration areas, the earth materials are predominantly composed of low plasticity lean clay to the bor. Within the southern portions of the restoration area and below a depth of 5 feet to as much as 20 feet, the earth materials are predominantly composed of well-graded sand with trace amounts of fine gravel.

These native earth materials will be usable as engineered fill provided that optimum soil moisture conditions can be attained by air drying or lime treatment, depending on the chosen contractor’s preference. Blending of the fine-grained soil (silts and lean clays) with the well-graded sand material will also be required to the extent possible prior to moisture conditioning in order to provide a homogenous engineered fill soil mixture.

All material derived from the Prairie Creek restoration areas to be reused as engineered fill should be free of any organic material, including roots with diameters in excess of 2 inches, root wads, and stumps. Excavated soil to be reused as engineered fill should be placed in maximum lifts of 8 to 12 inches of loose thickness, and should be compacted to 92 percent of the material’s maximum dry density as determined by ASTM D 1557 within the range of ±2% of the material’s optimum moisture content.

Use of this excavated material as engineered fill shall be restricted to roadway and parking areas, landscaped areas, sidewalks, pedestrian trails and any other area not located beneath foundations supporting buildings, water storage tanks, or large equipment pads. For the purposes of construction sequencing, the earthworks contractor may initially raise the entire project site with engineered fill to the planned subgrade elevations. Following the raising the of the site grades, the locations of the building foundations, water storage tank foundations, and large equipment pads may then be over-excavated to allow for the placement of the geogrid-reinforced crushed rock mat to be constructed as recommended in Section 7.

6.5.2 Crushed Aggregate Base

Crushed aggregate base used as a leveling layer below floor slabs, spread footings, equipment pads, and flexible and/or rigid pavements should consist of ¾-inch maximum aggregate with at least 50 percent of the material (as determined by the material’s dry weight) containing a minimum of two fractured faces. The aggregate base should contain no deleterious material and should meet the gradation specifications for Caltrans ¾-inch maximum Class 2 Aggregate Base (Caltrans, 2018). The crushed aggregate base course should be placed in maximum lifts of 8 inches of loose thickness, and should be compacted to 95 percent of the material’s maximum dry density as determined by ASTM D 1557.

6.6 Utility Trenches

Trenches for electrical and telecommunications conduit, and water and wastewater pipes should be deep enough to provide minimum cover of 36 inches from the finished grade to the top of all conduit and piping and to provide adequate structural cover from heavy equipment loads. All conduit and piping should be bedded and initially backfilled in accordance with the manufacturer's recommendations. The remaining backfill should meet the requirements for engineered fill.

New utility trenches excavated parallel to spread foundations should be set back from the footings such that the utility trench bottoms lie above a projected 1.5H:1V plane extending downward from the nearest footing bottom.

The initial backfill material should be placed and compacted with approved tampers from the bottom of the trench to an elevation at least 1 foot above the conduit or piping. The remaining trench backfill should be mechanically compacted to a minimum of 90 percent relative compaction. In areas to be used for vehicular traffic or support foundations, the top 12 inches of backfill should be compacted to a minimum 95 percent of the material's maximum dry density as determined by ASTM D 1557.

6.7 Asphalt Pavement Areas

Pavement construction should conform to the requirements of the Caltrans Standard Specifications, latest edition. Recommendations for both flexible pavements (asphalt concrete) and rigid pavements (Portland cement concrete) are provided below.

Recommended minimum pavement sections for standard flexible asphalt concrete are given below in Table 2 for various traffic loading conditions. The recommended pavement sections are based on an assumed R-Value of 20 for the anticipated silty lean clay import fill material that will be used to raise the grades at the site. Pavement sections for other traffic loading should be designed on a case-by-case basis.

Table 2. Minimum Pavement Sections, Standard Flexible Asphalt Concrete Pavement

Traffic Index	Asphalt Concrete Thickness (inches)	Class 2 Aggregate Base Thickness (inches)
4 and below	2.5	6
5	2.5	8
6	3	10

Aggregate used for asphalt concrete surfacing should conform to the grading specified in Caltrans Standard Specifications Section 39 for 9.5 millimeters (mm) or 12.5 mm (⅜ inch or ½ inch) maximum, medium grading. Asphalt concrete surfacing should be placed in a single lift.

We recommend that rigid concrete pavements consist of at least 6 inches of Class 2 Aggregate Base beneath at least 6 inches of concrete. For durability and wear resistance, all Portland cement concrete pavements should have a minimum compressive strength of 4,000 pounds per square inch (psi). A modulus of subgrade reaction, k_v (30-inch circular plate) of 150 psi may be used for design of Portland cement concrete pavements.

Paved areas should be sloped and adequately drained to prevent surface water or subsurface seepage from saturating the pavement subgrade soil. All curbs surrounding landscape areas should be embedded at least 6 inches into the soil subgrade to minimize the migration of water beneath pavements.

Heavy construction traffic on new pavements or partial pavement sections (such as, the base course over the prepared subgrade) will likely exceed the design loads and could potentially damage or shorten the pavement life. Therefore, we recommend construction traffic not be allowed on new pavements, or that the contractor take appropriate precautions to protect the subgrade and pavement during construction.

If construction traffic is to be allowed on newly constructed road sections, an allowance for this additional traffic will need to be made in the design pavement section.

6.8 Finished Grading and Surface Drainage

Surface drainage should be planned to prevent ponding and enable water to drain away from building foundations, slabs-on-grade, edges of roadways and parking areas, and toward suitable collection areas where it may then be conveyed toward the existing drainage ditches and/or proposed stormwater detention ponds. We recommend a positive surface drainage of at least 2 percent within 10 feet of all structure foundations where surfaced with asphalt and concrete, and at least 5 percent where landscaped. Roof drainage systems should be planned to direct rainwater away from building foundations. Concentrated water should not be discharged onto bare ground, but should be carried in pipes or lined channels to the existing drainage ditch network and/or proposed stormwater retention ponds.

7.0 Foundation Recommendations

7.1 Reinforced Crushed Rock Mat

We recommend a reinforced crushed rock mat be used to support all building, water storage tank, and large equipment pad foundations. As discussed in Section 6.5.1, SHN recommends initially raising the project site with imported engineered fill from the Prairie Creek restoration locations in order to achieve the planned subgrade elevations. The foundation locations for the buildings, water storage tanks, and equipment pads should then be over-excavated to a depth of 4.5 feet. The bottom of the excavations should extend a minimum horizontal distance of 5 feet beyond the footprint of all structure foundations in order to construct the reinforced crushed rock mat. Figure 5 shows a typical section of the recommended over-excavation and the reinforced crushed rock mat dimensions.

The excavations should be performed using a smooth-bladed tracked excavator. Subgrade areas should be cleanly cut. The bottom of the excavation should be rolled with a smooth-drum roller to re-compact the subgrade to a minimum 90 percent of the material's maximum dry density as determined by ASTM D 1557.

After the excavation and re-compaction of the subgrade is completed, a layer of non-woven geotextile should be installed directly on the prepared subgrade and extended up the side slopes of the excavations. The overlap of the geotextile should be at least 2 feet. After placement of the non-woven geotextile, construction of the geogrid reinforced crushed rock mat should follow immediately to provide protection of the prepared subgrade. The geogrid reinforcement should consist of two layers of biaxial geogrid. The overlap of the geogrid should be at least 2 feet. The recommended biaxial geogrid is Tencate Mirafi BXG120 or equivalent. The first layer of biaxial geogrid should be placed directly on the non-woven geotextile, and the second layer of biaxial geogrid should be placed 18 inches above the first layer.

The crushed aggregate used in the geogrid reinforced mat should consist of 1½-inch maximum aggregate, angular on at least 2 faces, and should be compacted to 92 percent of the material's maximum dry density as determined by ASTM D 1557. The crushed rock should contain no deleterious material and should meet the gradation specifications for Caltrans 1½-inch maximum Class 2 Aggregate Base. The crushed aggregate fill should be placed in maximum lifts of 8 inches of loose thickness and should be compacted within the range of ±2% of the material's optimum moisture content.

7.2 Building, Water Storage Tank, and Equipment Pad Foundations

7.2.1 Shallow Spread Footing Foundation

Conventional shallow foundations founded on the reinforced crushed rock mat may be used to support the proposed Visitor Center buildings, water treatment building, water storage tanks, and large equipment pads. Foundations for these structures and facilities should be designed using a maximum allowable bearing pressure of 3,000 psf. The recommended allowable bearing pressure applies to the total of dead plus long term live loads. Allowable bearing pressures may be increased by one-third for seismic and wind loads.

7.2.2 Foundation Static Settlement

For the reinforced crushed rock mat and foundations designed using the allowable bearing pressures given above, we estimate a post-construction settlement will be less than 1 inch for the perimeter and column foundation loads. Differential settlement will be on the order of one-half of the total settlement.

7.2.3 Lateral Resistance

Resistance to lateral loading by spread footings may be calculated using a coefficient of friction of 0.35 (ultimate) between cast-in-place concrete foundations and the underlying crushed rock mat fill. The passive resistance provided by foundations embedded in crushed rock fill may be calculated using an allowable equivalent fluid unit weight of 300 pounds per cubic foot (pcf) assuming the adjacent grade is level. This allowable equivalent fluid unit weights for passive resistance has been reduced by a factor of 1.5 from the ultimate value to limit the foundation movement required to mobilize passive pressure. Both the allowable passive pressure and ultimate base friction may be combined in calculating total lateral resistance.

The passive resistance contributed by engineered fill or soils within 1 foot of the ground surface should be neglected unless these materials are protected and confined by a slab-on-grade or pavement.

Spread footing foundations should be cast neat against the engineered fill to develop the design passive resistance. Alternatively, any gap between the footing and the adjacent ground should be completely backfilled using lean concrete or cement grout.

7.2.4 Slab-on-Grade Floors

Support for concrete slab-on-grade floors used in conjunction with spread footings can be obtained from the reinforced crushed rock mat. We recommend a minimum 4-inch-thick layer of compacted capillary break material covered with a high-quality impermeable membrane vapor retarder be placed between the floor slab and the reinforced crushed rock mat to provide a smooth bearing surface. The capillary break material should be free-draining, clean gravel or rock, such as No. 4 by ¾-inch pea gravel or permeable aggregate.

It is important that the subgrade be moist and free of desiccation cracks at the time the slab is cast. Recommendations for slab reinforcement, strength, thickness, control and construction joints, etc., should be provided by the project design team's structural engineer. Although cracks in concrete slabs are common and should be expected, the following measures may help to reduce cracking of slabs.

- Slabs should be cast using concrete with a maximum slump of 4 inches or less.
- Add a water reducing agent or plasticizer to the concrete to increase slump while maintaining a low water-cement ratio to reduce concrete shrinkage. (Concrete having a high water-cement ratio is a major cause of concrete cracking.)
- Control joints should be provided at appropriate intervals to control the location of shrinkage cracks.

7.3 Mat Foundation

Foundation support for the Visitor Center buildings and ancillary structures may also be achieved with reinforced concrete mat foundations in order to provide a higher degree of earthquake damage resistance, if desirable. Mat foundations should be designed using a maximum allowable bearing capacity of 3,000 psf for dead plus normal duration live loads. The allowable bearing capacity may be increased by one-third when considering short-term wind and seismic loads.

The mat foundation system should be constructed on compacted crushed rock fill with two layers of geogrid reinforcement designed and constructed as described above. It is important that the foundation excavations are moist, clean, and free of drying cracks, debris, loose sand and gravel, and water at the time the foundation is cast. Foundation excavations should be checked and approved by the geotechnical engineer or qualified representative immediately prior to placing concrete.

The maximum total settlement of foundations designed using the allowable bearing values given above is not expected to exceed ¾ inch. The maximum differential settlement is not expected to exceed half the maximum.

7.3.1 Subgrade Modulus for Mat Design

For mat design, we recommend using the following equation to estimate the subgrade modulus:

$$K_s = k_1\left\{\frac{(B+1)}{2B}\right\}^2$$

where:
k_1 = coefficient of subgrade reaction for 1 foot square plate = 250 pci (pounds per cubic inch)
B = width beneath column or bearing wall, in feet, where stresses are imposed on ground

The value of B and the corresponding K_s value should be consistent with the calculated deflected shape of the foundation beneath columns and bearing walls.

7.3.2 Lateral Resistance

Base friction resistance may be calculated using a friction coefficient of 0.35 (ultimate value for concrete on granular fill material). The ultimate friction coefficient may be as low as 0.15 if waterproofing is used, depending on the waterproofing. Passive resistance may be calculated using an equivalent fluid unit weight of 300 pcf. This value is reduced by a factor of 1.5 from the ultimate value to limit movement required to mobilize ultimate passive pressure. Both the ultimate base friction and allowable passive pressure may be combined in calculating total lateral resistance.

The passive resistance contributed by fill material within 1 foot of the ground surface should be neglected unless these materials are protected and confined by a slab-on-grade or pavement.

The mat foundation should be cast neat against the engineered fill to develop the design passive resistance. Alternatively, any gap between the footing and the adjacent ground should be completely backfilled using lean concrete.

7.4 Canopy Walk Foundation Support

The proposed elevated canopy walk and observation deck should be supported by cast-in-drilled hole (CIDH) piers that gain support from end bearing in the underlying decomposed bedrock. The drilled piers should be at least 18 inches in diameter and bottomed at least 5 feet into the underlying bedrock. It should be anticipated that the final depth of the piers will be on the order of 20 to 30 feet BGS. The drilled piers should be designed using an allowable end bearing pressure as indicated in Table 3 for dead plus long-term live loads in the decomposed bedrock.

Table 3. Allowable End-Bearing Pressures for CIDH[1] Piers

Drilled Pier Diameters (inches)	Allowable Bearing Pressures (kips)
18	20
24	36
30	56
1. CIDH: cast-in-drilled hole	

These values can be increased by one-third for total loads, including wind and seismic. Skin friction should be neglected because of the uncertainty of mobilizing end bearing and skin friction simultaneously. Piers should be spaced at least three pier diameters, center to center.

The piers should be interconnected with reinforced concrete grade beams and tie beams to support the structure loads. All grade beams should be designed to span unsupported between piers. The drilled piers on the downslope side should be tied back to the adjacent upslope piers using reinforced concrete tie beams. Tie beams should be at least 12 inches square and reinforced with at least two No. 5 reinforcing bars top and bottom. The tops of the tie beams and connection points with the drilled piers should be constructed below the planned finished grade elevation of the ground surface so as not to obstruct vehicle or pedestrian ingress/egress. The piers should be reinforced their full depth and the reinforcing steel should be tied into the grade beam and tie beam steel. A well-tied foundation designed this way will use the passive resistance below the upslope piers and grade beams to increase the overall stability of the structure.

Resistance to lateral loads can be obtained from passive earth pressure acting on pier faces. A passive earth pressure of 300 pcf (triangular distribution) should be used starting at a depth of 5 feet BGS; passive earth pressure should be neglected in the overlying soils. Passive pressure can be assumed to act on a width equal to 1.50 times the pier diameter, to take advantage of edge effects.

To prevent settlement of plastic concrete, the pier holes should contain no slough (debris soil) after drilling. The contractor should be equipped with casing in the event that caving soils are encountered, for satisfactory pier installation. If groundwater is encountered, the pier holes should be pumped dry or tremie concrete placement methods should be used.

8.0 Additional Services

We suggest that communications be maintained during the design and construction phase between the client's architects and contractors, and SHN to optimize compatibility between the design and site conditions. We also recommend that SHN be retained during the construction phase to verify the implementation of our recommendations related to earthwork.

8.1 Plan and Specification Review

We have assumed, in preparing our recommendations, that SHN will be retained to review those portions of the plans and specifications prepared by others pertaining to earthwork and foundations. The purpose of this review is to confirm that our earthwork and foundation recommendations have been properly interpreted and implemented during design. If we are not provided this opportunity for review of the plans and specifications, our recommendations could be misinterpreted.

8.2 Construction-Phase Monitoring

In order to assess construction conformance with the intent of our recommendations, it is important that a representative of SHN perform the following tasks:

1. Verify the removal and/or recompaction of the loose fill material and any other unsuitable material prior to the placement of structural fill.
2. Monitor subgrade preparation.
3. Observe and test placement of structural fill and backfill.
4. Observe foundation excavations and installation.

This construction-phase monitoring is important because it provides the stakeholders and SHN the opportunity to verify anticipated site conditions, and recommend appropriate changes in design or construction procedures if site conditions encountered during construction vary from those described in this report. It also allows SHN to recommend appropriate changes in design or construction procedures if construction methods adversely affect the competence of onsite soils to support the structural improvements.

9.0 Limitations

The geotechnical conclusions and recommendations presented in this report are intended for planning and design of the new proposed improvements at the project site as described in this report. These conclusions and recommendations may not apply if:

- Changes are made to the proposed construction.
- The report is used for a different site.
- The recommendations given in this report are not followed.

- Any other change is made that materially alters the proposed project.

The analyses and recommendations presented in this report are based upon interpretation of data obtained from the exploration locations located and on general field observations made during the site investigation. Subsurface exploration of any site is necessarily confined to selected locations and subsurface conditions may, and usually do, vary between and around these locations. Any person associated with this project who observes conditions or features of the site or its surrounding areas that are different from those described in the report should report them immediately to SHN for evaluation. If varied conditions come to light during project development, SHN should be given the opportunity to evaluate the need for additional exploration, testing, or analysis.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observation program during the construction phase.

This report was prepared in accordance with the generally accepted standards of geotechnical engineering practice at the time this report was written. No other warranty, express or implied, is made. It is the owner's responsibility to see that all parties to the project, including the designers, contractors, and subcontractors, are made aware of this report in its entirety.

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Report Figures 1

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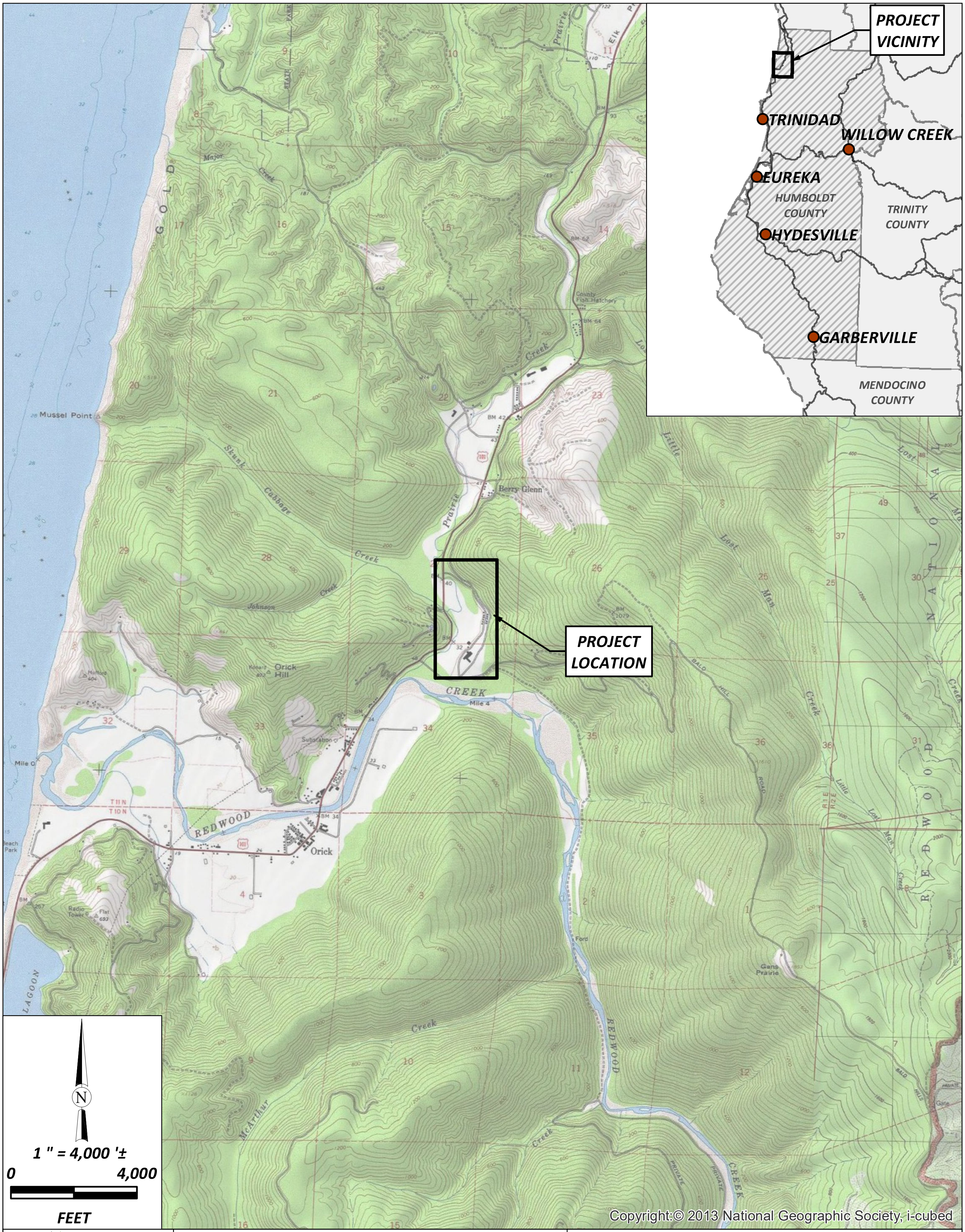

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Save-the-Redwoods League
Redwood Visitors Center
Orick, California

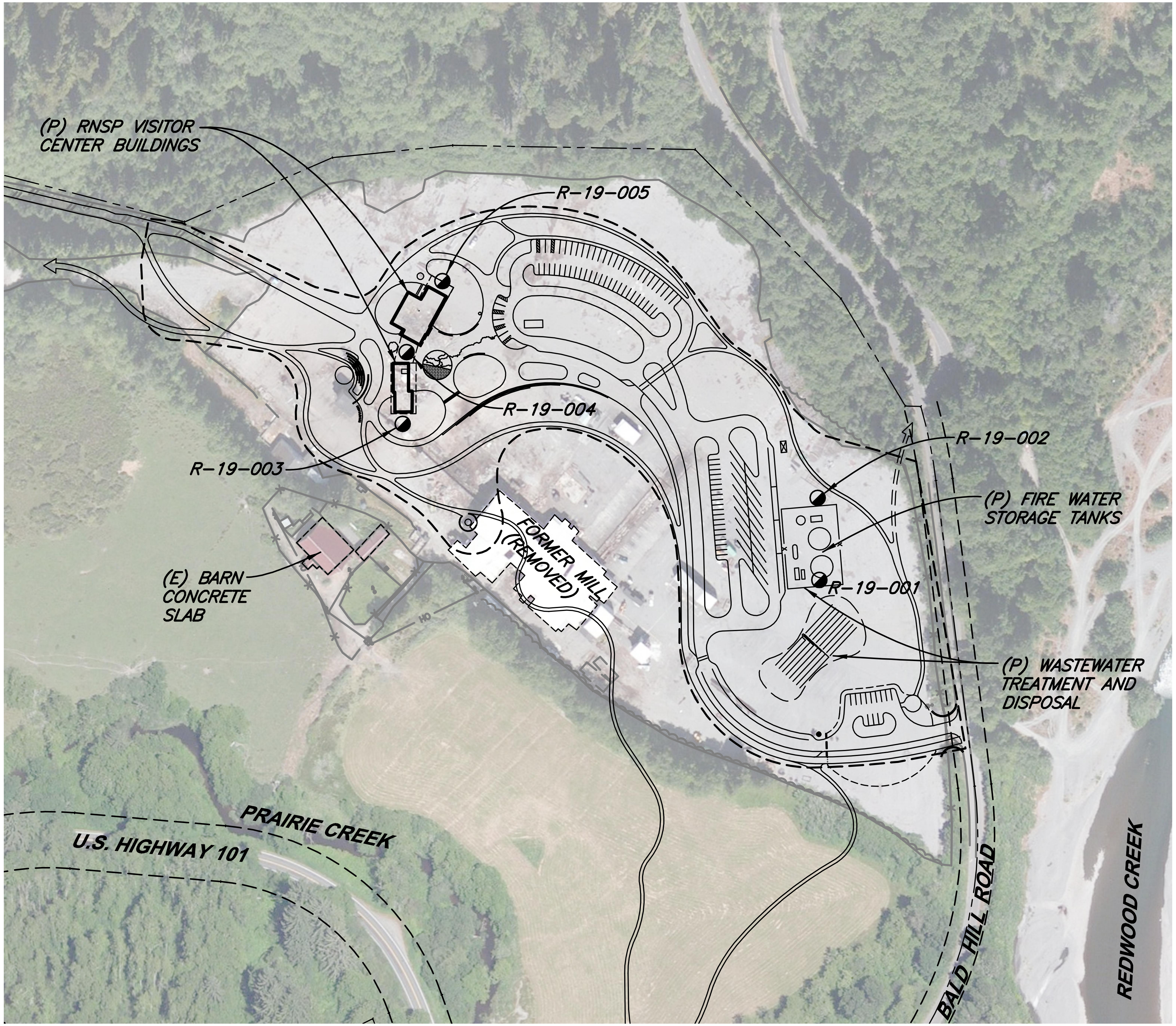
Project Location Map

SHN 018015

April 2019

Figure1_ProjectLocationMap

Figure 1



EXPLANATION

◐ R-19-001	SOIL BORING LOCATION AND DESIGNATION (ROTARY WASH BORING)
(P)	PROPOSED FEATURE
(E)	EXISTING FEATURE

0 200
1"=200'

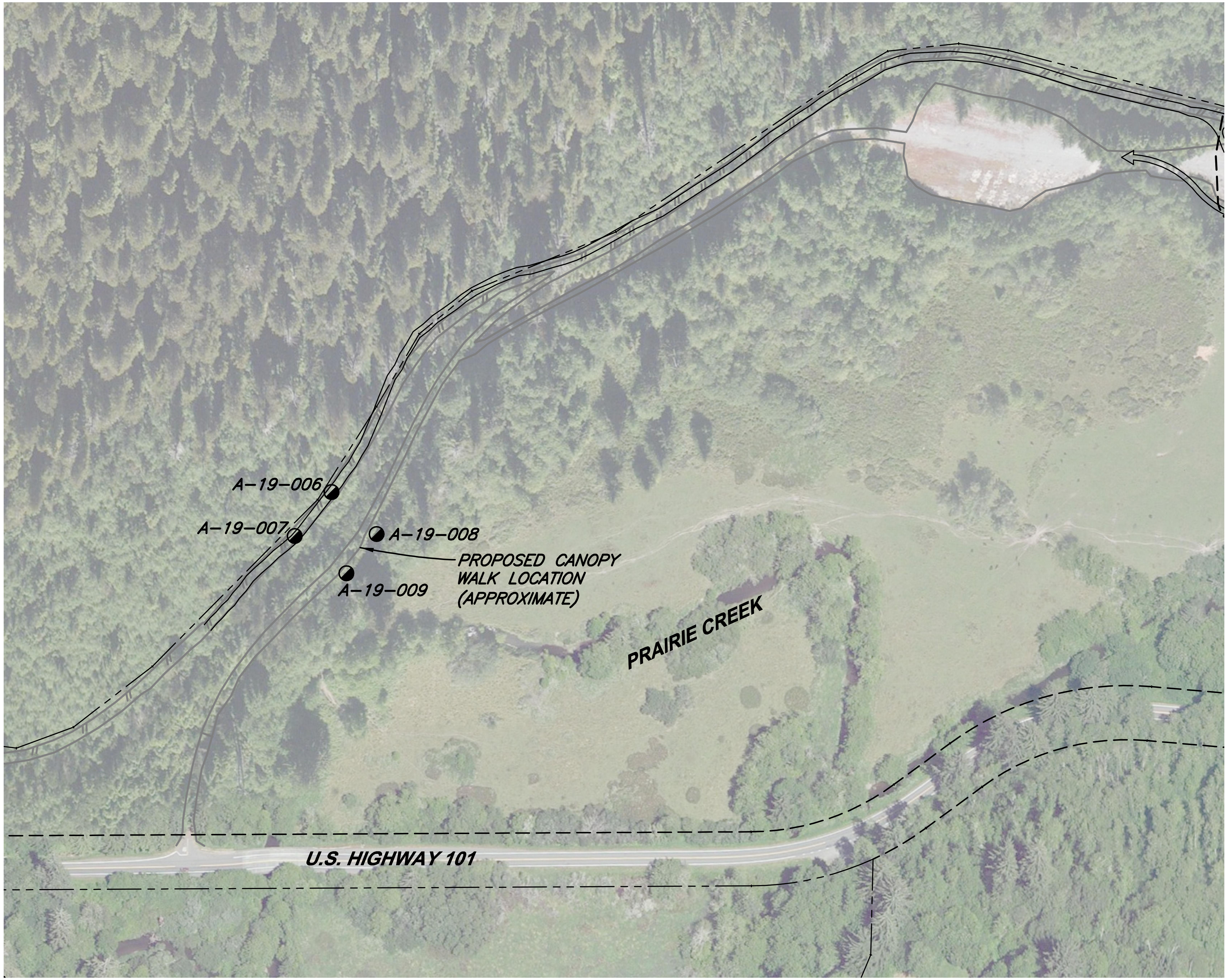
\\Eureka\Projects\2018\018015-OrickVisCen\Dwgs\GEO, SAVED: 7/29/2019 1:41 PM CNEWELL, PLOTTED: 7/29/2019 1:41 PM, CHRIS D. NEWELL

SHN

Save The Redwoods League
Redwood Visitor Center
Orick, California

Site Plan with Geotechnical
Boring Locations
SHN 018015

May 2019
018015-SITE-BOR-LOC
Figure 2



EXPLANATION

◐ A–19–006	SOIL BORING LOCATION AND DESIGNATION (AUGER BORING)

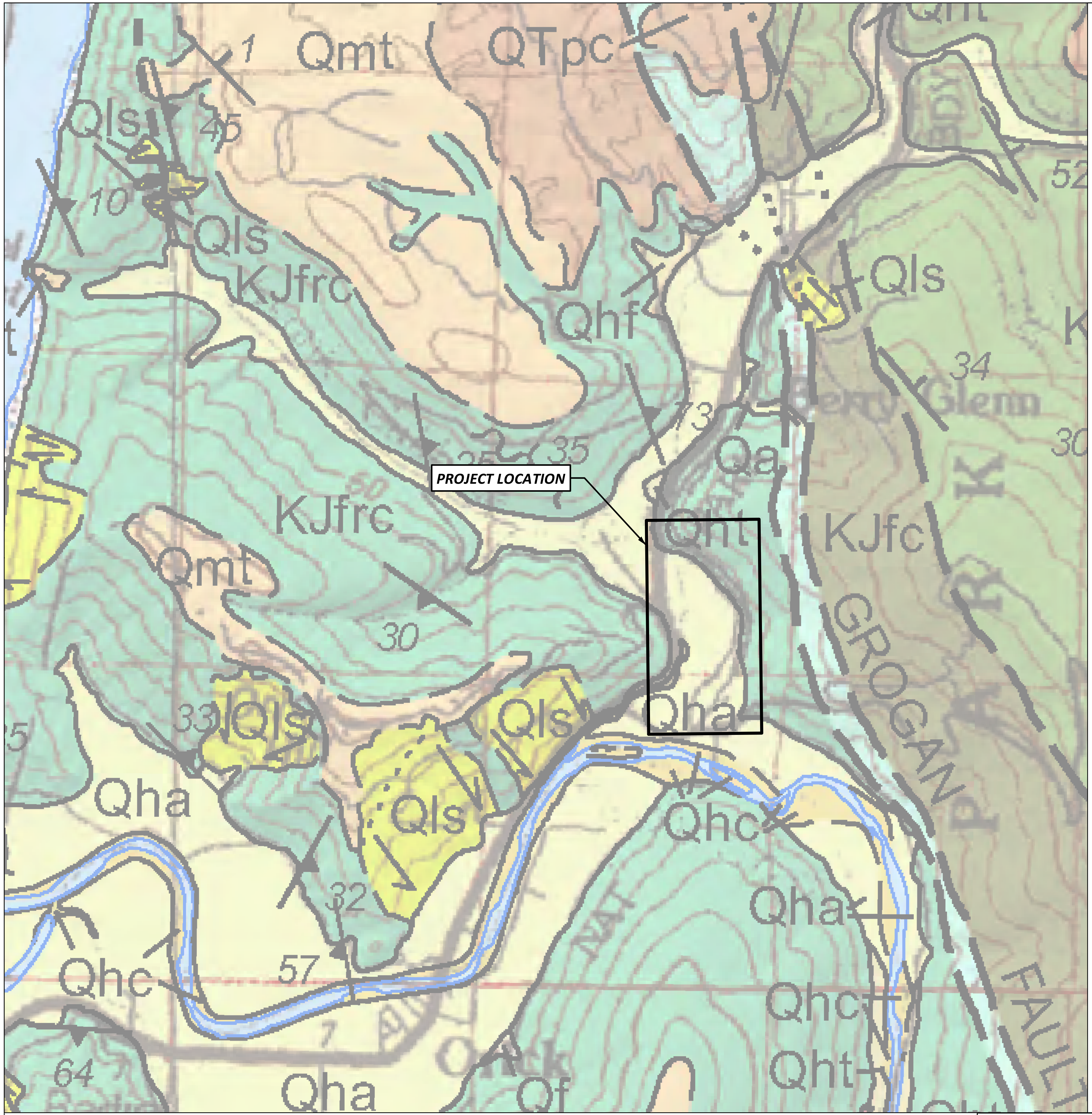
0 200
1"=200'

\\Eureka\Projects\2018\018015-OrickVisCen\Dwgs\GEO, SAVED: 5/2/2019 4:34 PM CNEWELL, PLOTTED: 5/2/2019 4:35 PM, CHRIS D. NEWELL

Save The Redwoods League
Redwood Visitor Center
Orick, California

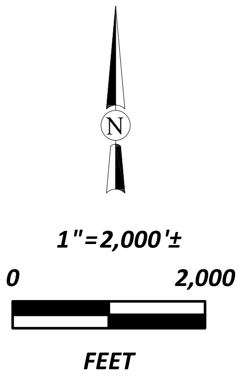
Canopy Walk Geotechnical
Boring Locations
SHN 018015

May 2019
018015-SITE-BOR-LOC
Figure 3



EXPLANATION

Qhc	Stream channel deposits (latest Holocene)
Qha	Young alluvial deposits, undifferentiated (Holocene)
Qhf	Young alluvial fan deposits (Holocene)
Qls	Landslide deposits (historical to Pleistocene)
Qmt	Marine terrace deposits (Pleistocene)
QTpc	Prairie Creek Formation (early Pleistocene to late Pliocene)
KJfrc	Redwood Creek Schist (Early Cretaceous to Late Jurassic)
KJfl	Coherent unit of Lacks Creek (Cretaceous to Jurassic)
KJfc	Incoherent unit of Coyote Creek (Cretaceous to Jurassic)
KJfrc	Redwood Creek Schist (Early Cretaceous to Late Jurassic)



Save-the-Redwoods League
Redwood Visitors Center
Orick, California

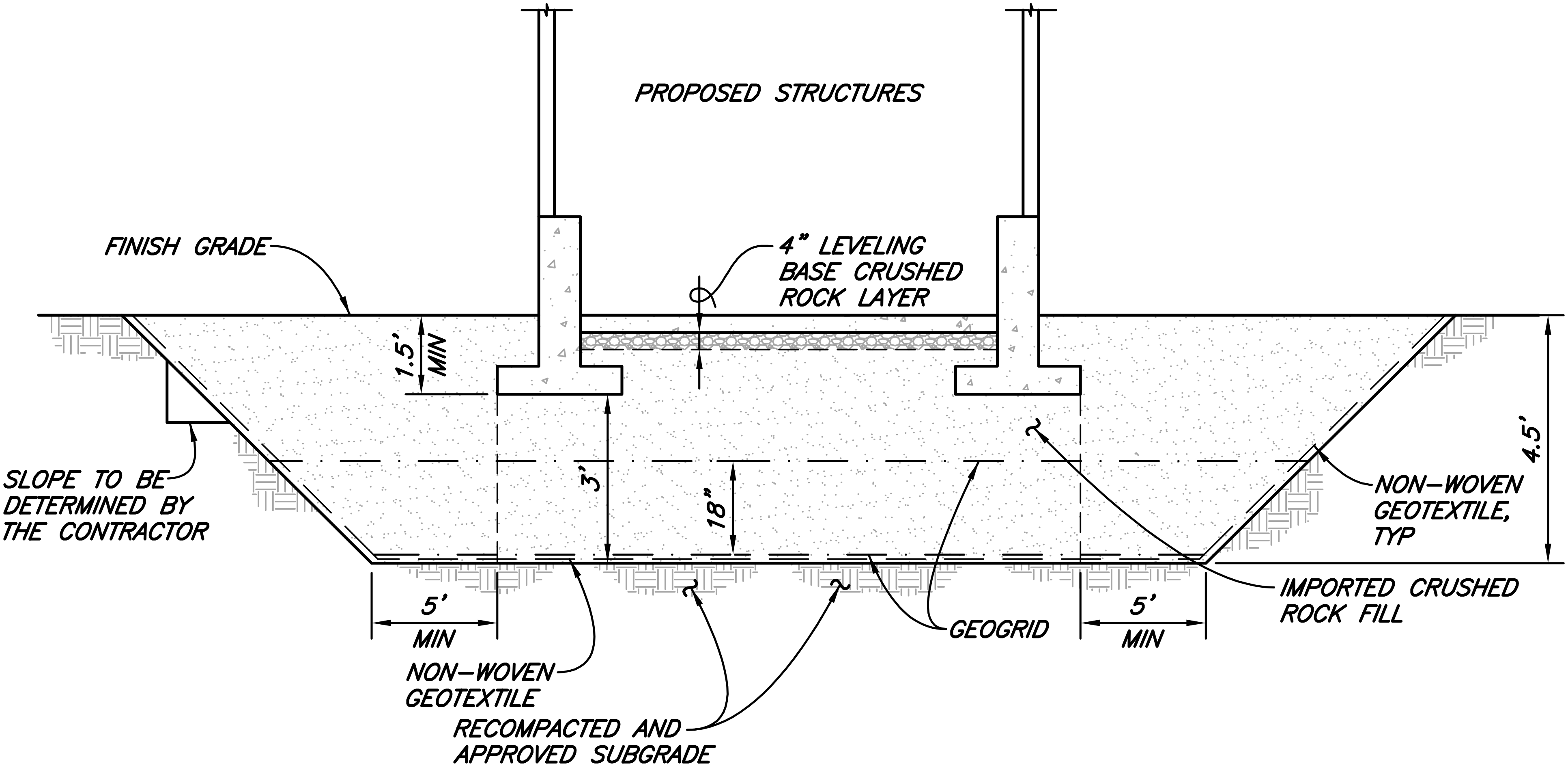
Geologic Map
(Delattre and Rosinski, 2012)
SHN 018015

June 2019

Figure4_GeologicMap

Figure 4

Path: \\eureka\projects\2018\018015-OrickVisCen\GIS\PROJ_MXD\Figure4_GeologicMap.mxd User Name: psundberg DATE: 6/4/19, 4:18PM



NOT TO SCALE

SHN	Save the Redwoods League Redwood Visitor Center Orick, California	Typcal Section Excavation and Reinforced Crushed Rock Mat SHN 018015
	June 2019	018015-TYP-SCTN
		Figure 5

Geotechnical Boring Logs 2

METHOD OF SOIL CLASSIFICATION

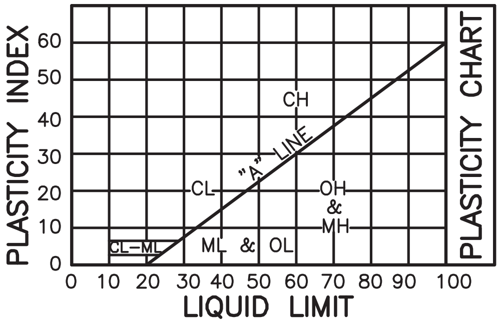
CLASSIFICATION CHART

MAJOR DIVISIONS		SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN 1/2 OF SOIL >NO. 200 SIEVE SIZE)	GRAVELS (MORE THAN 1/2 OF COARSE FRACTION > NO.4 SIEVE SIZE)	GW	WELL GRADED GRAVELS OR GRAVEL–SAND MIXTURES, LITTLE OR NO FINES
		GP	POORLY GRADED GRAVELS OR GRAVEL–SAND MIXTURES, LITTLE OR NO FINES
		GM	SILTY GRAVELS, GRAVEL–SAND–SILT MIXTURES
		GC	CLAYEY GRAVELS, GRAVEL–SAND–CLAY MIXTURES
	SANDS (MORE THAN 1/2 OF COARSE FRACTION < NO.4 SIEVE SIZE)	SW	WELL GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SM	SILTY SANDS, SAND–SILT MIXTURES
		SC	CLAYEY SANDS, SAND–CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN 1/2 OF SOIL <NO. 200 SIEVE SIZE)	SILTS & CLAYS LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS & CLAYS LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS, ORGANIC SILTS
HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZE CHART

CLASSIFICATION	U.S. STANDARD SIEVE SIZE
BOULDERS	ABOVE 12"
COBBLES	12" TO 3"
GRAVEL	3" TO NO. 4
COARSE	3" TO 3/4"
FINE	3/4" TO NO. 4
SAND	NO. 4 TO NO. 200
COARSE	NO. 4 TO NO. 10
MEDIUM	NO. 10 TO NO. 40
FINE	NO. 40 TO NO. 200
SILT & CLAY	BELOW NO. 200

PLASTICITY CHART



CONSISTENCY OF FINE GRAINED SOILS		DENSITY OF COARSE GRAINED SOILS	
CLASSIFICATION	COHESION (PSF)	CLASSIFICATION	STANDARD PENETRATION (BLOW COUNT)
VERY SOFT	0–250	VERY LOOSE	0–4
SOFT	250–500	LOOSE	4–10
MEDIUM STIFF	500–1000	MEDIUM	10–30
STIFF	1000–2000	DENSE	30–50
VERY STIFF	2000–4000	VERY DENSE	50+
HARD	4000+		

MOISTURE CLASSIFICATIONS
DRY
DAMP
MOIST
WET

BASED ON UNIFIED SOILS CLASSIFICATION SYSTEM

BORING LOG KEY

SAMPLE TYPES

⊠	DISTURBED SAMPLE (BULK)
◨	HAND DRIVEN TUBE SAMPLE
⌶	1.4” I.D. STANDARD PENETRATION TEST SAMPLE (SPT)
◩	2.5” I.D. MODIFIED CALIFORNIA SAMPLE (SOLID WHERE RETAINED)
▯	CORE BARREL SAMPLE (NOT RETAINED)
◪	CORE BARREL SAMPLE (RETAINED)

SYMBOLS

▽	INITIAL WATER LEVEL
▼	STABILIZED WATER LEVEL
– – – – –	GRADATIONAL CONTACT
———	WELL DEFINED CONTACT
SS	SPLIT SPOON

PROJECT: Redwood Visitor Center
LOCATION: Proposed Water Tanks
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/29/19
TOTAL DEPTH OF BORING: 36.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-001

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0						A/C paving.						
				GW		Well-graded GRAVEL, very dense, dry, fine to coarse gravel, maximum size 1 1/2", angular, fractured from hammer blow, medium to coarse sand (FILL).						River-run gravel FILL.
-2.5			8 30 50/6"				3	131		>4.5		
-5.0			11 10 9			Becomes medium dense, wet, subrounded gravel maix. size 3/4" with medium to coarse sand (FILL).						
-7.5			11 10 7				6	104		>4.5		
				ML		Fill/Native soil contact noted in shoe of split-spoon sampler at 9' based on presence of of medium stiff SILT.						Fine-grained native alluvial sediments beignning at 9'.
-10.0			4 4 6				21	100		2.25	62	
						SANDY SILT, medium stiff, moist, dark bluish gray (Gley 2 3/10B), weak cementation, low dry strength, non-plastic silt with fine sand,						No groundwater encountered to 11.5'; switched to rotary wash drilling.
-12.5												
-15.0			7 8 7			No recovery.						
-17.5												
-20.0												

PROJECT: Redwood Visitor Center
LOCATION: Proposed Water Tanks
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/29/19
TOTAL DEPTH OF BORING: 36.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-001

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
-20.0			7 11 11	GW		No recovery; coarse sand to fine gravel with wood fragments in drill cuttings.						Coarse-grained fluvial sediments beignning at 20' based on drill cuttings.
-22.5												Rig chattering from 22-25'.
-25.0			6 4 5			Well-graded GRAVEL, medium dense fine to coarse gravel, max. size 1 1/2", fractured from hammer blow, fine to coarse sand; no cementation.						Lost return circulation from 25-30'; borehole is caving on top of drill bit.
-27.5												
-30.0			11 17 13	SW		Well-graded SAND, dense, medium to coarse sand, no cementation; abundant subrounded fine gravel with few subangular coarse gravels fractured from hammer blow.						
						Borehole completed to 31.5 feet; backfilled with bentonite chips.						
-32.5												
-35.0												
-37.5												

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PROJECT: Redwood Visitor Center
LOCATION: Proposed Water Treatment Plant
GROUND SURFACE ELEVATION: ~40 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/29/19
TOTAL DEPTH OF BORING: 36.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-002

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0						A/C paving.						
				GW		Well-graded GRAVEL, hard drilling, very dense, dry, fine to coarse gravel, maximum size 3", abundant medium to coarse sand (FILL).						River-run gravel FILL.
-2.5			3 4 3	ML		Fill/Native soil contact observed in split-spoon sampler at 2.5'. SILT, medium stiff, moist, very dark gray (5Y 3/1), weak cementation, non-plastic fines, medium dry strength; trace fine sand.						Fine-grained native alluvial sediments beignning at 2.5'.
-5.0			4 5							2.5		
			7	SM		SILTY SAND, loose to medium dense fine sand, dry, dark gray, no cementation, non-plastic fines, low dry strength; less than about 5% silt.	12	98		1.5	34	
-7.5												
-10.0			1 1 2	ML		SANDY SILT, soft, moist, dark gray (5Y 4/1), no cementation, non-plastic fines, no dry strength; fine sand,					66	
-12.5												
				GM		SILTY GRAVEL, dense, fine to coarse gravel, maximum size 1 1/2", fractured from hammer blow, abundant coarse sand; dry, dark grayish brown silt matrix (2.5Y 4/2), weak cementation, low plasticity fines, slightly cohesive.						Coarse-grained fluvial sand and gravel beignning at 14' based on rig chatter. No groundwater encountered to 16.5'; switched to rotary wash drilling.
-15.0			16 20 21									
-17.5												
-20.0												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

BORING LOG

PROJECT: Redwood Visitor Center
LOCATION: Proposed Water Treatment Plant
GROUND SURFACE ELEVATION: ~40 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/29/19
TOTAL DEPTH OF BORING: 36.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-002

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
-20.0			9 6 5			No recovery; fluid loss from 20-25'.						
-22.5												
-25.0			7 7 11			Minimal recovery; cobble in shoe blocked off sampler; few fractured hard sandstone gravels in sample.						Lost return circulation from 25-30'; borehole is caving on top of drill bit.
-27.5												
-30.0			14 12 15	SW		Well-graded SAND and GRAVEL, medium dense, medium to coarse sand, fine to coarse hard gravel fractured from hammer blow; olive brown silt matrix, no cementation; slightly cohesive fines.						Rig chattering from 30-35'.
-32.5												
-35.0			6 14 13									
						Borehole completed to 36.5 feet; backfilled with bentonite chips.						
-37.5												

BORING LOG

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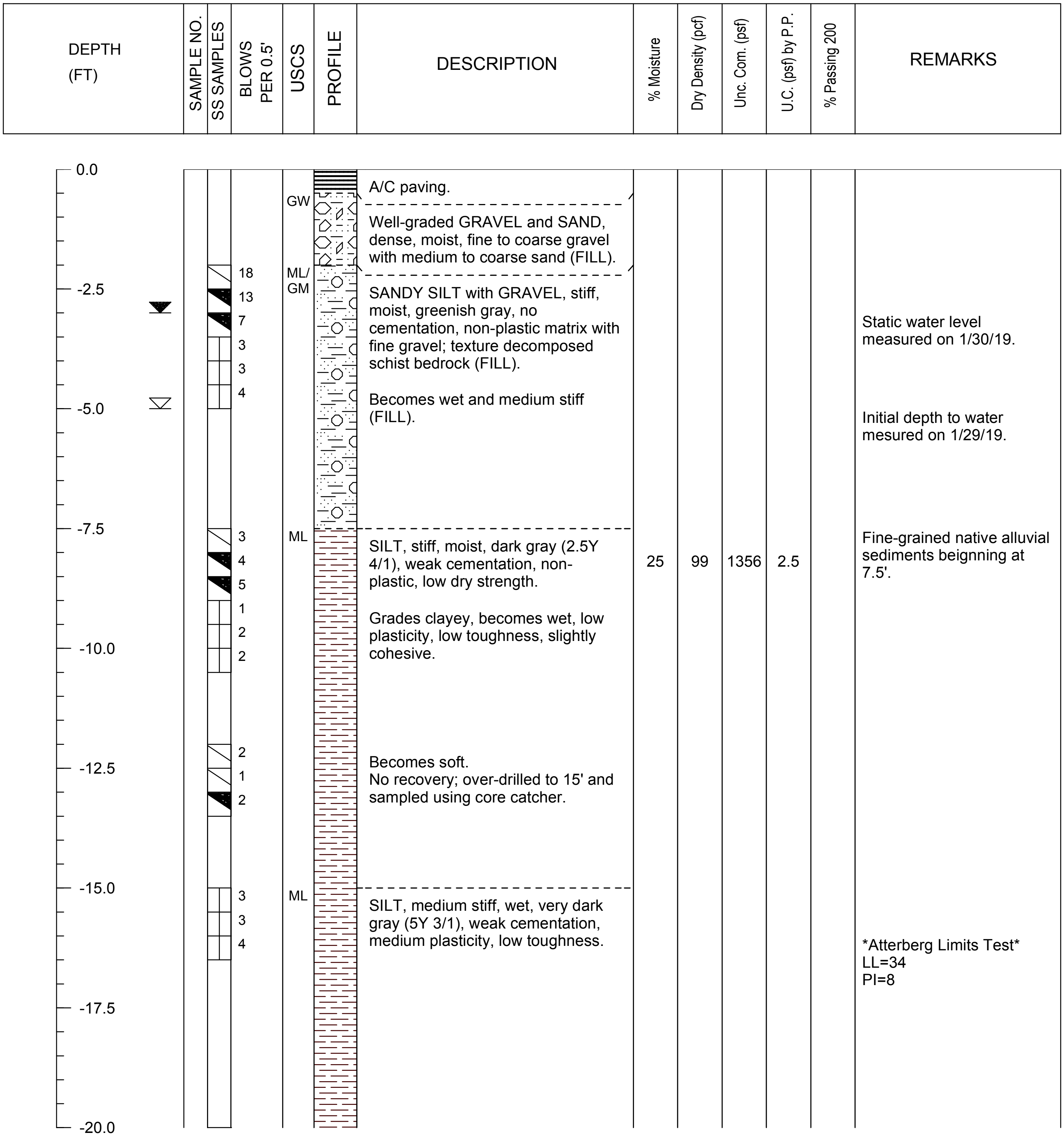
PROJECT: Redwood Visitor Center
LOCATION: W. Edge Visitor Center Bldg. #2
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/29-30/19
TOTAL DEPTH OF BORING: 36.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-003



DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0						A/C paving.						
				GW		Well-graded GRAVEL and SAND, dense, moist, fine to coarse gravel with medium to coarse sand (FILL).						
-2.5			18 13 7 3 3 4	ML/ GM		SANDY SILT with GRAVEL, stiff, moist, greenish gray, no cementation, non-plastic matrix with fine gravel; texture decomposed schist bedrock (FILL). Becomes wet and medium stiff (FILL).						Static water level measured on 1/30/19. Initial depth to water mesured on 1/29/19.
-7.5			3 4 5 1 2 2 2 1 2	ML		SILT, stiff, moist, dark gray (2.5Y 4/1), weak cementation, non-plastic, low dry strength. Grades clayey, becomes wet, low plasticity, low toughness, slightly cohesive. Becomes soft. No recovery; over-drilled to 15' and sampled using core catcher.	25	99	1356	2.5		Fine-grained native alluvial sediments beignning at 7.5'.
-15.0			3 3 4	ML		SILT, medium stiff, wet, very dark gray (5Y 3/1), weak cementation, medium plasticity, low toughness.						*Atterberg Limits Test* LL=34 PI=8

BORING LOG

PROJECT: Redwood Visitor Center
LOCATION: W. Edge Visitor Center Bldg. #2
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/29-30/19
TOTAL DEPTH OF BORING: 36.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-003

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
-20.0			1 1 2			Grades to SILT with fine SAND, becomes soft, wet, dark gray, no cementation.					82	
-22.5				SW								Coarse-grained fluvial sands and gravels beignning at 22' based on rig chatter.
-25.0			14 18 13			Well-graded SAND with SILT and GRAVEL, dense, medium to coarse sand, fine subrounded hard gravel with few coarse gravels, wet, dark gray matrix, weak to moderate cementation; non-plastic silt.					9	
-27.5												
-30.0			14 17 13			Gravelly based on rig chatter and cuttings. No recovery;						Lost return circulation from 30'-35'.
-32.5												
-35.0			6 6 7			Becomes medium dense; minimal recovery, coarse sand and fine gravel in shoe.						
-37.5						Borehole completed to 36.5 feet; backfilled with tremied grout.						

BORING LOG

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PROJECT: Redwood Visitor Center
LOCATION: Center of Visitor Center Bldgs. #1 and #2
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/30/19
TOTAL DEPTH OF BORING: 61.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-004

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0						A/C paving.						
				GW		Well-graded GRAVEL and SAND, dense, moist, fine to coarse gravel with medium to coarse sand (FILL).						
-2.5			16 10 11	ML/ SM		SANDY SILT, very stiff, moist, greenish gray, moderately compact, non-plastic, fine to coarse sand (FILL).	7	126		2.5 3.5		
-5.0			2 4 6	ML		GRAVELLY SILT, stiff, moist, light greenish gray, moderately compact, medium dry strength, low plasticity, medium toughness (FILL).						*Atterberg Limits Test* LL=34 PI=8
-7.5			7 7 7			Heterogenous mix of CLAY, SILT, and fine GRAVEL (FILL).	16	108		3.0 2.5		
-10.0			1 2 2	ML		SILT, soft, moist, dark gray (2.5Y 4/1), no cementation, no dry strength, medium plasticity, low toughness, trace fine sand.						Fine-grained native alluvial sediments beignning at 10'.
-12.5												
-15.0			1 1 1			Becomes very soft.				0		
-17.5												
-20.0			P 1 2 3			Becomes soft, trace intact roots; grades Sandy beginning at 21.5'.						
-22.5 ▼												Depth to water mesured on 1/30/19; switched to rotary wash drilling.
-25.0												

BORING LOG

PROJECT: Redwood Visitor Center
LOCATION: Center of Visitor Center Bldgs. #1 and #2
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/30/19
TOTAL DEPTH OF BORING: 61.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-004

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
-25.0			1 6 5	ML		SANDY SILT, stiff, wet, dark gray (Gley 1 4/4), weak cementation, low strength, non-plastic; thin interbeds (1-2") of fine sand with abundant redwood fragments.					69	
-27.5						Abundant wood fragments in cuttings from 27-30'.						
-30.0			13 20 34	GW		Becomes dense; rig chattering from 30-35' with fine gravels in drill cuttings.						Coarse-grained fluvial sands and gravels beignning at 30' based on rig chatter; significant fluid loss from 30-35'.
-32.5												
-35.0			11 9 9			Well-graded GRAVEL with SILT and SAND, medium dense, wet, grayish brown silt matrix; fine to coarse gravel, max. size 1 1/2" fractured from hammer blow, medium to coarse sand, non-plastic fines.						
-37.5												
-40.0			2 3 2	SM		SILTY SAND, loose, wet, gray, weak cementation, low plasticity fines.					24	
-42.5												
-45.0			6 6 9	SW		Well-graded SAND with GRAVEL, medium dense, wet, quartz-rich medium to coarse sand, subrounded fine gravel, max. size 1/2".					5	Significant fluid loss from 45-50'.
-47.5												
-50.0												

PROJECT: Redwood Visitor Center
LOCATION: Center of Visitor Center Bldgs. #1 and #2
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/30/19
TOTAL DEPTH OF BORING: 61.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-004

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
-50.0			9 7 11			Interbedded well-graded SAND with dark yellowish brown CLAYEY SAND; abundant fine gravel					8	
-52.5												
-55.0												
-57.5												
-60.0			10 11 10			Grades to well-graded GRAVEL, max. size 1".						Lost return circulation from 55-60'.
						Borehole completed to 61.5 feet; backfilled with tremied grout.						
-62.5												
-65.0												
-67.5												
-70.0												
-72.5												

BORING LOG

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PROJECT: Redwood Visitor Center
LOCATION: E. Edge Visitor Center Bldg. #1
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/30-31/19
TOTAL DEPTH OF BORING: 52 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-005

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0				GW		A/C paving.						
-2.5 ▽			12 8 6			Well-graded GRAVEL and SAND, medium dense, moist to wet, fine to coarse gravel with medium to coarse sand; grades Clayey beginning at 4' (FILL).						Static water level measured at beginning of day on 1/31/19 .
-5.0 ▽			5 4 5	CL/ GC		GRAVELLY CLAY, stiff, wet, light greenish gray, low plasticity fines (FILL).						Initial depth to water mesured on 1/30/19.
-7.5			4 5 6			No recovery.						
-10.0			1 1 2	ML		No recovery.						Fine-grained native alluvial sediments beignning at 10' based on blow counts.
-12.5												
-15.0 ▼			3 2 3			No recovery.						Final depth to water at completion of drilling.
-17.5												
-20.0			3 1 2 3	ML/ SM		SANDY SILT, soft, wet, bluish black (Gley 2 2.5/5B), no cementation, low plasticity with slightly cohesive fines, fine sand with abundant wood fragments.					64	
-22.5												
-25.0			5 7 14	GP		Poor recovery. Approximately 3" of Poorly-graded GRAVEL, medium dense, max. size 1 1/2" fractured from hammer blow. Rig chattering from 25-30'; abundant wood fragments in drill cuttings.						Lost return circulation from 25'-30'.
-27.5												
-30.0												

BORING LOG

PROJECT: Redwood Visitor Center
LOCATION: E. Edge Visitor Center Bldg. #1
GROUND SURFACE ELEVATION: ~42 Feet (GoogleEarth)
EXCAVATION METHOD: Flight Auger/Rotary Wash (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/30-31/19
TOTAL DEPTH OF BORING: 52 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
R-19-005

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
-30.0			13 11 5 3			No recovery.						Lost return circulation from 30'-35'.
-32.5												
-35.0			3 2 2 1			No recovery.						Lost return circulation from 35'-40'.
-37.5												
-40.0			3 2 2 4	ML		SILT with fine SAND, medium stiff, wet, dark gray, weak cementation, medium plasticity, medium toughness.				0.5	75	*Atterberg Limits Test* LL=22 PI=2
-42.5												
-45.0												
-47.5												
-50.0			3 1 2 3			SAME, becomes moist (no visible moisture), medium stiff, medium to high plasticity.						
-52.5						Borehole completed to 52 feet; backfilled with tremied grout. Drill fluid level in borehole dropped to 15' following completion of drilling; initial & static water levels noted above are interpreted to be due to saturation of the river-run gravel fill and proximity of drainage at east edge of A/C paving.						
-55.0												
-57.5												

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PROJECT: Redwood Visitor Center
LOCATION: Canopy Walk, Upper Road, South Edge
GROUND SURFACE ELEVATION: ~78 Feet (Project Daturm)
EXCAVATION METHOD: Flight Auger (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/31/19
TOTAL DEPTH OF BORING: 31.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
A-19-006

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0				ML		SILT, firm, dark brown; grading to Gravel (FILL).						Outboard roadway fill slope.
-2.5			5 5 8 2 2 2	ML		SILT, stiff becoming soft at 3.5', moist, dark reddish brown, low dry strength, non-plastic (FILL).	40	71	2288	2.0 2.5		
-5.0												
-7.5			3 5 8 5 7 9	CL		LEAN CLAY, stiff, moist, yellowish brown (10YR 5/6), moderate cementation, medium dry strength, low plasticity.	28	95	866	3.5 0.5		Native colluvial soil beignning at approximately 7.5'. *Atterberg Limits Test* LL=33 PI=10
-10.0				ML/ CL		SILTY LEAN CLAY, stiff, dry, weak cementation, faintly visible original foliated bedrock fabric (highly decomposed SCHIST bedrock weathered to fine grained soil.						
-12.5												
-15.0			9 10 10							4.0		
-17.5												
-20.0 ▽			2 4 4			Becomes wet, medium stiff.						Perched groundwater at 20'; bedrock below is dry.
-22.5												
-25.0			6 9 11			SCHIST, medium dense, dry, dark gray, moderate field strength, slightly disintegrated, moderately decomposed, foliated.						Redwood Creek Schist (Early Cretaceous to Late Jurassic age)
-27.5												
-30.0			7 11 12									
-32.5						Borehole completed to 31.5 feet; backfilled with bentonite chips.						
-35.0												

BORING LOG

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PROJECT: Redwood Visitor Center
LOCATION: Canopy Walk, Upper Road, North Edge
GROUND SURFACE ELEVATION: ~87 Feet (Project Daturm)
EXCAVATION METHOD: Flight Auger (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/31/19
TOTAL DEPTH OF BORING: 21.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
A-19-007

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0				GM		A/C paving.						Outboard roadway fill slope.
						SANDY GRAVEL to 4' based on cuttings (FILL).						
						Grades SILTY (FILL).						
-5.0			8 19 24	ML		SILT, very stiff to hard, dry, dark reddish brown, contains abundant Schist rock fragments (disturbed NATIVE soil).	22	105				Native colluvial soil beignning at approximately 5'.
-10.0			28 20 40	CL		LEAN CLAY, hard, dry, strong brown, moderate cementation, low plasticity; abundant Schist rock fragments (Residual soil/Saprolite).						
-15.0			14 25 22			SCHIST, dense, dry, weak field strength, intensely disintegrated, highly decomposed.						Redwood Creek Schist (Early Cretaceous to Late Jurassic age)
-20.0			10 10 14			Becomes medium dense, moist.						
-21.5						Borehole completed to 21.5 feet; no groundwater encountered. Backfilled borehole with bentonite chips and drill cuttings.						

-2.5
-7.5
-12.5
-17.5
-22.5
-25.0
-27.5
-30.0

BORING LOG

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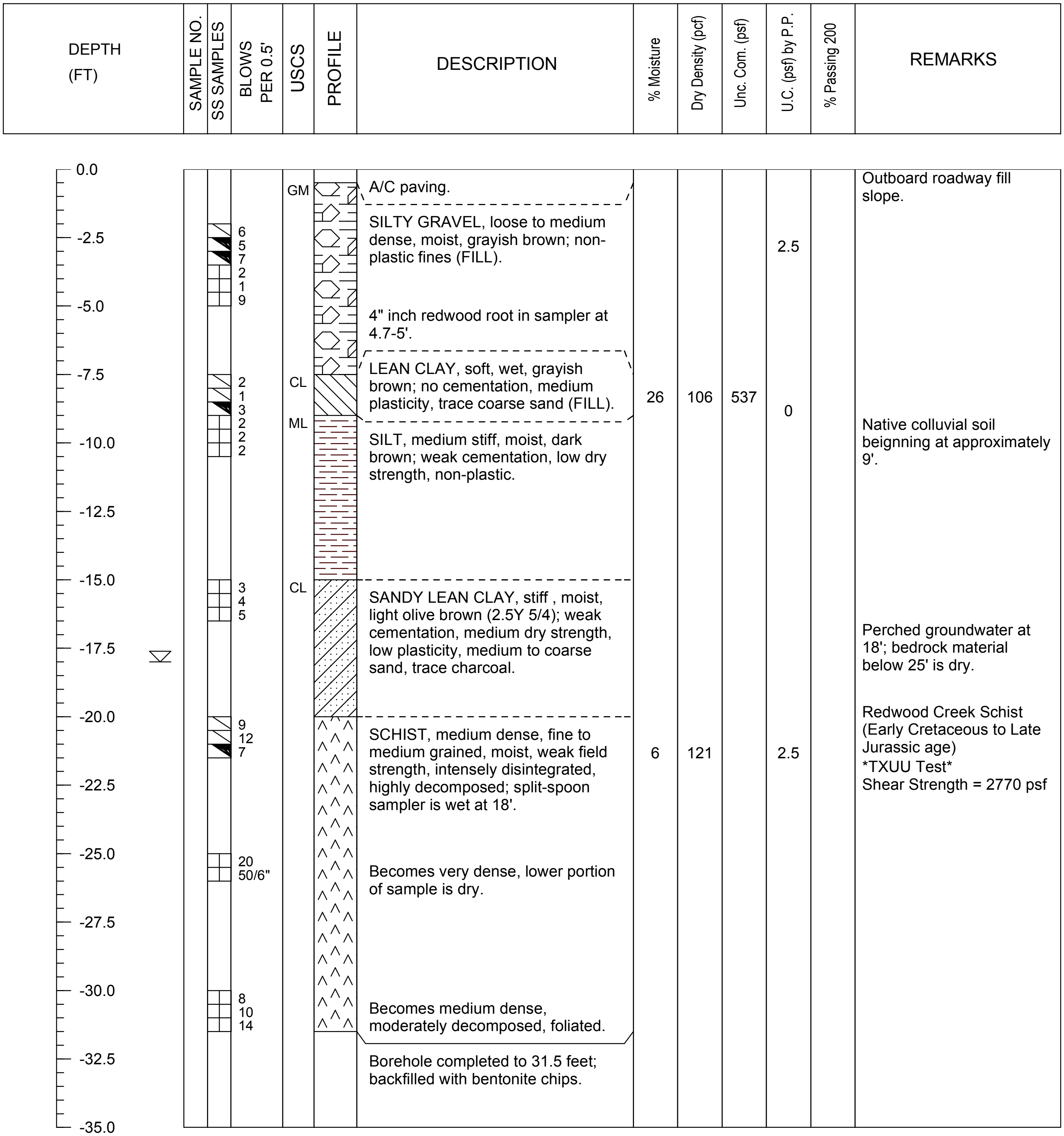
PROJECT: Redwood Visitor Center
LOCATION: Canopy Walk, Lower Road, South Edge
GROUND SURFACE ELEVATION: ~52 Feet (Project Daturm)
EXCAVATION METHOD: 4" Flight Auger (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/31/19
TOTAL DEPTH OF BORING: 31.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
A-19-008



DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0				GM		A/C paving.						Outboard roadway fill slope.
-2.5			6 5 7 2 1 9			SILTY GRAVEL, loose to medium dense, moist, grayish brown; non-plastic fines (FILL).				2.5		
-5.0						4" inch redwood root in sampler at 4.7-5'.						
-7.5			2 1 3 2 2 2	CL		LEAN CLAY, soft, wet, grayish brown; no cementation, medium plasticity, trace coarse sand (FILL).	26	106	537	0		
-10.0				ML		SILT, medium stiff, moist, dark brown; weak cementation, low dry strength, non-plastic.						Native colluvial soil beignning at approximately 9'.
-12.5												
-15.0			3 4 5	CL		SANDY LEAN CLAY, stiff , moist, light olive brown (2.5Y 5/4); weak cementation, medium dry strength, low plasticity, medium to coarse sand, trace charcoal.						
-17.5 ▽												Perched groundwater at 18'; bedrock material below 25' is dry.
-20.0			9 12 7			SCHIST, medium dense, fine to medium grained, moist, weak field strength, intensely disintegrated, highly decomposed; split-spoon sampler is wet at 18'.	6	121		2.5		Redwood Creek Schist (Early Cretaceous to Late Jurassic age) *TXUU Test* Shear Strength = 2770 psf
-22.5												
-25.0			20 50/6"			Becomes very dense, lower portion of sample is dry.						
-27.5												
-30.0			8 10 14			Becomes medium dense, moderately decomposed, foliated.						
-32.5						Borehole completed to 31.5 feet; backfilled with bentonite chips.						
-35.0												

BORING LOG

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PROJECT: Redwood Visitor Center
LOCATION: Canopy Walk, Lower Road, North Edge
GROUND SURFACE ELEVATION: ~54 Feet (Project Daturm)
EXCAVATION METHOD: 4" Flight Auger (CME-75)
LOGGED BY: G. Vadurro, CEG 2385

JOB NUMBER: 018015
DATE DRILLED: 1/31/19
TOTAL DEPTH OF BORING: 26.5 Feet
SAMPLER TYPE: 2.5" ID MCS & 1.4" ID SPT

BORING NUMBER
A-19-009

DEPTH (FT)	SAMPLE NO.	SS SAMPLES	BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0				GP		A/C paving. SANDY GRAVEL to 3' (FILL).						Outboard roadway fill slope. Straight-drilled to 10'.
				ML		Soft GRAVELLY SILT to 10' (FILL).						
-10.0			8 9 12	GM		SILTY GRAVEL, medium dense, moist, grayish brown to reddish brown; no cementation, non-plastic fines, decomposed Schist rock fragments (FILL).	17	118		3.0 4.0		
-15.0 ▽			3 2 3	ML		SILT, medium stiff, moist, light olive brown; weak cementation, low dry strength, non-plastic, trace coarse sand to fine gravel-sized rock fragments (Residual soil/Saprolite).						Native colluvial soil beignning at approximately 15'. Perched groundwater at 19'; bedrock material below 21' is dry.
-20.0			12 16 19			SCHIST, medium dense to dense, moderate field strength, slightly to moderately disintegrated, moderately decomposed; drill rods are wet at 19'; bedrock material is dry below 21'.	9	119		4.0 >4.5		Redwood Creek Schist (Early Cretaceous to Late Jurassic age) *TXUU Test* Shear Strength = 4013 psf
-25.0			14 16 23			Becomes dense.						
						Borehole completed to 25.5 feet; backfilled with bentonite chips.						
-30.0												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

BORING LOG

Laboratory Test Data 3

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DENSITY BY DRIVE- CYLINDER METHOD (ASTM D2937)

Project Name:	**Redwood Visitor Center**	**Project Number:**	**018015**
Performed By:	**ESP**	**Date:**	**2/15/2019**
Checked By:	**NAN**	**Date:**	**2/27/2019**
Project Manager:	**JOB**		

Lab Sample Number	19-098	19-099	19-100	19-101	19-108
Boring Label	001	001	001	002	004
Sample Depth (ft)	3-3.5	8-8.5	11-11.5	6-6.5	3-3.5
Diameter of Cylinder, in	2.36	2.40	2.36	2.40	2.36
Total Length of Cylinder, in.	5.95	6.00	6.00	6.00	6.00
Length of Empty Cylinder A, in.	0.00	0.00	0.00	0.00	0.69
Length of Empty Cylinder B, in.	0.80	1.15	0.05	0.15	0.40
Length of Cylinder Filled, in	5.15	4.85	5.95	5.85	4.91
Volume of Sample, in^3	22.53	21.94	26.03	26.46	21.48
Volume of Sample, cc.	369.17	359.55	426.51	433.68	351.96

Pan #	a5	a6	ss2	ss3	a12
Weight of Wet Soil and Pan	883.9	717.6	1018.2	958.7	846.8
Weight of Dry Soil and Pan	860.6	684.7	873.7	875.2	799.7
Weight of Water	23.3	32.9	144.5	83.5	47.1
Weight of Pan	86.9	87.5	194.1	197.7	87.8
Weight of Dry Soil	773.7	597.2	679.6	677.5	711.9
Percent Moisture	3.0	5.5	21.3	12.3	6.6
Dry Density, g/cc	2.10	1.66	1.59	1.56	2.02
Dry Density, lb/ft^3	130.8	103.7	99.5	97.5	126.3

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DENSITY BY DRIVE- CYLINDER METHOD (ASTM D2937)

Project Name:	**Redwood Visitor Center**	**Project Number:**	**18015**
Performed By:	**ESP**	**Date:**	**2/15/2019**
Checked By:	**NAN**	**Date:**	**2/27/2019**
Project Manager:	**JOB**		

Lab Sample Number	19-110	19-120	19-123		
Boring Label	004	007	009		
Sample Depth (ft)	8.0-8.5	6.0-6.5	11.0-11.5		
Diameter of Cylinder, in	2.40	2.40	2.36		
Total Length of Cylinder, in.	6.00	6.00	6.00		
Length of Empty Cylinder A, in.	0.42	0.00	0.00		
Length of Empty Cylinder B, in.	0.30	0.15	0.21		
Length of Cylinder Filled, in	5.28	5.85	5.79		
Volume of Sample, in^3	23.89	26.46	25.33		
Volume of Sample, cc.	391.42	433.68	415.04		

Pan #	A10	A4	A7		
Weight of Wet Soil and Pan	874.5	974.8	1007.3		
Weight of Dry Soil and Pan	765.6	814.0	870.8		
Weight of Water	108.9	160.8	136.5		
Weight of Pan	87.3	88.3	86.9		
Weight of Dry Soil	678.3	725.7	783.9		
Percent Moisture	16.1	22.2	17.4		
Dry Density, g/cc	1.73	1.67	1.89		
Dry Density, lb/ft^3	108.2	104.5	117.9		

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PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Project Name:	**Redwood Visitor Center**	**Project Number:**	**018015**
Performed By:	**ESP**	**Date:**	**2/15/2019**
Checked By:	**NAN**	**Date:**	**2/27/19**
Project Manager:	**JOB**		

Lab Sample Number	19-100	19-101	19-102	19-106	19-107
Boring Label	001	002	002	003	003
Sample Depth	11'	6'	10-11.5'	20-21.5'	25-26.5'
Pan Number	ss2	ss3	ss10	ss15	ss12
Dry Weight of Soil & Pan	558.8	661.3	405.4	399.7	461.1
Pan Weight	194.2	197.2	195.5	194.4	194.3
Weight of Dry Soil	364.6	464.1	209.9	205.3	266.8
Soil Weight Retained on #200&Pan	333.4	503.9	267.9	231.2	437.8
Soil Weight Passing #200	225.4	157.4	137.5	168.5	23.3
Percent Passing #200	**61.8**	**33.9**	**65.5**	**82.1**	**8.7**

Lab Sample Number	19-111	19-112	19-113	19-114	19-115
Boring Label	004	004	004	004	005
Sample Depth	25-26.5'	40-41.5'	45-46.5'	50-51.5'	20-21.5
Pan Number	ss8	ss14	ss9	ss5	ss7
Dry Weight of Soil & Pan	459.6	442.5	452.0	511.9	458.5
Pan Weight	193.0	192.8	196.6	195.6	193.2
Weight of Dry Soil	266.6	249.7	255.4	316.3	265.3
Soil Weight Retained on #200&Pan	274.5	382.8	438.3	485.2	288.5
Soil Weight Passing #200	185.1	59.7	13.7	26.7	170.0
Percent Passing #200	**69.4**	**23.9**	**5.4**	**8.4**	**64.1**

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PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Project Name:	**Redwood Visitor Center**	**Project Number:**	**018015**
Performed By:	**ESP**	**Date:**	**2/15/2019**
Checked By:	**NAN**	**Date:**	**2/27/2019**
Project Manager:	**JOB**		

Lab Sample Number	19-116				
Boring Label	005				
Sample Depth	40-41.5				
Pan Number	ss1				
Dry Weight of Soil & Pan	476.4				
Pan Weight	194.9				
Weight of Dry Soil	281.5				
Soil Weight Retained on #200&Pan	265.9				
Soil Weight Passing #200	210.5				
Percent Passing #200	**74.8**				

Lab Sample Number					
Boring Label					
Sample Depth					
Pan Number					
Dry Weight of Soil & Pan					
Pan Weight					
Weight of Dry Soil					
Soil Weight Retained on #200&Pan					
Soil Weight Passing #200					
Percent Passing #200					

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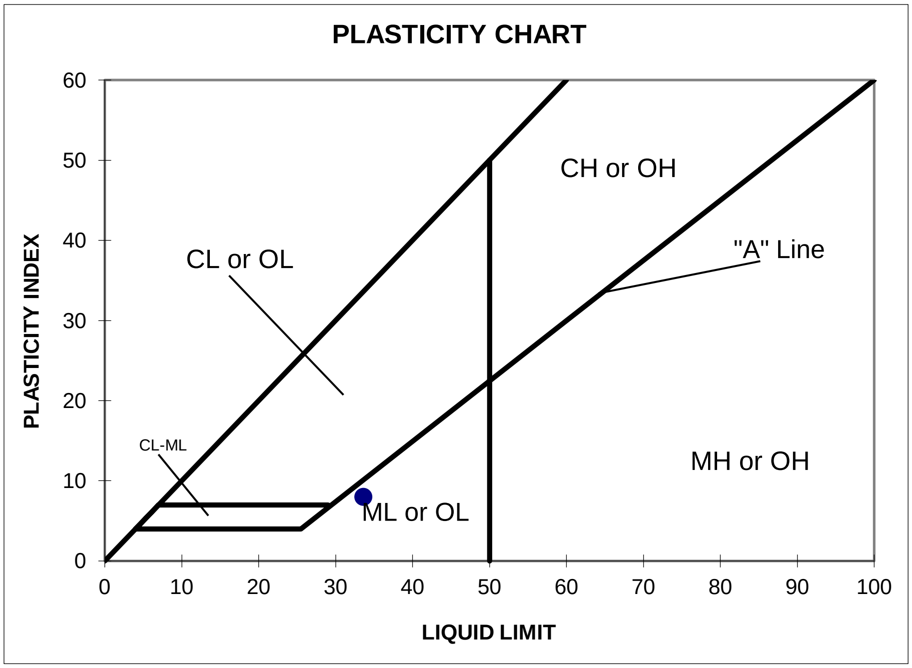
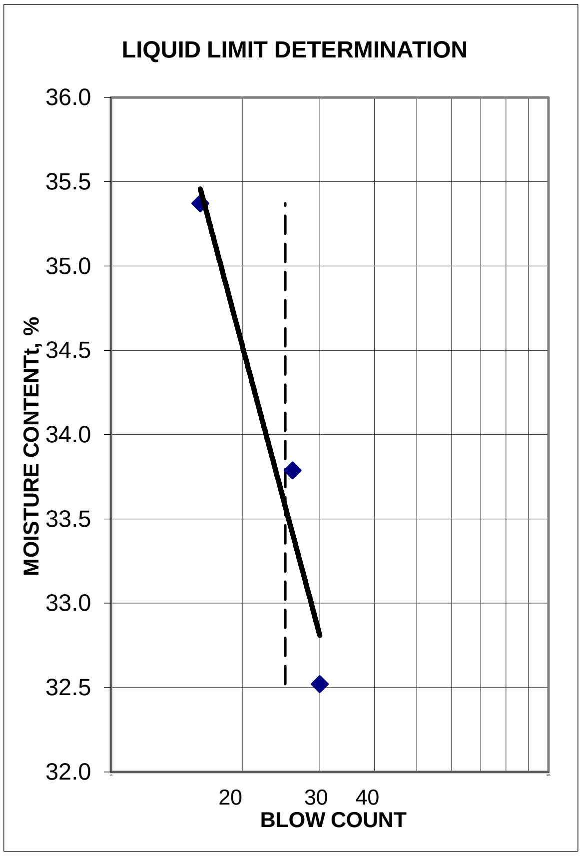
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**Redwood Visitor Center Project No.**	**018015**		LAB SAMPLE #:	**19-105**
SAMPLE ID:	**R19-003 16'**	PERFORMED BY:	**JMA**	DATE:	2/21/2019
PROJECT MANAGER:	**JOB**	CHECKED BY:	**NAN**	DATE:	2/27/2019

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	19	20	10	11	12
B	PAN WT. (g)	16.920	17.200	29.660	28.720	29.370
C	WT. WET SOIL & PAN (g)	24.210	23.420	39.440	37.550	37.560
D	WT. DRY SOIL & PAN (g)	22.720	22.090	37.040	35.320	35.420
E	WT. WATER (C-D)	1.490	1.330	2.400	2.230	2.140
F	WT. DRY SOIL (D-B)	5.800	4.890	7.380	6.600	6.050
G	BLOW COUNT	--	--	30	26	16
H	MOISTURE CONTENT (E/F*100)	25.7	27.2	32.5	33.8	35.4

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
34	**8**	26





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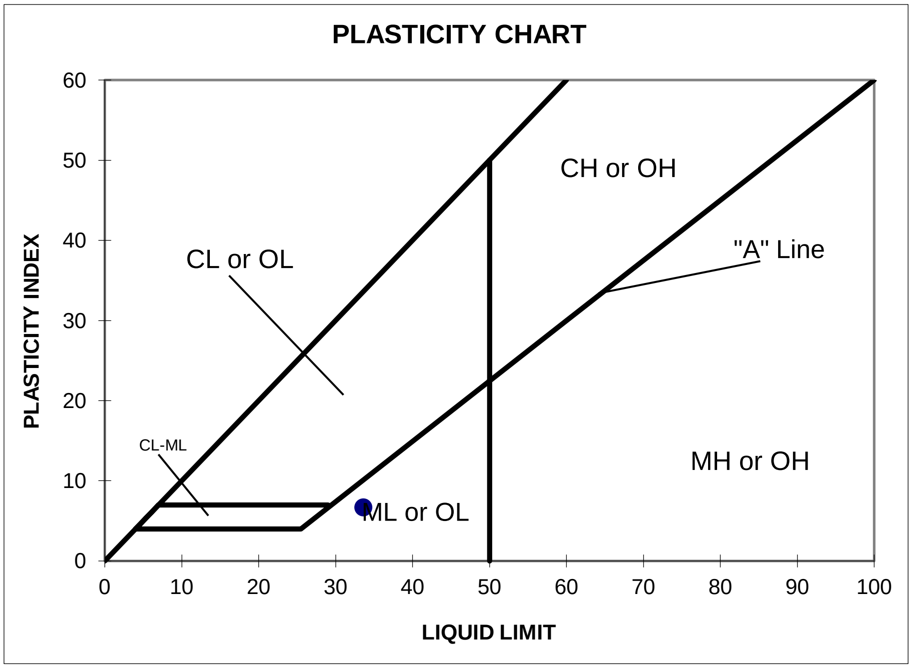
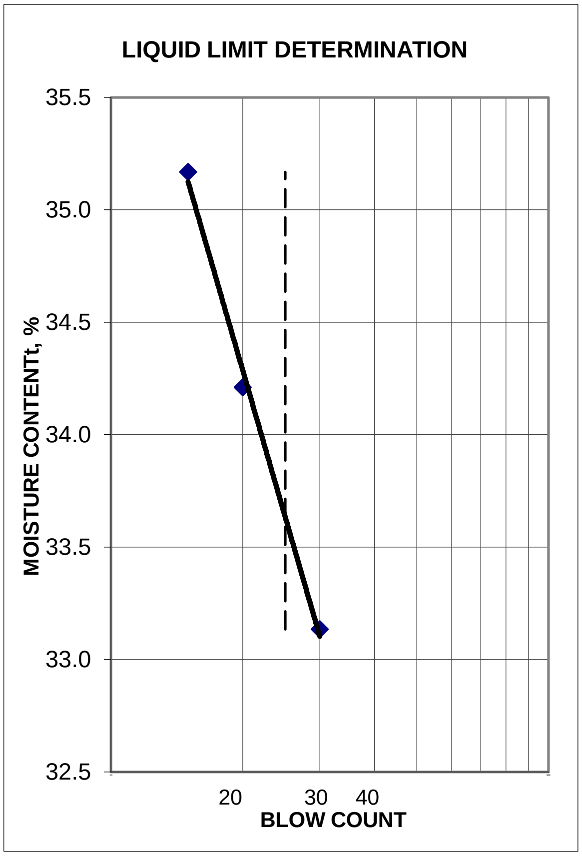
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**Redwood Visitor Center** **Project No.**	**018015**	LAB SAMPLE #:	**19-109**	
SAMPLE ID:	**R19-004 5-6.5'**	PERFORMED BY:	**JMA**	DATE:	2/21/2019
PROJECT MANAGER:	**JOB**	CHECKED BY:	**NAN**	DATE:	2/27/2019

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	17	18	7	8	9
B	PAN WT. (g)	20.370	20.180	28.890	29.040	28.660
C	WT. WET SOIL & PAN (g)	27.590	26.960	37.810	38.220	36.270
D	WT. DRY SOIL & PAN (g)	26.040	25.540	35.590	35.880	34.290
E	WT. WATER (C-D)	1.550	1.420	2.220	2.340	1.980
F	WT. DRY SOIL (D-B)	5.670	5.360	6.700	6.840	5.630
G	BLOW COUNT	--	--	30	20	15
H	MOISTURE CONTENT (E/F*100)	27.3	26.5	33.1	34.2	35.2

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
34	**7**	27





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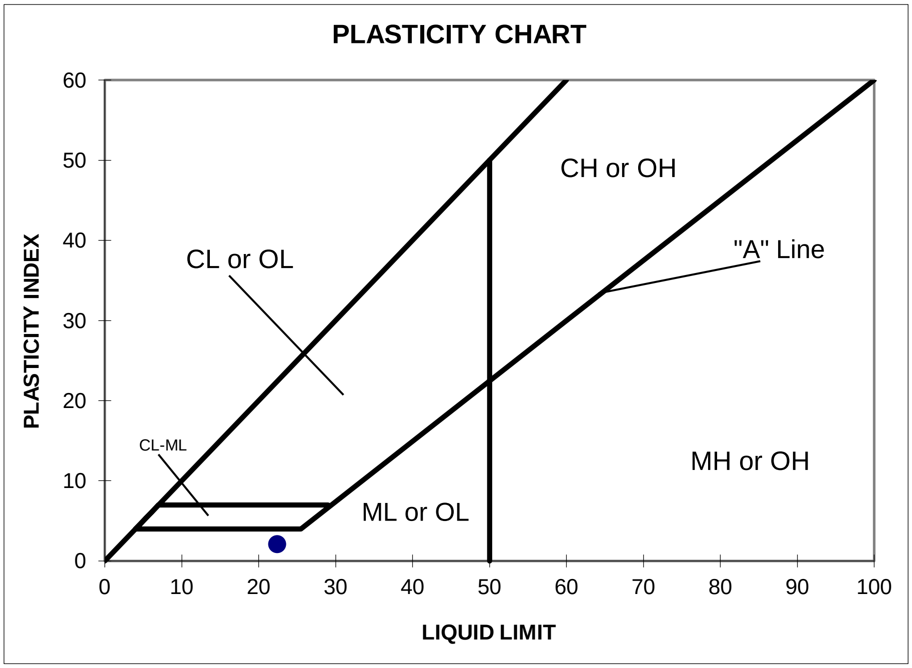
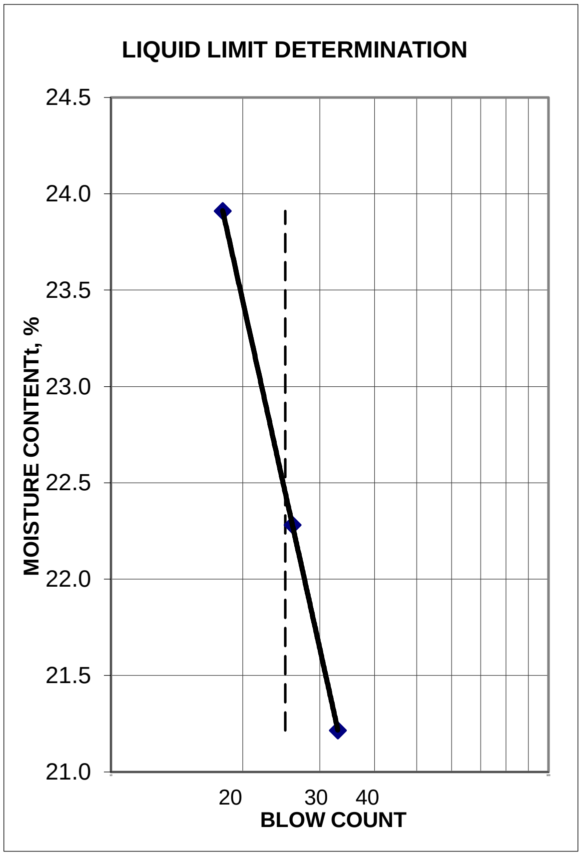
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**Redwood Visitor Center**	**Project No.**	**018015**	LAB SAMPLE #:	**19-116**
SAMPLE ID:	**R19 40-42'**	PERFORMED BY:	**JMA**	DATE:	2/25/2019
PROJECT MANAGER:	**JOB**	CHECKED BY:	**NAN**	DATE:	2/27/2019

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	17	18	7	8	9
B	PAN WT. (g)	20.370	20.230	28.950	29.100	28.690
C	WT. WET SOIL & PAN (g)	28.790	26.850	43.520	40.680	38.640
D	WT. DRY SOIL & PAN (g)	27.360	25.740	40.970	38.570	36.720
E	WT. WATER (C-D)	1.430	1.110	2.550	2.110	1.920
F	WT. DRY SOIL (D-B)	6.990	5.510	12.020	9.470	8.030
G	BLOW COUNT	--	--	33	26	18
H	MOISTURE CONTENT (E/F*100)	20.5	20.1	21.2	22.3	23.9

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
22	**2**	20





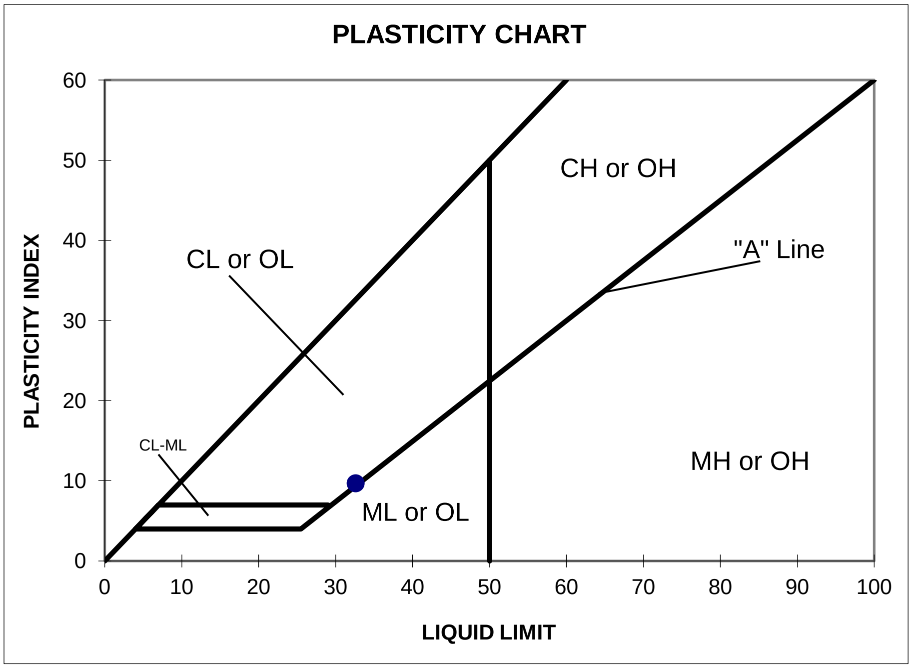
SHN
CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shninfo@shn-engr.com

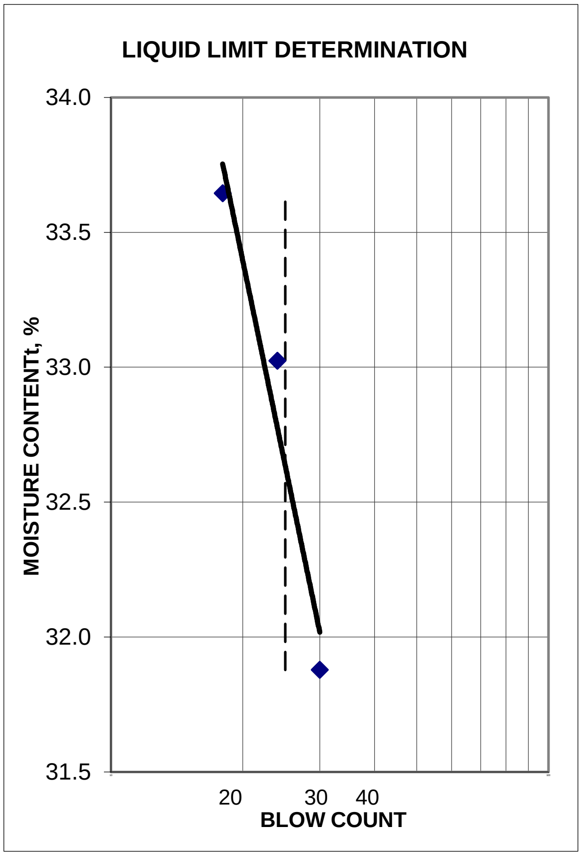
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**Redwood Visitor Center**	**Project No.**	**018015**	LAB SAMPLE #:	**19-118**
SAMPLE ID:	**R19-006 @ 8'**	PERFORMED BY:	**JMA**	DATE:	2/26/2019
PROJECT MANAGER:	**JOB**	CHECKED BY:	**NAN**	DATE:	2/27/2019

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	19	20	10	11	12
B	PAN WT. (g)	16.940	17.150	29.660	28.720	29.370
C	WT. WET SOIL & PAN (g)	23.900	23.440	42.650	38.750	40.810
D	WT. DRY SOIL & PAN (g)	22.600	22.270	39.510	36.260	37.930
E	WT. WATER (C-D)	1.300	1.170	3.140	2.490	2.880
F	WT. DRY SOIL (D-B)	5.660	5.120	9.850	7.540	8.560
G	BLOW COUNT	--	--	30	24	18
H	MOISTURE CONTENT (E/F*100)	23.0	22.9	31.9	33.0	33.6

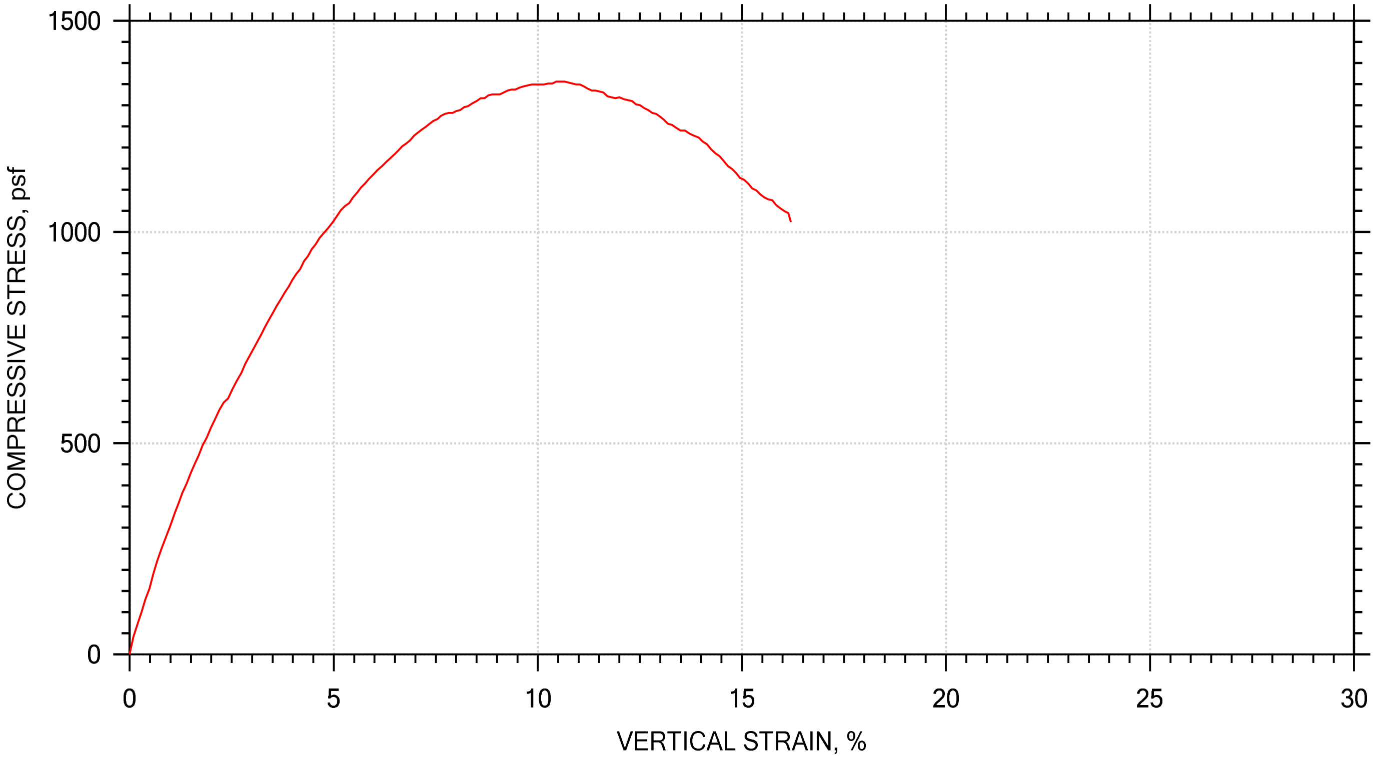
LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
33	**10**	23





Revised 1/03

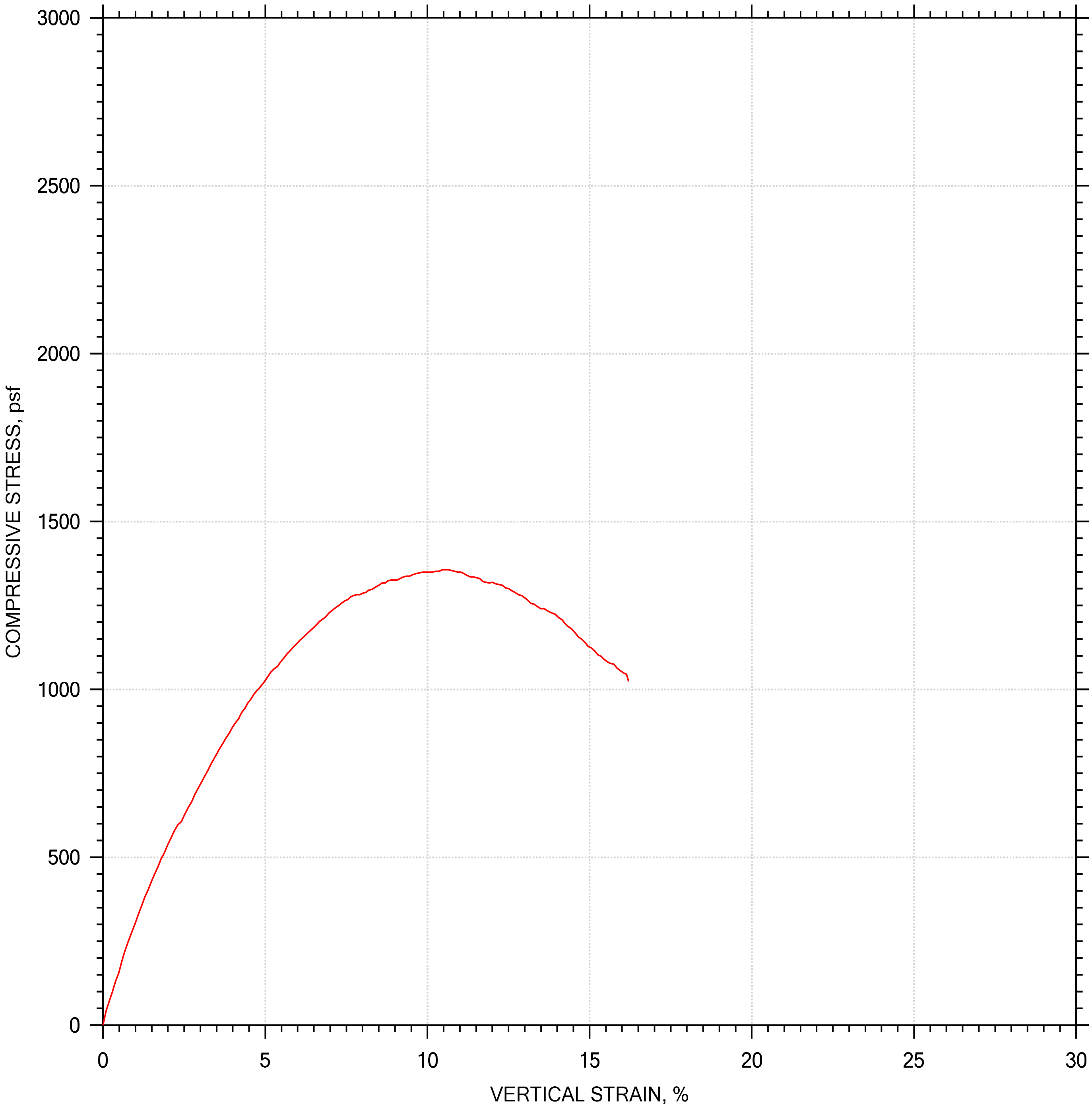
UNCONFINED COMPRESSION TEST REPORT



Symbol					
Test No.		19-104			
Initial	Diameter, in	2.42			
	Height, in	5.25			
	Water Content, %	25.47			
	Dry Density, pcf	98.81			
	Saturation, %	100.08			
	Void Ratio	0.674			
Unconfined Compressive Strength, psf		1356			
Undrained Shear Strength, psf		678.2			
Time to Failure, min		10.8			
Strain Rate, %/min		0.01			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			
Plasticity Index		0			
Failure Sketch					

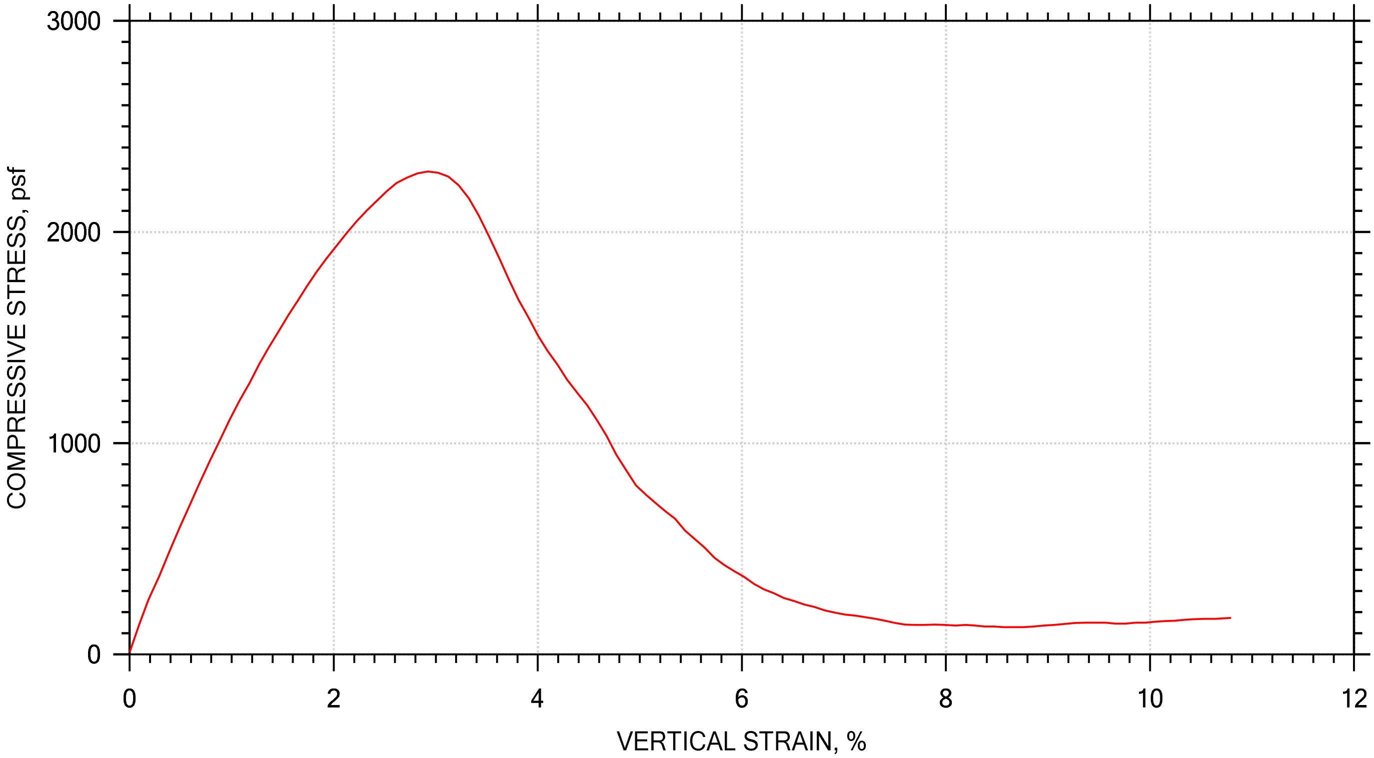
Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 003	Test Date: 2/21/19	Elevation:
Test No.: 19-104	Preparation: 2.5" cal brl	Depth: 8'
Description:		
Remarks:		

UNCONFINED COMPRESSION TEST REPORT



Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 003	Test Date: 2/21/19	Elevation:
Test No.: 19-104	Preparation: 2.5" cal brl	Depth: 8'
Description:		
Remarks:		

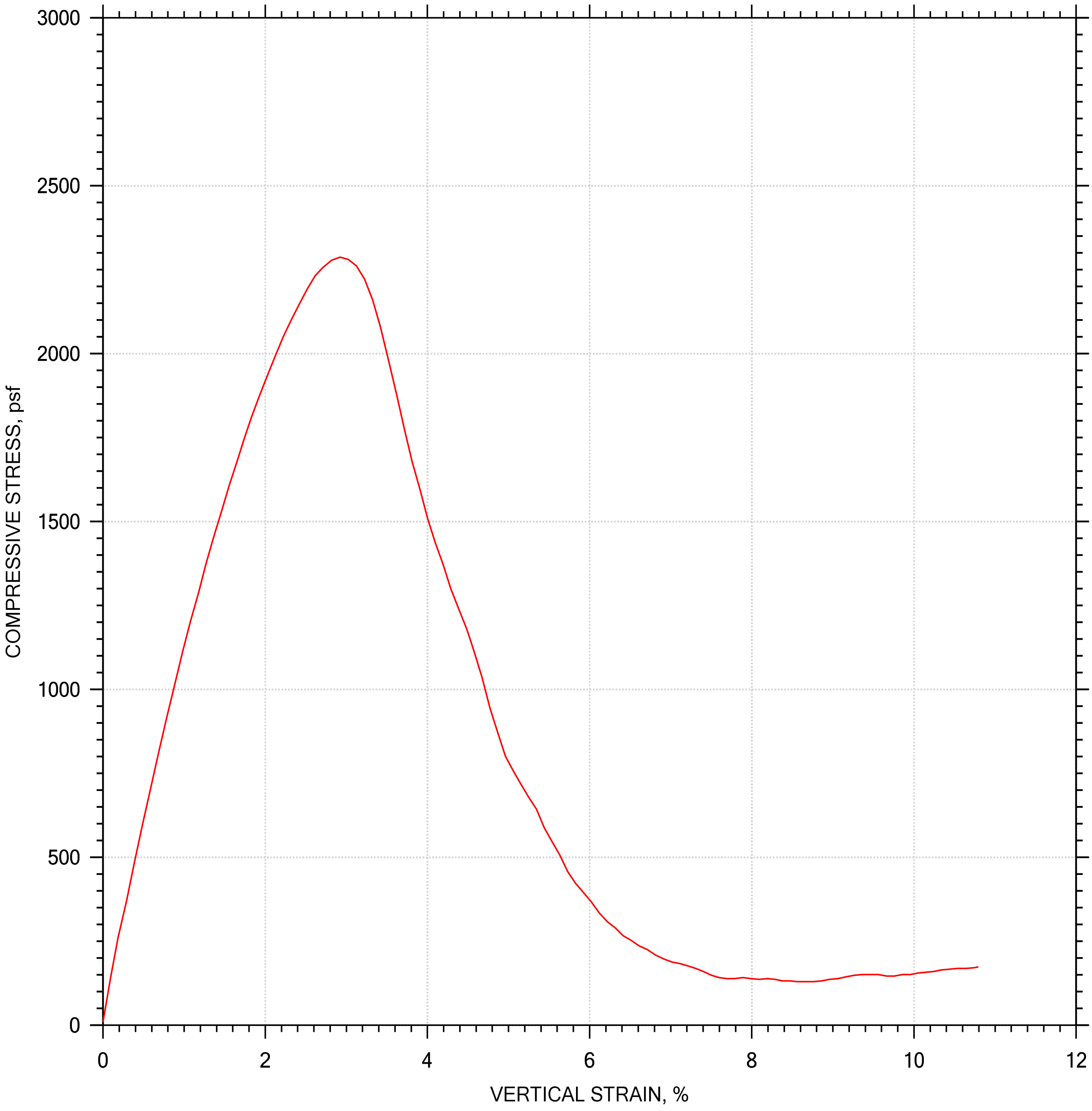
UNCONFINED COMPRESSION TEST REPORT



Symbol					
Test No.		19-117			
Initial	Diameter, in	2.42			
	Height, in	5.44			
	Water Content, %	39.61			
	Dry Density, pcf	70.86			
	Saturation, %	78.66			
	Void Ratio	1.33			
Unconfined Compressive Strength, psf		2288			
Undrained Shear Strength, psf		1144			
Time to Failure, min		3.0003			
Strain Rate, %/min		0.01			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			
Plasticity Index		0			
Failure Sketch					

SHN	Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
	Boring No.: R19	Tested By: JMA	Checked By:
	Sample No.: 006	Test Date: 2/21/19	Elevation:
	Test No.: 19-117	Preparation: 2.5" calbrl	Depth: 3"
	Description:		
	Remarks:		

UNCONFINED COMPRESSION TEST REPORT

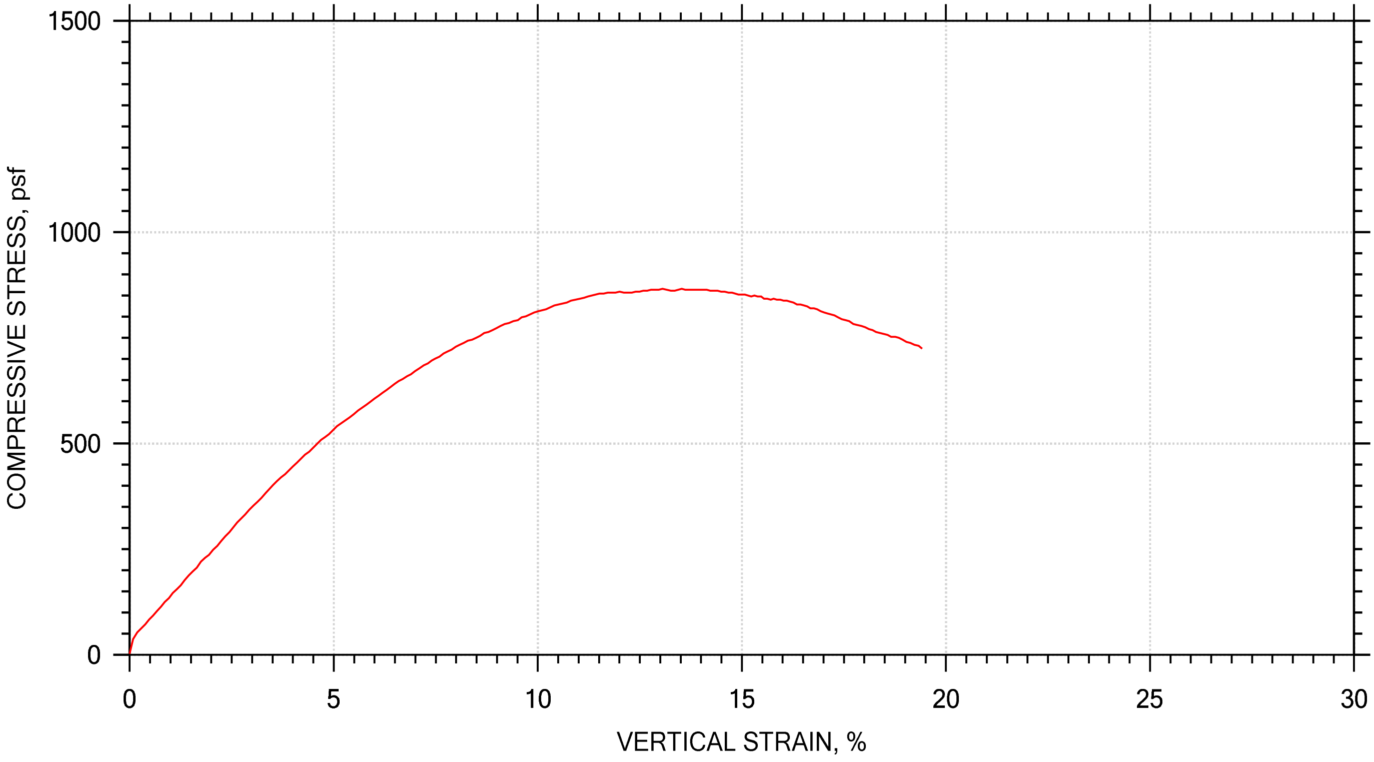


Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 006	Test Date: 2/21/19	Elevation:
Test No.: 19-117	Preparation: 2.5" calbrl	Depth: 3"

Description:

Remarks:

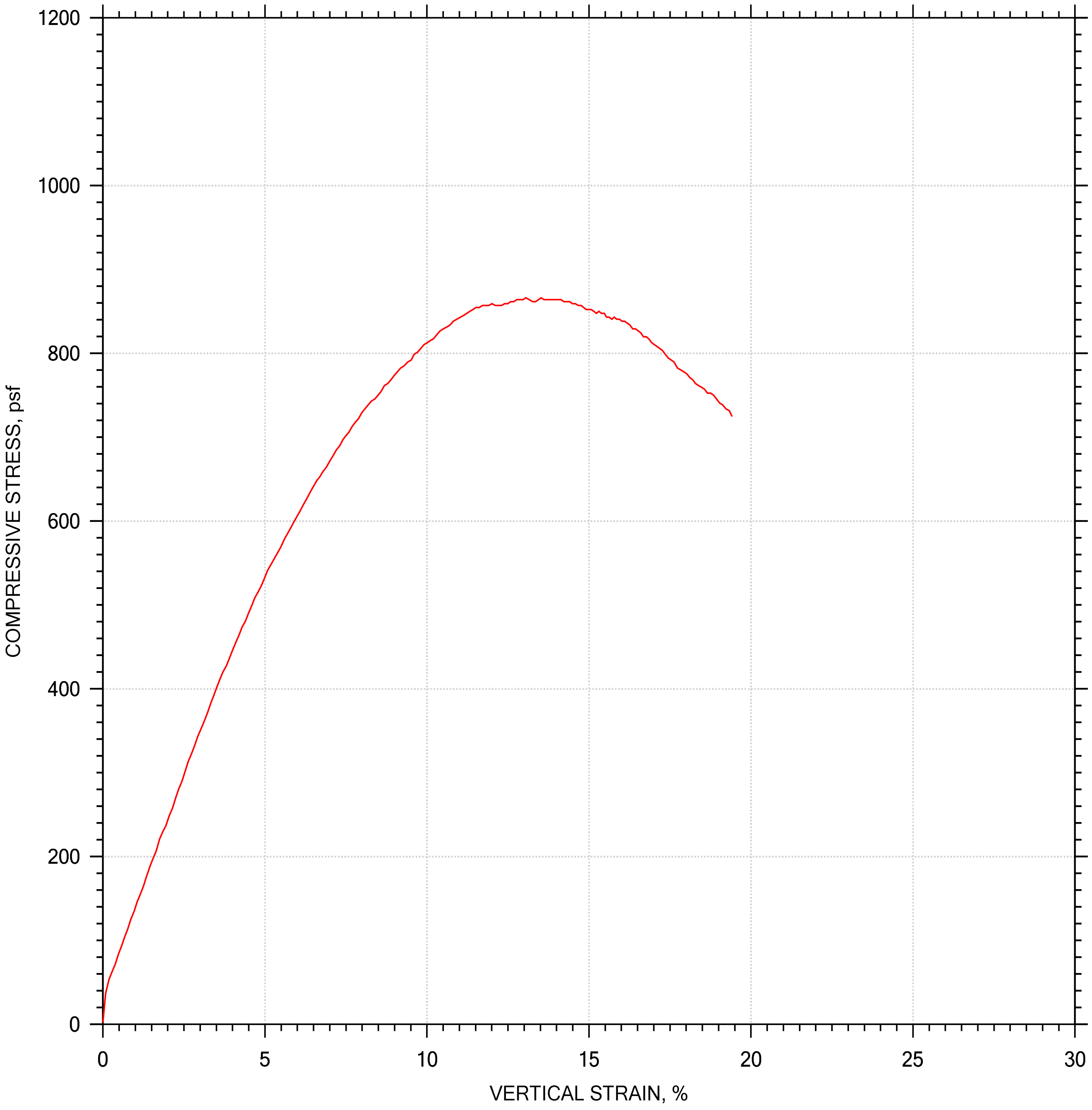
UNCONFINED COMPRESSION TEST REPORT



Symbol					
Test No.		19-118			
Initial	Diameter, in	2.42			
	Height, in	5.15			
	Water Content, %	27.60			
	Dry Density, pcf	94.69			
	Saturation, %	97.90			
	Void Ratio	0.747			
Unconfined Compressive Strength, psf		866.3			
Undrained Shear Strength, psf		433.1			
Time to Failure, min		13.701			
Strain Rate, %/min		0.01			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			
Plasticity Index		0			
Failure Sketch					

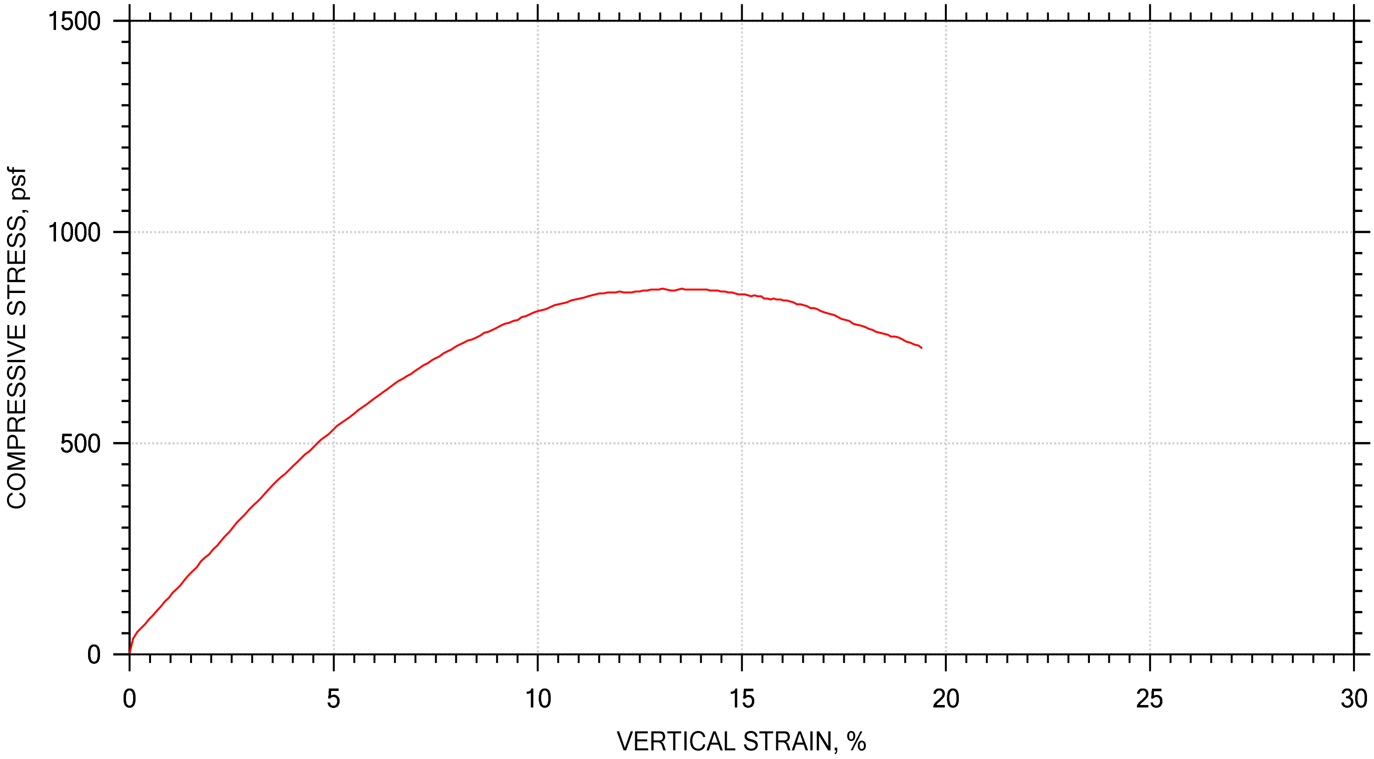
Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 006	Test Date: 2/21/19	Elevation:
Test No.: 19-118	Preparation:	Depth: 8'
Description:		
Remarks:		

UNCONFINED COMPRESSION TEST REPORT



Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 006	Test Date: 2/21/19	Elevation:
Test No.: 19-118	Preparation:	Depth: 8'
Description:		
Remarks:		

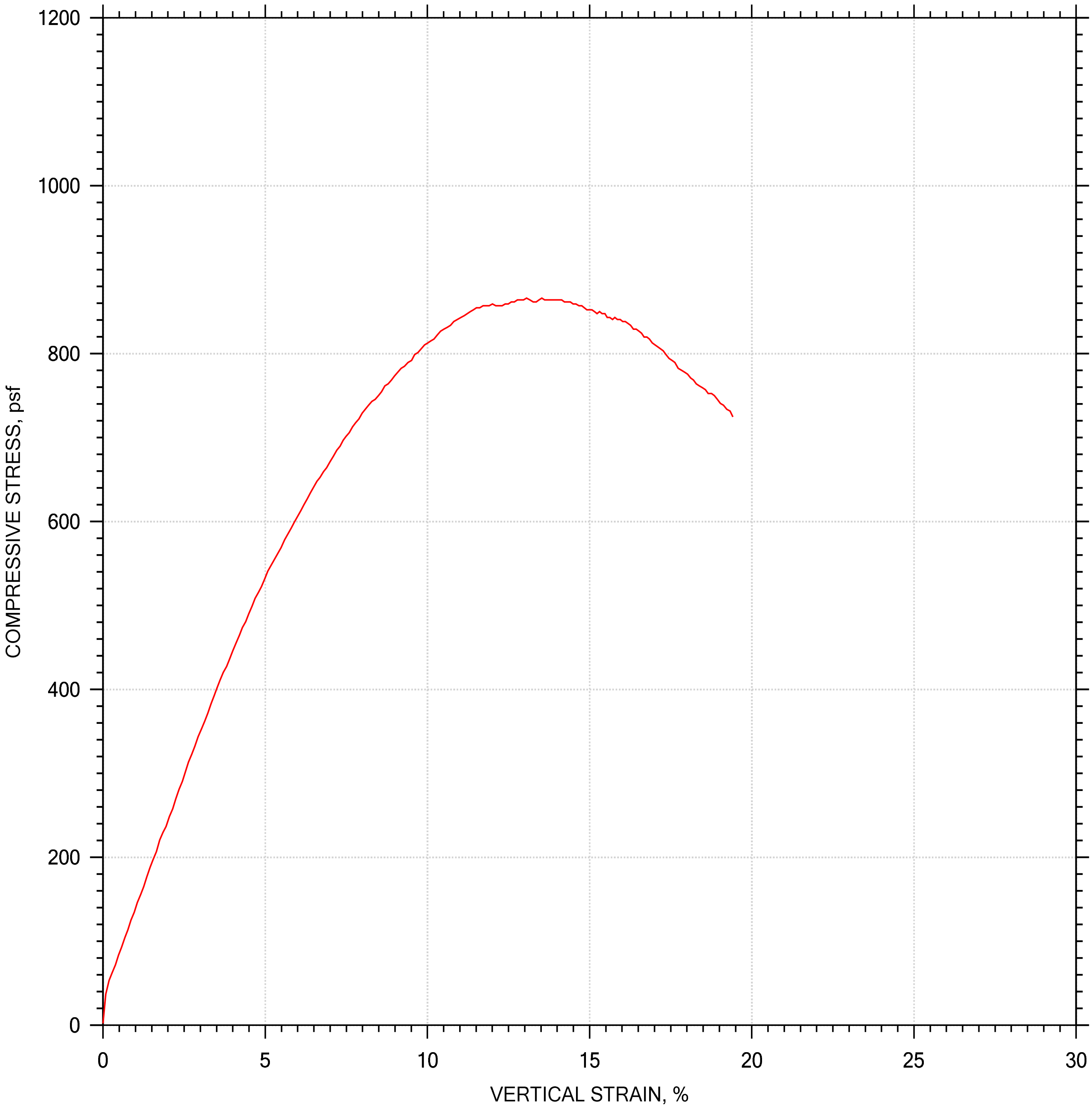
UNCONFINED COMPRESSION TEST REPORT



Symbol					
Test No.		19-118			
Initial	Diameter, in	2.42			
	Height, in	5.15			
	Water Content, %	27.60			
	Dry Density, pcf	94.69			
	Saturation, %	97.90			
	Void Ratio	0.747			
Unconfined Compressive Strength, psf		866.3			
Undrained Shear Strength, psf		433.1			
Time to Failure, min		13.701			
Strain Rate, %/min		0.01			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			
Plasticity Index		0			
Failure Sketch					

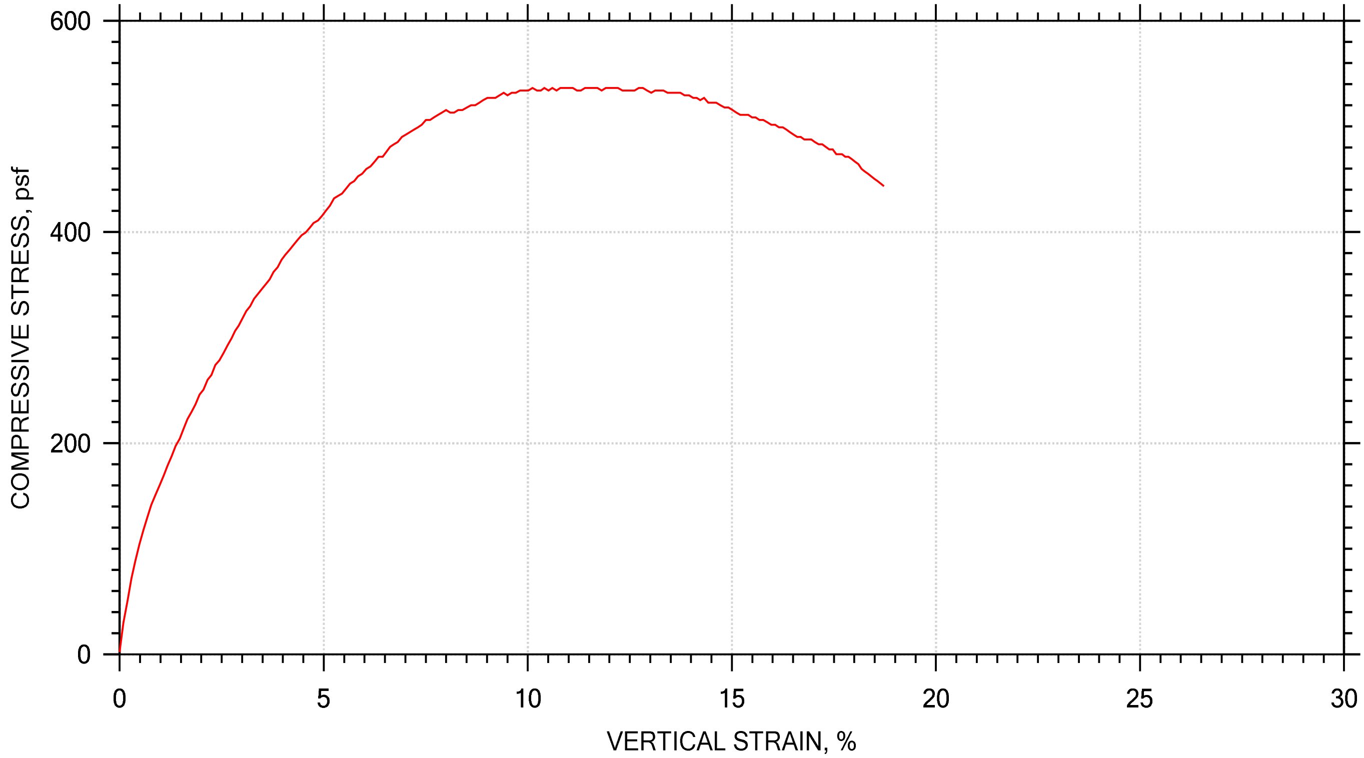
Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 006	Test Date: 2/21/19	Elevation:
Test No.: 19-118	Preparation:	Depth: 8'
Description:		
Remarks:		

UNCONFINED COMPRESSION TEST REPORT



Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 006	Test Date: 2/21/19	Elevation:
Test No.: 19-118	Preparation:	Depth: 8'
Description:		
Remarks:		

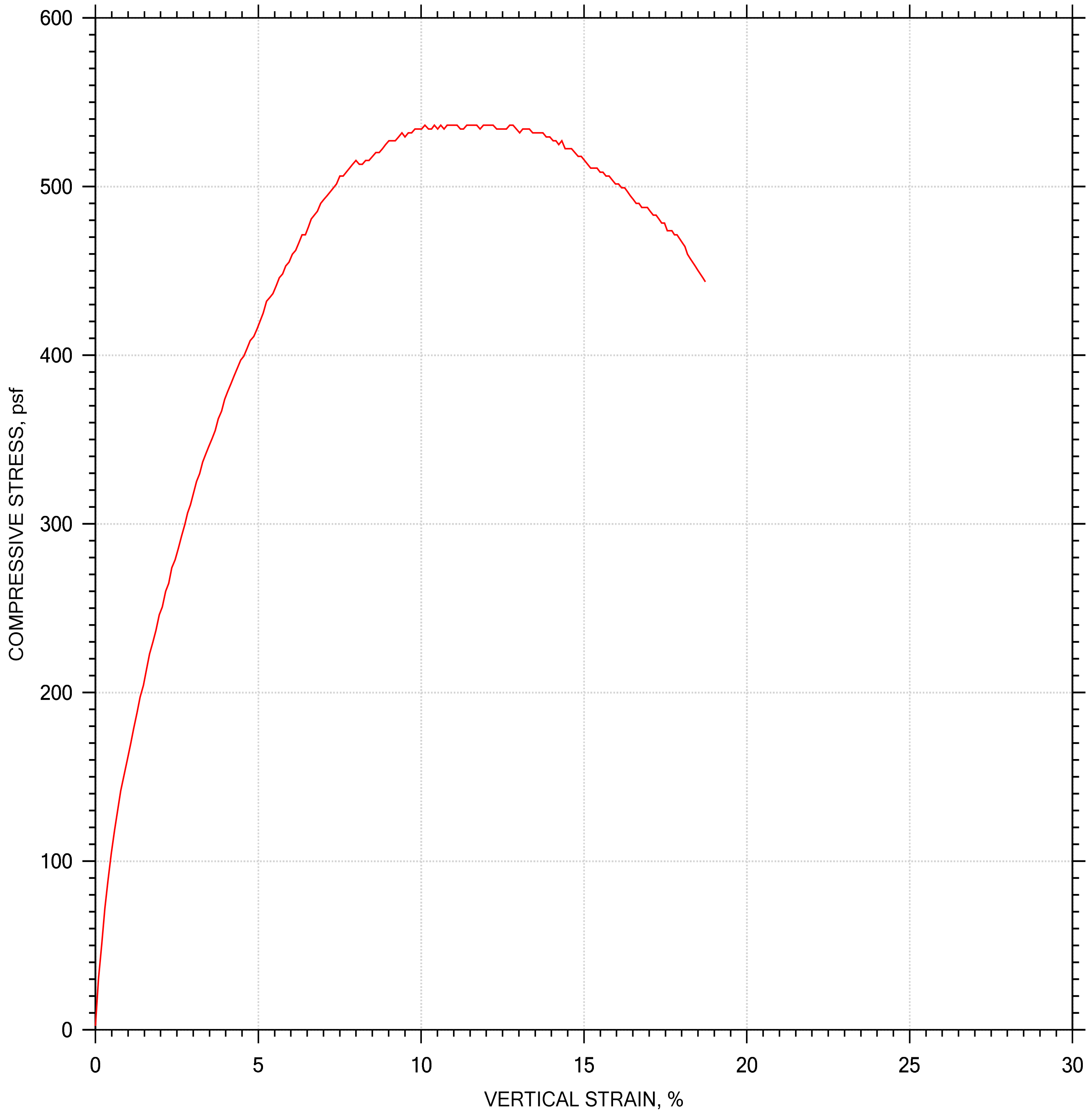
UNCONFINED COMPRESSION TEST REPORT



Symbol					
Test No.		19-121			
Initial	Diameter, in	2.42			
	Height, in	5.34			
	Water Content, %	26.30			
	Dry Density, pcf	105.5			
	Saturation, %	122.77			
	Void Ratio	0.568			
Unconfined Compressive Strength, psf		536.5			
Undrained Shear Strength, psf		268.2			
Time to Failure, min		13.001			
Strain Rate, %/min		0.01			
Estimated Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			
Plasticity Index		0			
Failure Sketch					

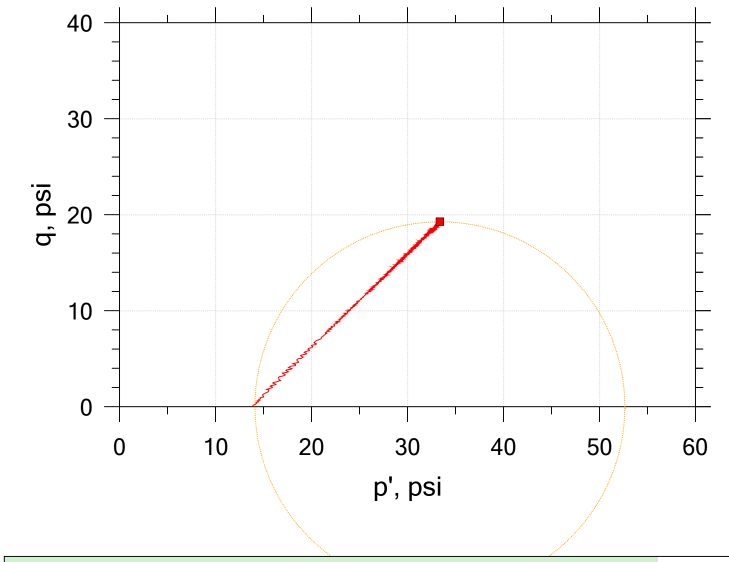
Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 008	Test Date: 2/21/19	Elevation:
Test No.: 19-121	Preparation: 2.5" cal Brl	Depth: 8'
Description:		
Remarks:		

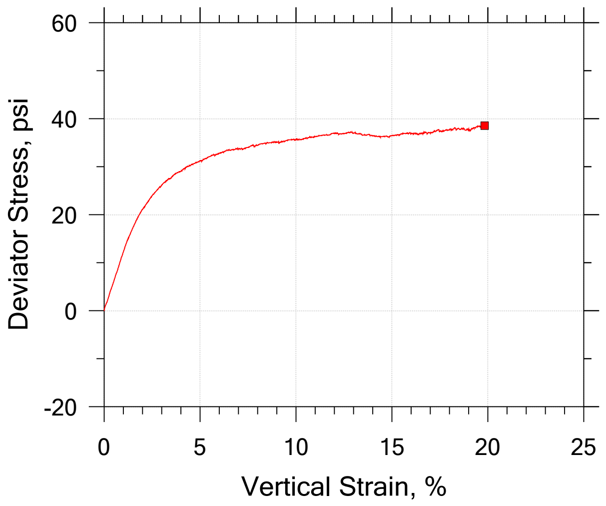
UNCONFINED COMPRESSION TEST REPORT



Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 008	Test Date: 2/21/19	Elevation:
Test No.: 19-121	Preparation: 2.5" cal Brl	Depth: 8'
Description:		
Remarks:		

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



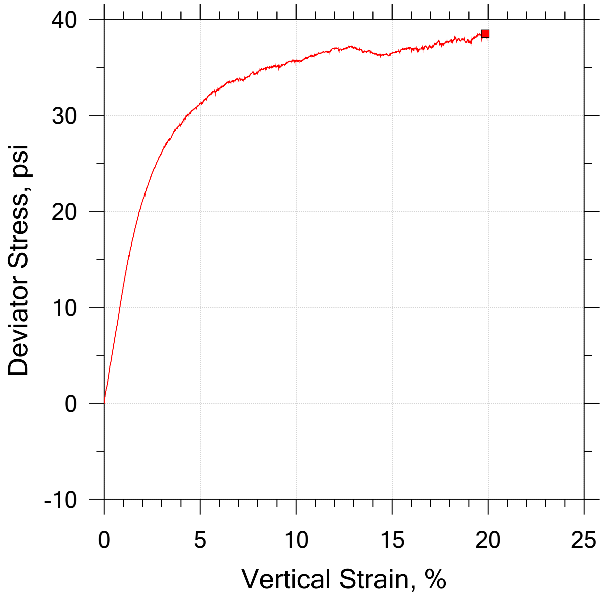


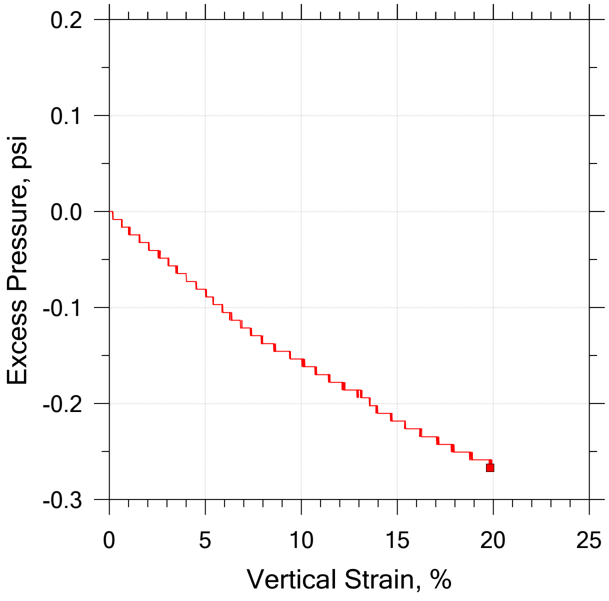
Symbol		🟥			
Sample ID		008			
Depth, ft		21'			
Test Number		19-122			
Initial	Height, in	5.900			
	Diameter, in	2.420			
	Moisture Content (from Cuttings), %	6.0			
	Dry Density, pcf	121.			
	Saturation (Wet Method), %	43.7			
	Void Ratio	0.362			
Final	Moisture Content, %	13.3			
	Dry Density, pcf	122.			
	Cross-Sectional Area (Method A), in²	4.581			
	Saturation, %	100.0			
	Void Ratio	0.353			
	Back Pressure, %	0.0000			
Vertical Effective Consolidation Stress, psi		13.90			
Horizontal Effective Consolidation Stress, psi		13.92			
Vertical Strain after Consolidation, %		0.0000			
Volumetric Strain after Consolidation, %		0.0000			
Time to 50% Consolidation, min		0.0000			
Shear Strength, psi		19.26			
Strain at Failure, %		19.8			
Strain Rate, %/min		1.000			
Deviator Stress at Failure, psi		38.53			
Effective Minor Principal Stress at Failure, psi		14.11			
Effective Major Principal Stress at Failure, psi		52.64			
B-Value		---			

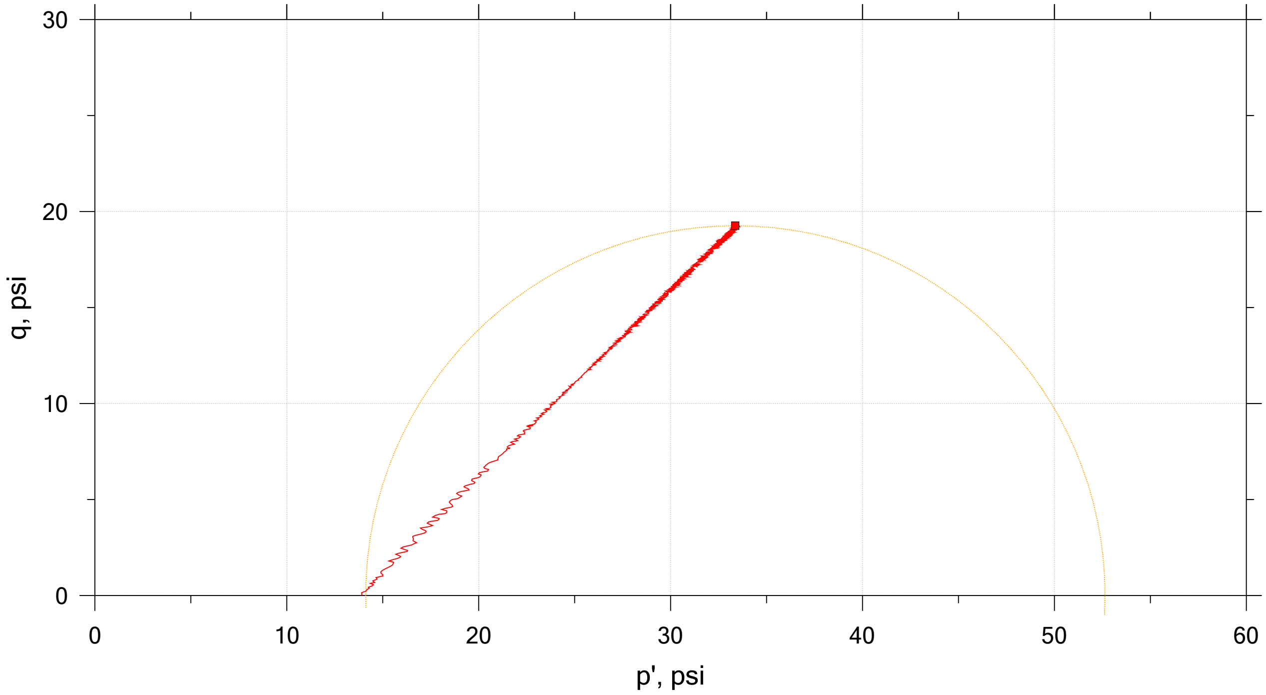
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 008	Test Date: 2/21/19	Depth: 21'
Test No.: 19-122	Sample Type: 2.5" cal Brl	Elevation:
Description: Silty Gravel		
Remarks: Unconsolidated Undrained		

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



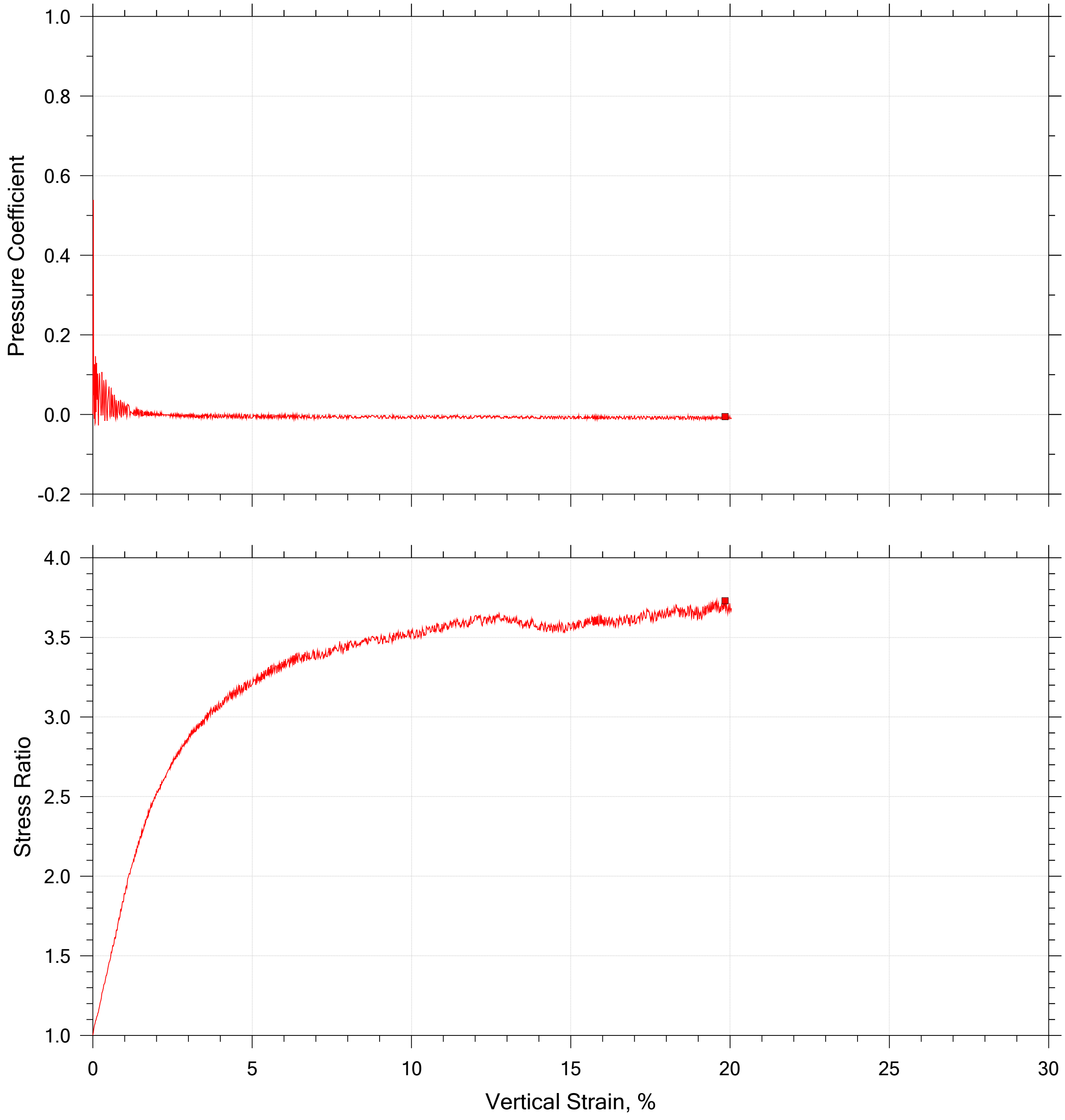




	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
🟥	008	19-122	21'	JMA	2/21/19			TX 19-122 Redwood Visitor ctr.dat

Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 008	Test Date: 2/21/19	Depth: 21'
Test No.: 19-122	Sample Type: 2.5" cal Brl	Elevation:
Description: Silty Gravel		
Remarks: Unconsolidated Undrained		

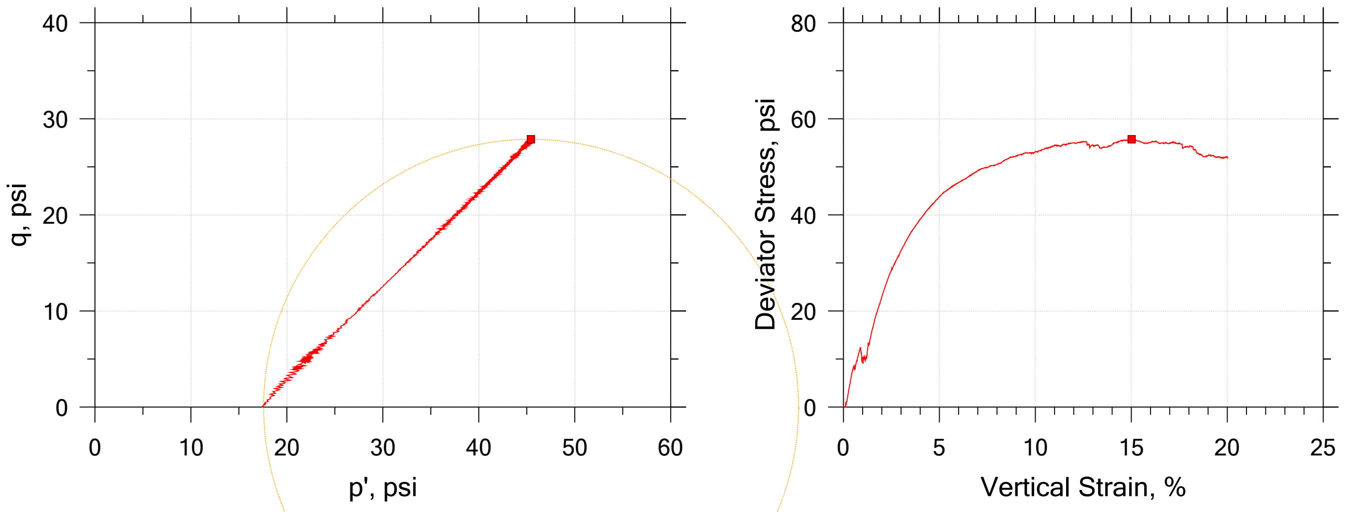
UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
🟥	008	19-122	21'	JMA	2/21/19			TX 19-122 Redwood Visitor ctr.dat

Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 008	Test Date: 2/21/19	Depth: 21'
Test No.: 19-122	Sample Type: 2.5" cal Brl	Elevation:
Description: Silty Gravel		
Remarks: Unconsolidated Undrained		

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850

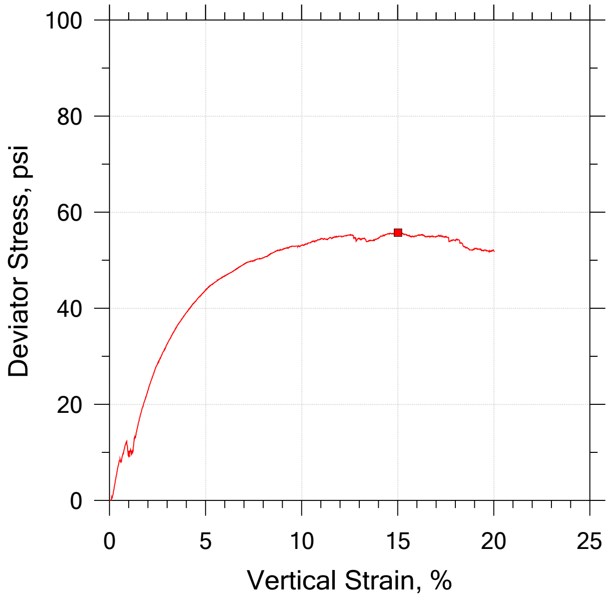


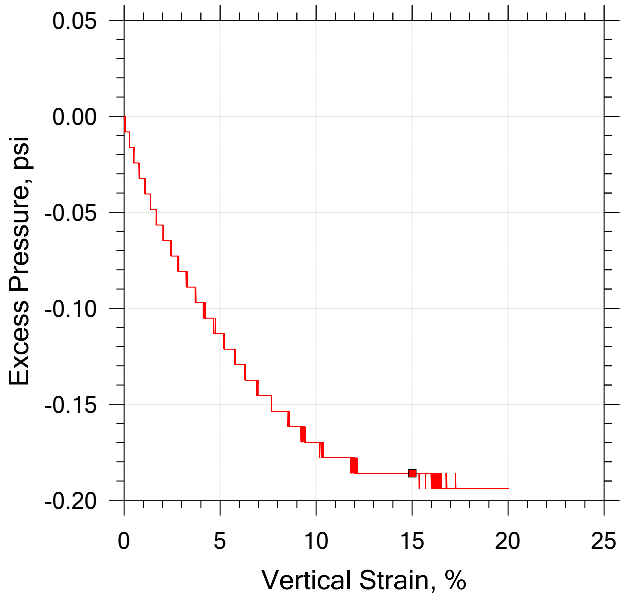
Symbol		🟥			
Sample ID		009			
Depth, ft		21'			
Test Number		19-124			
Initial	Height, in	5.600			
	Diameter, in	2.420			
	Moisture Content (from Cuttings), %	9.3			
	Dry Density, pcf	119.			
	Saturation (Wet Method), %	61.0			
	Void Ratio	0.409			
Final	Moisture Content, %	15.1			
	Dry Density, pcf	119.			
	Cross-Sectional Area (Method A), in²	4.587			
	Saturation, %	100.0			
	Void Ratio	0.403			
	Back Pressure, %	0.008085			
Vertical Effective Consolidation Stress, psi		17.39			
Horizontal Effective Consolidation Stress, psi		17.39			
Vertical Strain after Consolidation, %		0.0000			
Volumetric Strain after Consolidation, %		0.0000			
Time to 50% Consolidation, min		0.0000			
Shear Strength, psi		27.87			
Strain at Failure, %		15.0			
Strain Rate, %/min		1.000			
Deviator Stress at Failure, psi		55.74			
Effective Minor Principal Stress at Failure, psi		17.57			
Effective Major Principal Stress at Failure, psi		73.32			
B-Value		---			

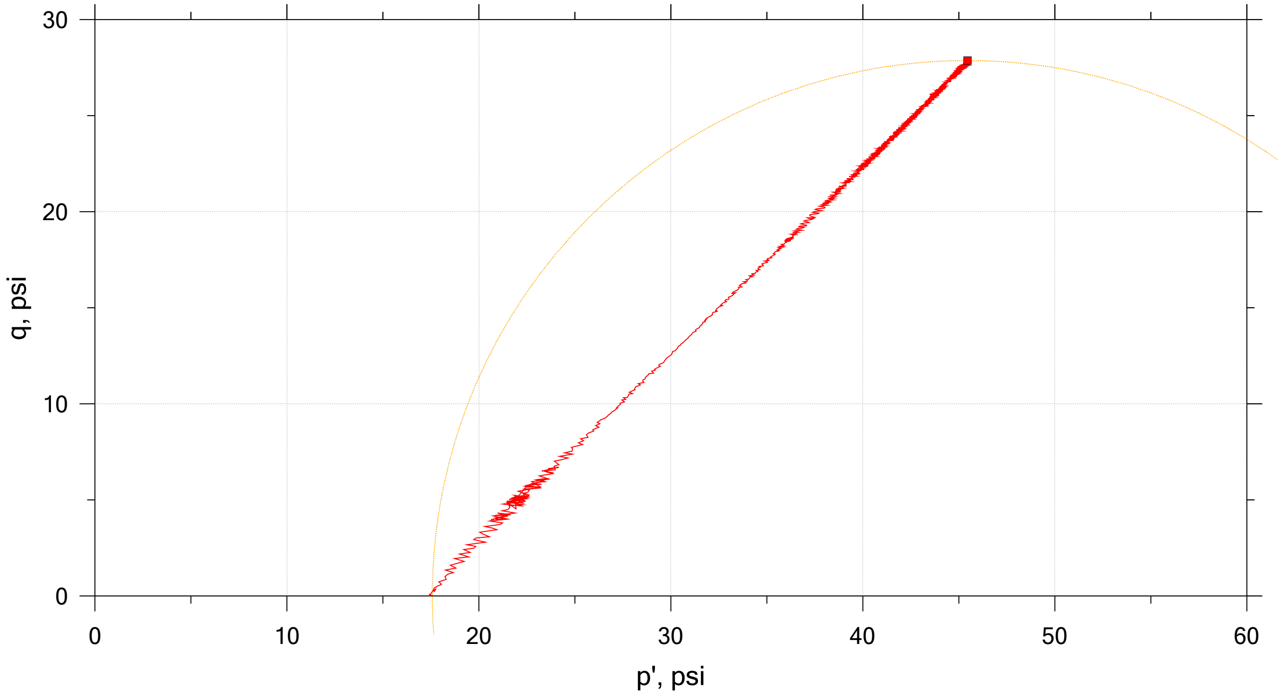
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 009	Test Date: 2/21/19	Depth: 21'
Test No.: 19-124	Sample Type: 2.5" shelby	Elevation:
Description: Silty Gravel		
Remarks: Unconsolidated Undrained		

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



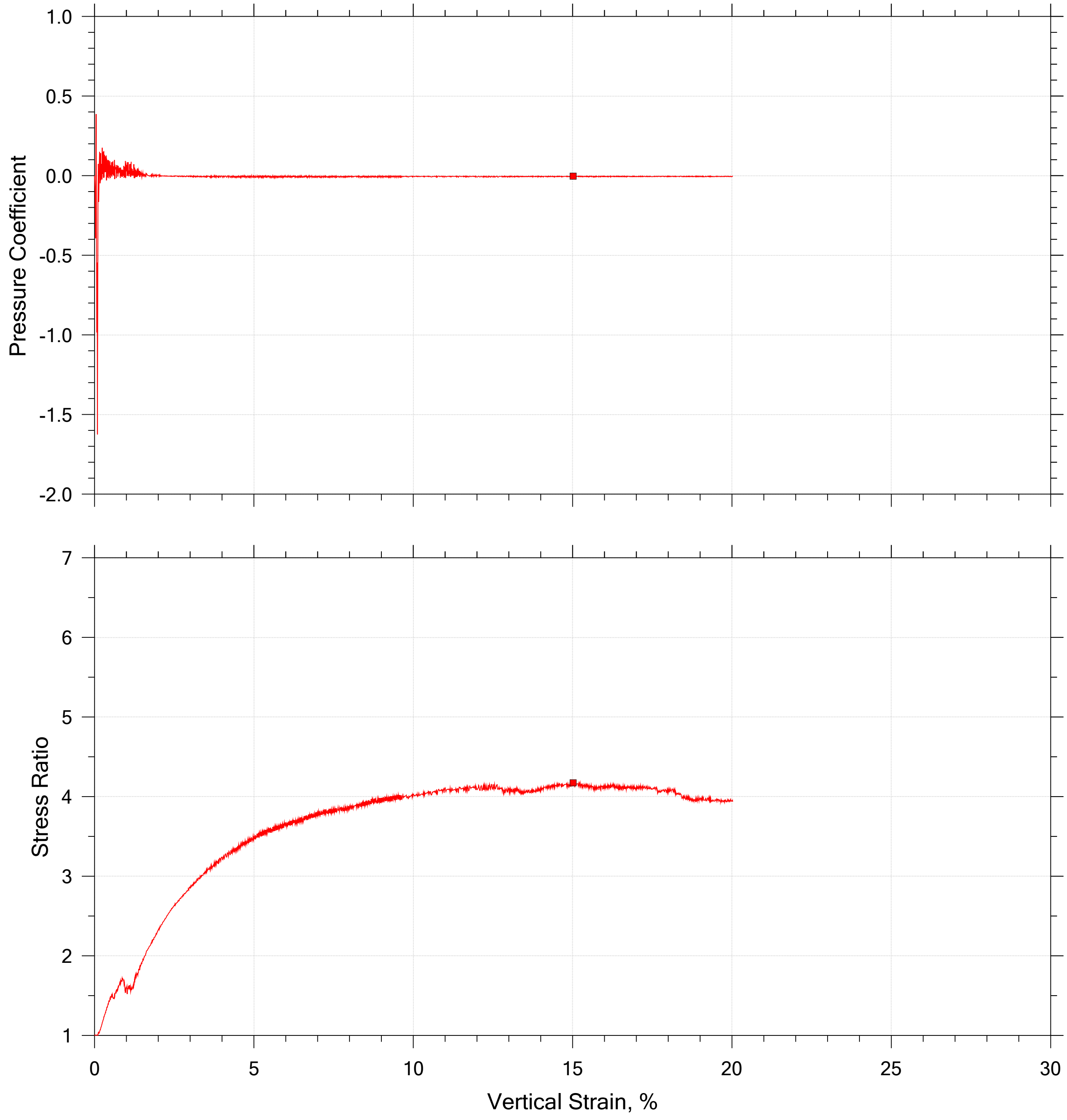




	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
🟥	009	19-124	21'	JMA	2/21/19			TX 19-124 Redwood Visitor ctr.dat

Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 009	Test Date: 2/21/19	Depth: 21'
Test No.: 19-124	Sample Type: 2.5" shelby	Elevation:
Description: Silty Gravel		
Remarks: Unconsolidated Undrained		

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
🟥	009	19-124	21'	JMA	2/21/19			TX 19-124 Redwood Visitor ctr.dat

Project: Redwood Visitor Center	Location: Orick	Project No.: 018015
Boring No.: R19	Tested By: JMA	Checked By:
Sample No.: 009	Test Date: 2/21/19	Depth: 21'
Test No.: 19-124	Sample Type: 2.5" shelby	Elevation:
Description: Silty Gravel		
Remarks: Unconsolidated Undrained		

Liquefaction Analyses Reports

4

SHN Engineers & Geologists
Eureka, CA

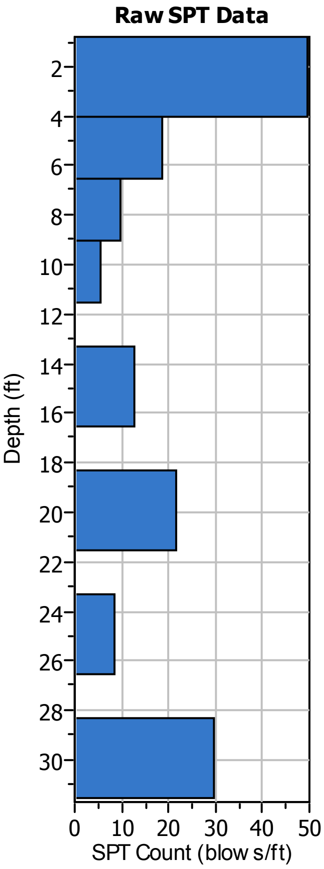
SPT BASED LIQUEFACTION ANALYSIS REPORT

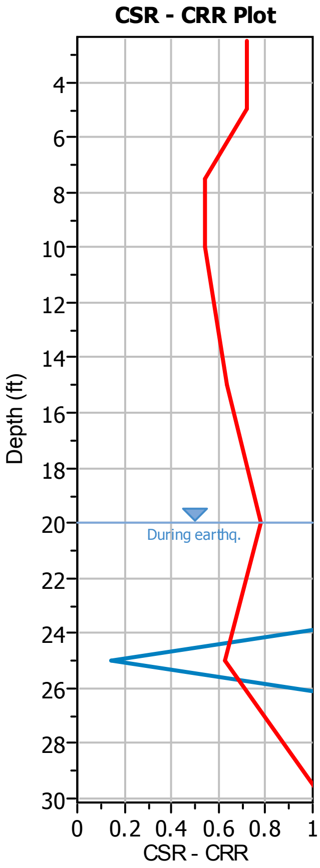
Project title : Redwood Visitor Center **SPT Name: R-19-001**

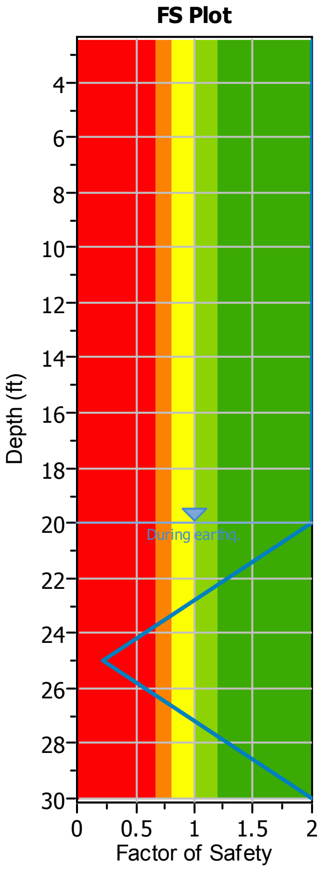
Location : Orick, CA

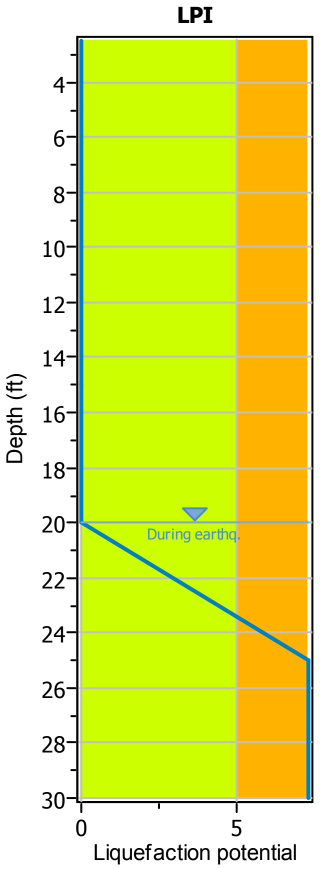
:: Input parameters and analysis properties ::

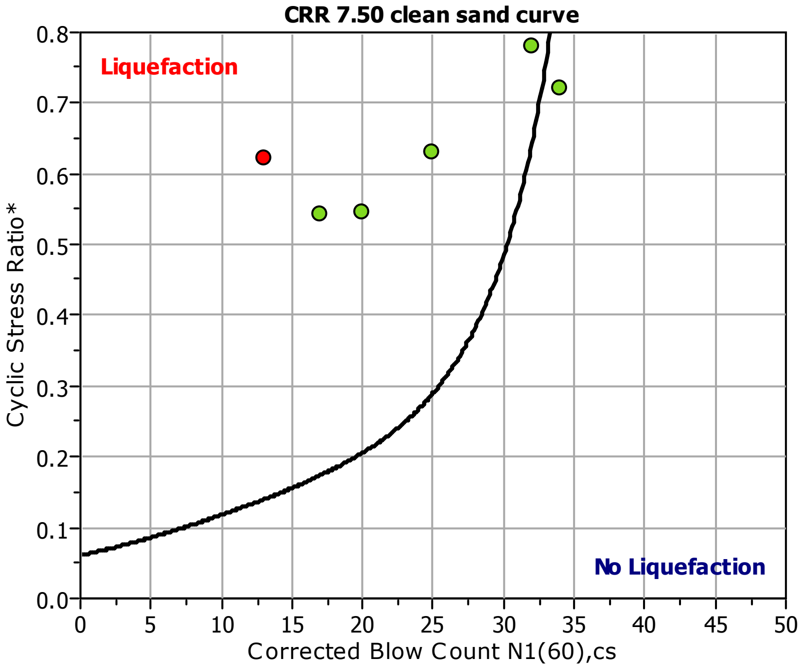
Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	20.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	20.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	8.50 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.79 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.30		











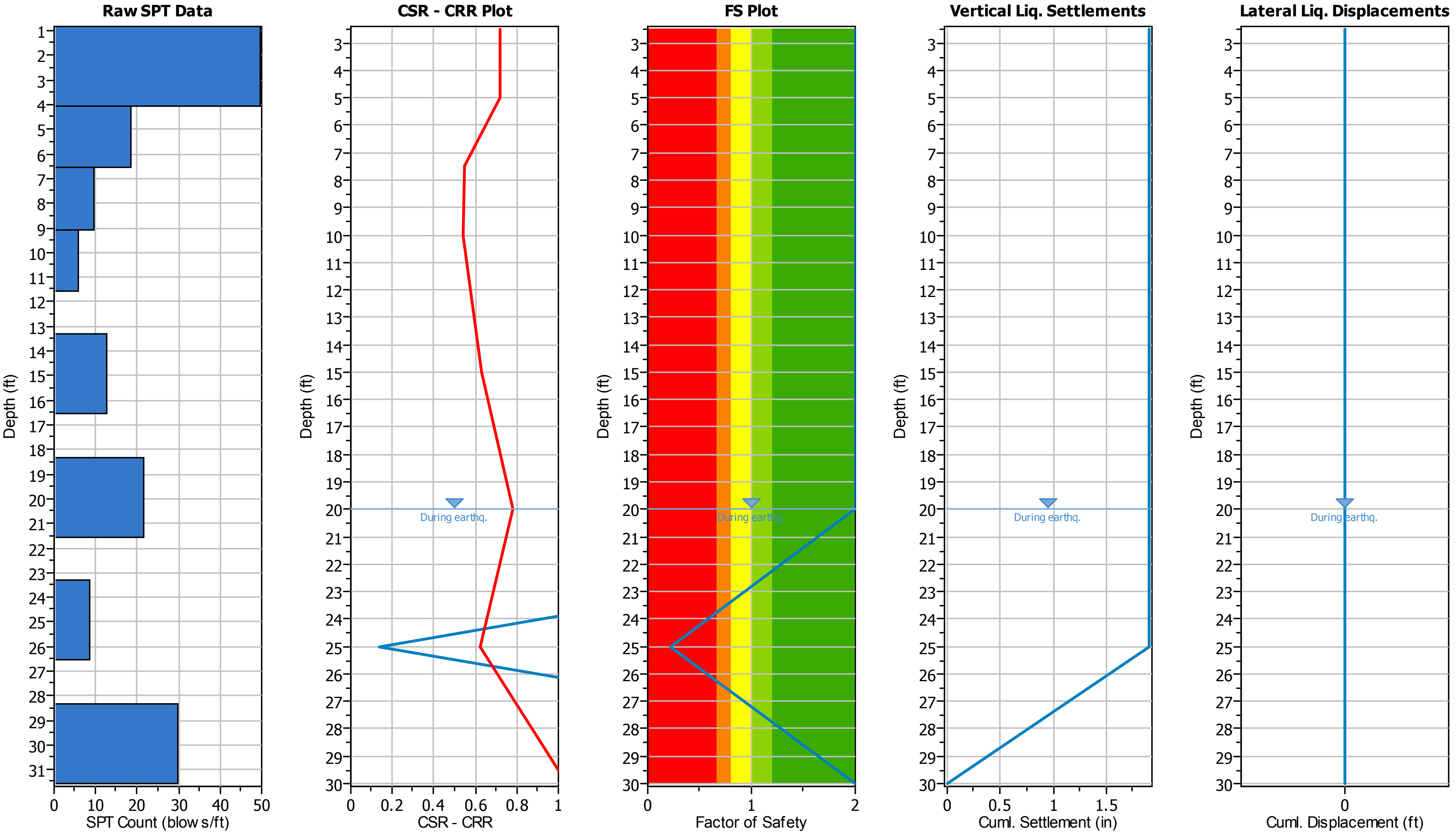
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



Project File: \\Eureka\Projects\2018\018015-OrickVisCen\Data\Geotechnical\LiquefactionAnalysis\LiqAnalysis.lsvs

:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	50	5.00	135.00	2.50	No
5.00	19	5.00	135.00	2.50	No
7.50	10	5.00	110.00	2.50	No
10.00	6	62.00	120.00	5.00	No
15.00	13	62.00	120.00	5.00	No
20.00	22	5.00	120.00	5.00	Yes
25.00	9	5.00	120.00	5.00	Yes
30.00	30	5.00	130.00	5.00	Yes

Abbreviations

Depth:	Depth at which test was performed (ft)
SPT Field Value:	Number of blows per foot
Fines Content:	Fines content at test depth (%)
Unit Weight:	Unit weight at test depth (pcf)
Infl. Thickness:	Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy:	User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	50	135.00	0.17	0.00	0.17	0.12	1.26	1.30	1.00	0.75	1.20	74	5.00	0.00	75	4.000
5.00	19	135.00	0.34	0.00	0.34	0.34	1.48	1.30	1.00	0.75	1.20	33	5.00	0.00	34	4.000
7.50	10	110.00	0.47	0.00	0.47	0.46	1.44	1.30	1.00	0.80	1.20	19	5.00	0.00	20	4.000
10.00	6	120.00	0.63	0.00	0.63	0.46	1.28	1.30	1.00	0.85	1.20	11	62.00	5.60	17	4.000
15.00	13	120.00	0.93	0.00	0.93	0.41	1.06	1.30	1.00	0.85	1.20	19	62.00	5.60	25	4.000
20.00	22	120.00	1.23	0.00	1.23	0.36	0.95	1.30	1.00	0.95	1.20	31	5.00	0.00	32	4.000
25.00	9	120.00	1.52	0.16	1.37	0.52	0.87	1.30	1.00	0.95	1.20	12	5.00	0.00	13	0.140
30.00	30	130.00	1.85	0.31	1.54	0.29	0.90	1.30	1.00	1.00	1.20	43	5.00	0.00	44	4.000

Abbreviations

σ_v:	Total stress during SPT test (tsf)
u_o:	Water pore pressure during SPT test (tsf)
σ'_{vo}:	Effective overburden pressure during SPT test (tsf)
m:	Stress exponent normalization factor
C_N:	Overburden corretion factor
C_E:	Energy correction factor
C_B:	Borehole diameter correction factor
C_R:	Rod length correction factor
C_S:	Liner correction factor
$N_{1(60)}$:	Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$	Equivalent clean sand adjustment
$N_{1(60)cs}$:	Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$:	Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.50	135.00	0.17	0.00	0.17	1.00	0.515	2.20	75	0.65	0.795	1.10	0.722	2.000	●
5.00	135.00	0.34	0.00	0.34	1.00	0.514	2.20	34	0.65	0.793	1.10	0.721	2.000	●
7.50	110.00	0.47	0.00	0.47	1.00	0.513	1.49	20	0.86	0.600	1.10	0.545	2.000	●
10.00	120.00	0.63	0.00	0.63	1.00	0.512	1.38	17	0.89	0.576	1.06	0.542	2.000	●
15.00	120.00	0.93	0.00	0.93	0.99	0.509	1.72	25	0.79	0.646	1.02	0.632	2.000	●

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
20.00	120.00	1.23	0.00	1.23	0.99	0.506	2.12	32	0.67	0.754	0.97	0.780	2.000	🟢
25.00	120.00	1.52	0.16	1.37	0.98	0.560	1.26	13	0.92	0.606	0.97	0.623	0.225	🔴
30.00	130.00	1.85	0.31	1.54	0.97	0.600	2.20	44	0.65	0.926	0.89	1.041	2.000	🟢

Abbreviations

$\sigma_{v,eq}$:	Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$:	Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$:	Effective overburden pressure, during earthquake (tsf)
r_d :	Nonlinear shear mass factor
CSR :	Cyclic Stress Ratio
MSF :	Magnitude Scaling Factor
$CSR_{eq,M=7.5}$:	CSR adjusted for M=7.5
K_{sigma}:	Effective overburden stress factor
CSR^*:	CSR fully adjusted
FS:	Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00
7.50	2.000	0.00	8.86	2.50	0.00
10.00	2.000	0.00	8.48	2.50	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	0.225	0.78	6.19	5.00	7.31
30.00	2.000	0.00	5.43	5.00	0.00

Overall potential I_L : 7.31

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

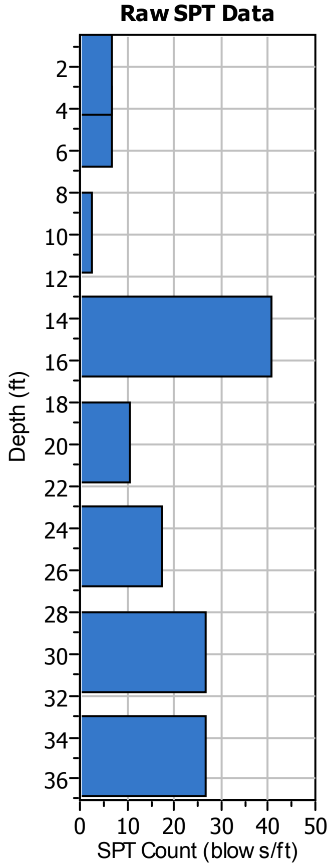
SPT BASED LIQUEFACTION ANALYSIS REPORT

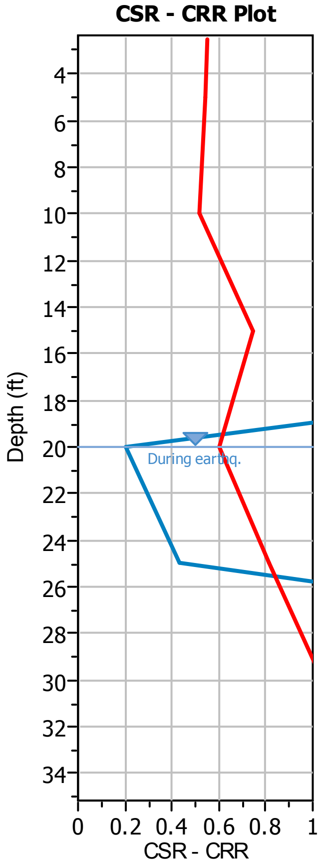
Project title : Redwood Visitor Center **SPT Name: R-19-002**

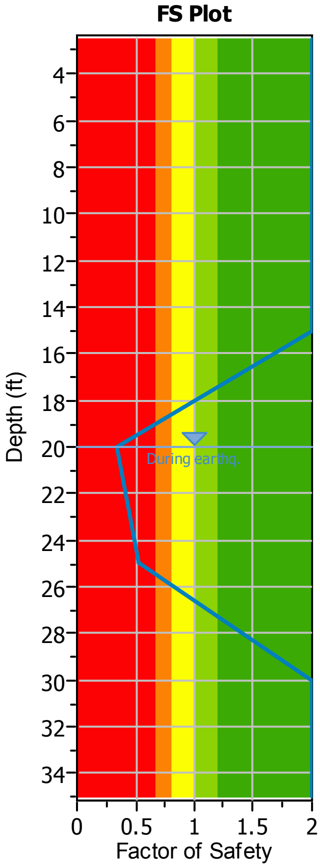
Location : Orick, CA

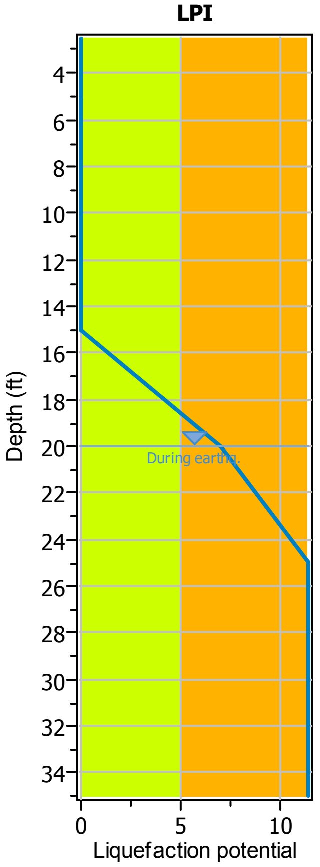
:: Input parameters and analysis properties ::

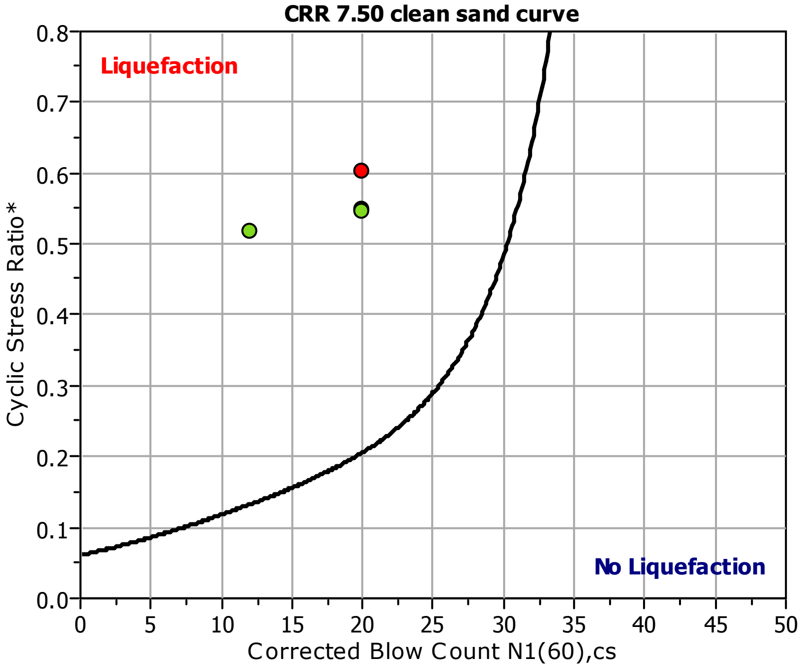
Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	20.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	20.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	8.50 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.79 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.30		


Raw SPT Data


CSR - CRR Plot


FS Plot


LPI


CRR 7.50 clean sand curve

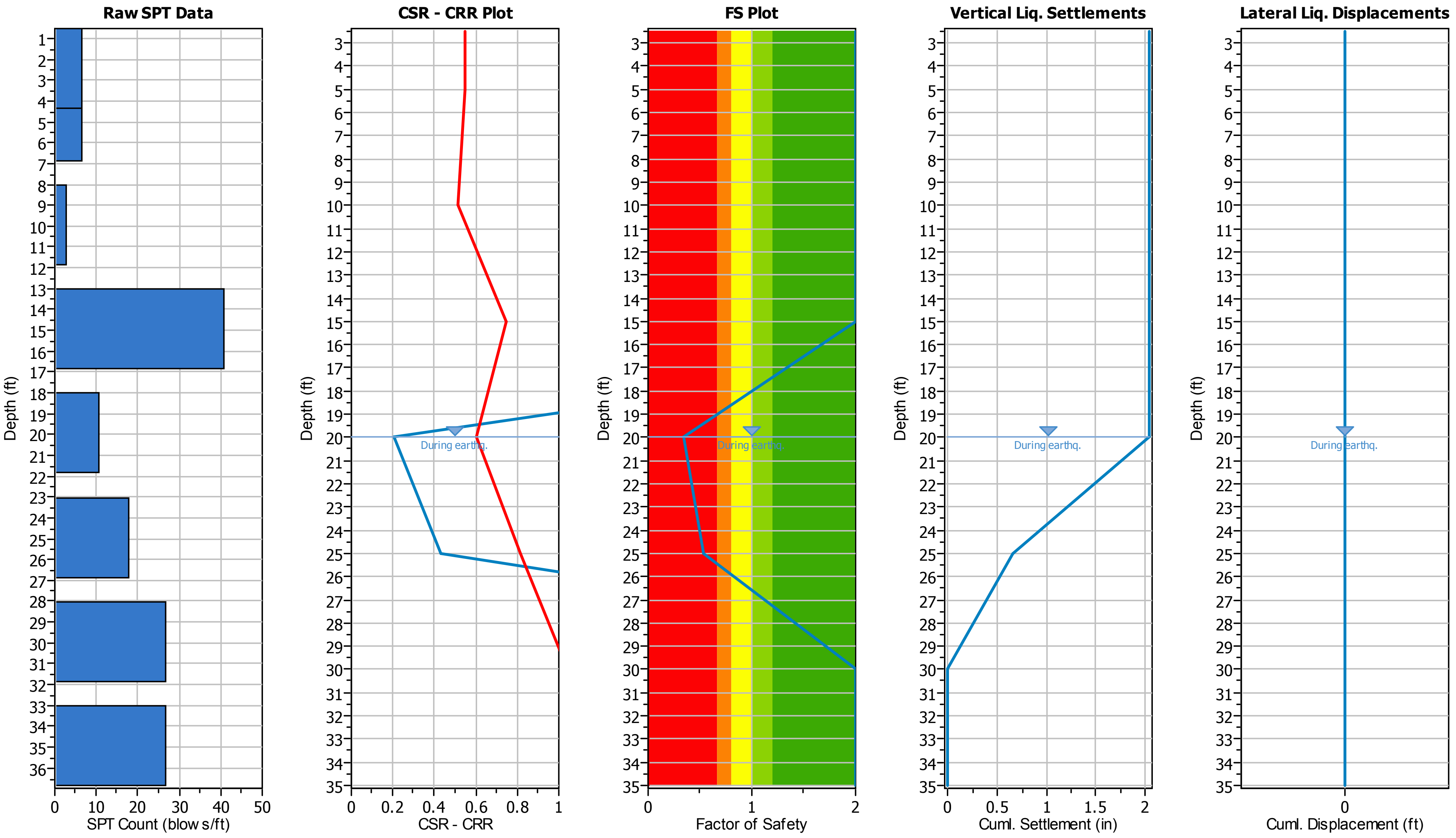
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	7	80.00	110.00	2.50	No
5.00	7	34.00	110.00	5.00	No
10.00	3	66.00	110.00	5.00	No
15.00	41	15.00	130.00	5.00	No
20.00	11	15.00	130.00	5.00	Yes
25.00	18	15.00	130.00	5.00	Yes
30.00	27	5.00	125.00	5.00	Yes
35.00	27	5.00	125.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	7	110.00	0.14	0.00	0.14	0.41	1.70	1.30	1.00	0.75	1.20	14	80.00	5.54	20	4.000
5.00	7	110.00	0.28	0.00	0.28	0.41	1.70	1.30	1.00	0.75	1.20	14	34.00	5.49	20	4.000
10.00	3	110.00	0.55	0.00	0.55	0.50	1.39	1.30	1.00	0.85	1.20	6	66.00	5.59	12	4.000
15.00	41	130.00	0.88	0.00	0.88	0.19	1.04	1.30	1.00	0.85	1.20	57	15.00	3.26	61	4.000
20.00	11	130.00	1.20	0.00	1.20	0.45	0.94	1.30	1.00	0.95	1.20	16	15.00	3.26	20	0.206
25.00	18	130.00	1.52	0.16	1.37	0.38	0.91	1.30	1.00	0.95	1.20	25	15.00	3.26	29	0.429
30.00	27	125.00	1.84	0.31	1.53	0.31	0.89	1.30	1.00	1.00	1.20	38	5.00	0.00	39	4.000
35.00	27	125.00	2.15	0.47	1.68	0.32	0.86	1.30	1.00	1.00	1.20	37	5.00	0.00	38	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
m: Stress exponent normalization factor
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$ Equivalent clean sand adjustment
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.50	110.00	0.14	0.00	0.14	1.00	0.515	1.49	20	0.86	0.602	1.10	0.547	2.000	🟢
5.00	110.00	0.28	0.00	0.28	1.00	0.514	1.49	20	0.86	0.601	1.10	0.546	2.000	🟢
10.00	110.00	0.55	0.00	0.55	1.00	0.512	1.24	12	0.93	0.550	1.06	0.516	2.000	🟢
15.00	130.00	0.88	0.00	0.88	0.99	0.509	2.20	61	0.65	0.786	1.06	0.744	2.000	🟢
20.00	130.00	1.20	0.00	1.20	0.99	0.506	1.49	20	0.86	0.592	0.98	0.602	0.342	🔴

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
25.00	130.00	1.52	0.16	1.37	0.98	0.560	1.94	29	0.73	0.772	0.95	0.813	0.528	🔴
30.00	125.00	1.84	0.31	1.53	0.97	0.601	2.20	39	0.65	0.927	0.89	1.039	2.000	🟢
35.00	125.00	2.15	0.47	1.68	0.96	0.632	2.20	38	0.65	0.975	0.86	1.130	2.000	🟢

Abbreviations

$\sigma_{v,eq}$:	Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$:	Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$:	Effective overburden pressure, during earthquake (tsf)
r_d :	Nonlinear shear mass factor
CSR :	Cyclic Stress Ratio
MSF :	Magnitude Scaling Factor
$CSR_{eq,M=7.5}$:	CSR adjusted for M=7.5
K_{sigma}:	Effective overburden stress factor
CSR^*:	CSR fully adjusted
FS:	Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	0.342	0.66	6.95	5.00	6.97
25.00	0.528	0.47	6.19	5.00	4.46
30.00	2.000	0.00	5.43	5.00	0.00
35.00	2.000	0.00	4.67	5.00	0.00

Overall potential I_L : 11.43

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

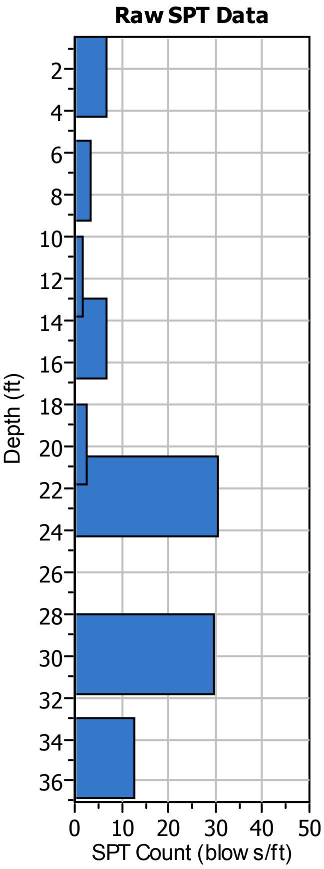
SPT BASED LIQUEFACTION ANALYSIS REPORT

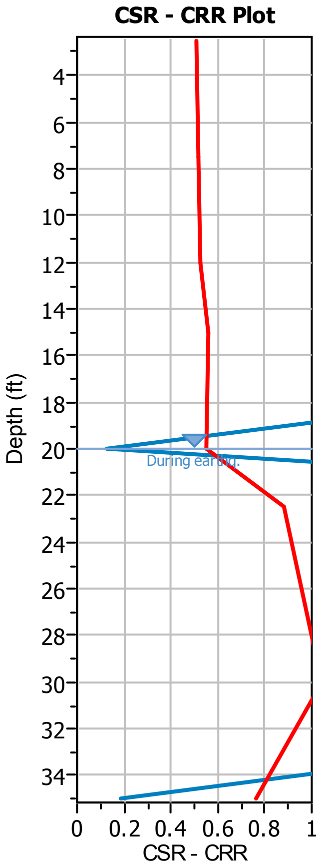
Project title : Redwood Visitor Center **SPT Name: R-19-003**

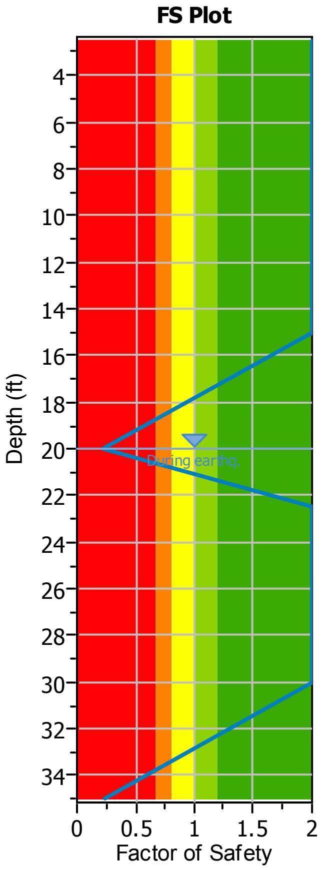
Location : Orick, CA

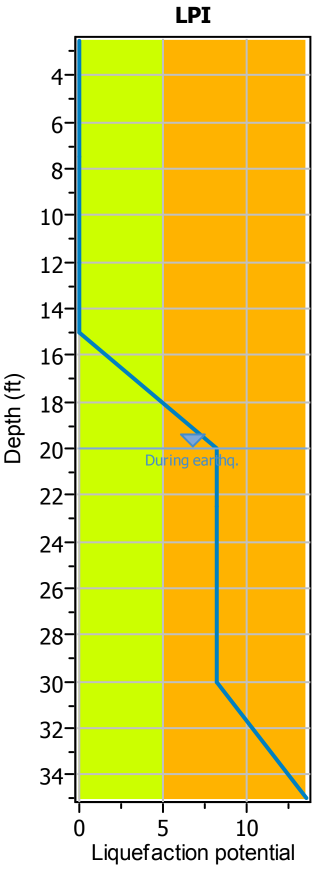
:: Input parameters and analysis properties ::

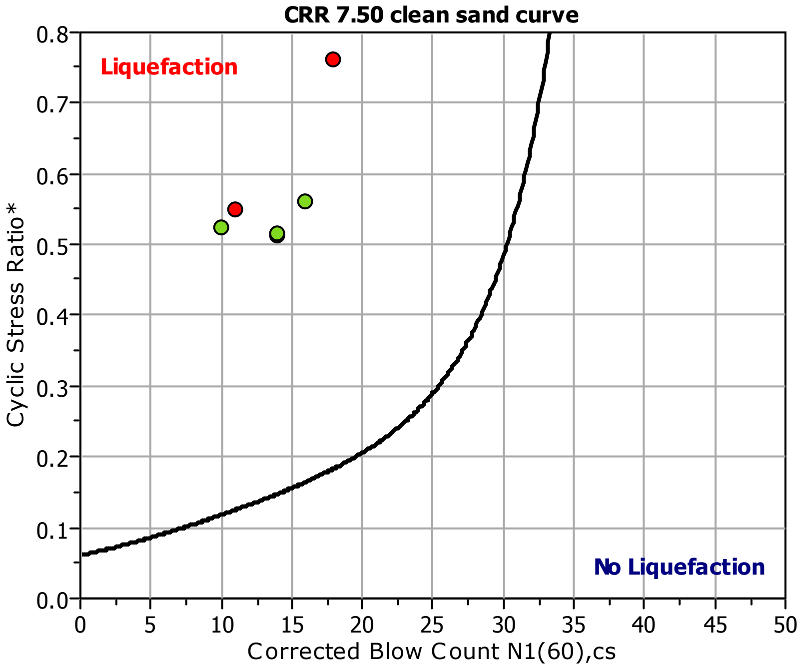
Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	20.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	20.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	8.50 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.79 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.30		











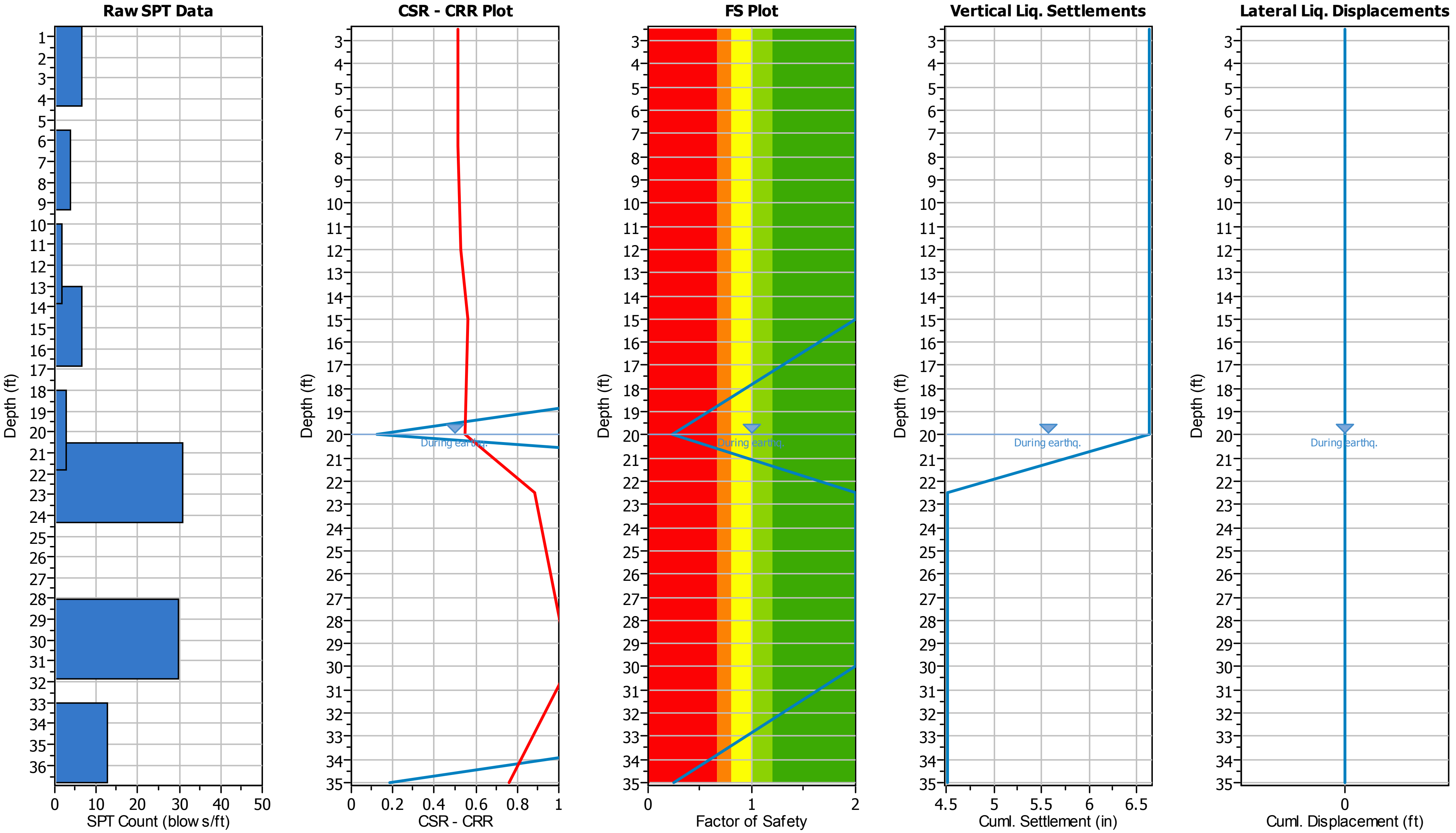
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	7	0.00	125.00	5.00	No
7.50	4	82.00	124.00	4.50	No
12.00	2	82.00	124.00	3.00	No
15.00	7	82.00	124.00	5.00	No
20.00	3	82.00	124.00	5.00	Yes
22.50	31	9.00	130.00	5.00	No
30.00	30	9.00	130.00	5.00	No
35.00	13	9.00	130.00	15.00	Yes

Abbreviations

Depth:	Depth at which test was performed (ft)
SPT Field Value:	Number of blows per foot
Fines Content:	Fines content at test depth (%)
Unit Weight:	Unit weight at test depth (pcf)
Infl. Thickness:	Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy:	User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	7	125.00	0.16	0.00	0.16	0.50	1.70	1.30	1.00	0.75	1.20	14	0.00	0.00	14	4.000
7.50	4	124.00	0.47	0.00	0.47	0.48	1.48	1.30	1.00	0.80	1.20	8	82.00	5.54	14	4.000
12.00	2	124.00	0.75	0.00	0.75	0.54	1.21	1.30	1.00	0.85	1.20	4	82.00	5.54	10	4.000
15.00	7	124.00	0.93	0.00	0.93	0.48	1.06	1.30	1.00	0.85	1.20	10	82.00	5.54	16	4.000
20.00	3	124.00	1.24	0.00	1.24	0.55	0.92	1.30	1.00	0.95	1.20	5	82.00	5.54	11	0.125
22.50	31	130.00	1.40	0.08	1.33	0.28	0.94	1.30	1.00	0.95	1.20	44	9.00	0.72	45	4.000
30.00	30	130.00	1.89	0.31	1.58	0.28	0.89	1.30	1.00	1.00	1.20	42	9.00	0.72	43	4.000
35.00	13	130.00	2.22	0.47	1.75	0.47	0.79	1.30	1.00	1.00	1.20	17	9.00	0.72	18	0.184

Abbreviations

σ_v:	Total stress during SPT test (tsf)
u_o:	Water pore pressure during SPT test (tsf)
σ'_{vo}:	Effective overburden pressure during SPT test (tsf)
m:	Stress exponent normalization factor
C_N:	Overburden corretion factor
C_E:	Energy correction factor
C_B:	Borehole diameter correction factor
C_R:	Rod length correction factor
C_S:	Liner correction factor
$N_{1(60)}$:	Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$	Equivalent clean sand adjustment
$N_{1(60)cs}$:	Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$:	Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.50	125.00	0.16	0.00	0.16	1.00	0.515	1.29	14	0.92	0.563	1.10	0.511	2.000	🟢
7.50	124.00	0.47	0.00	0.47	1.00	0.513	1.29	14	0.92	0.560	1.09	0.515	2.000	🟢
12.00	124.00	0.75	0.00	0.75	1.00	0.511	1.19	10	0.94	0.541	1.03	0.524	2.000	🟢
15.00	124.00	0.93	0.00	0.93	0.99	0.509	1.35	16	0.90	0.567	1.01	0.559	2.000	🟢
20.00	124.00	1.24	0.00	1.24	0.99	0.506	1.21	11	0.94	0.540	0.98	0.548	0.228	🔴

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
22.50	130.00	1.40	0.08	1.33	0.98	0.534	2.20	45	0.65	0.824	0.93	0.883	2.000	🟢
30.00	130.00	1.89	0.31	1.58	0.97	0.598	2.20	43	0.65	0.922	0.88	1.045	2.000	🟢
35.00	130.00	2.22	0.47	1.75	0.96	0.627	1.42	18	0.88	0.714	0.94	0.762	0.241	🔴

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
CSR : Cyclic Stress Ratio
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted
FS: Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	5.00	0.00
7.50	2.000	0.00	8.86	5.00	0.00
12.00	2.000	0.00	8.17	4.50	0.00
15.00	2.000	0.00	7.71	3.00	0.00
20.00	0.228	0.77	6.95	5.00	8.18
22.50	2.000	0.00	6.57	2.50	0.00
30.00	2.000	0.00	5.43	7.50	0.00
35.00	0.241	0.76	4.67	5.00	5.40

Overall potential I_L : 13.57

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

GEOLOGISMIKI
Geotechnical Software

SHN Engineers & Geologists
Eureka, CA

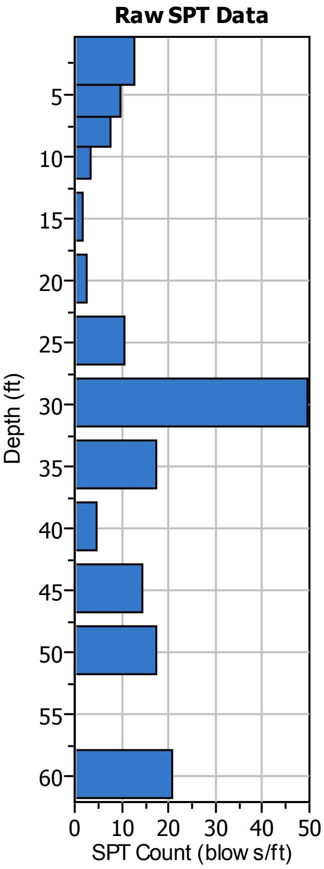
SPT BASED LIQUEFACTION ANALYSIS REPORT

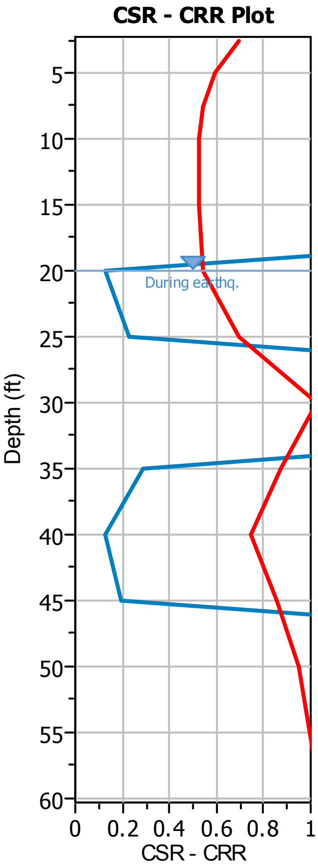
Project title : Redwood Visitor Center **SPT Name: R-19-004**

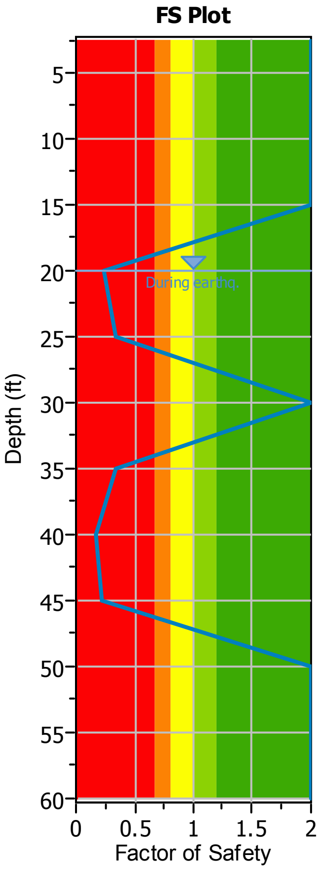
Location : Orick, CA

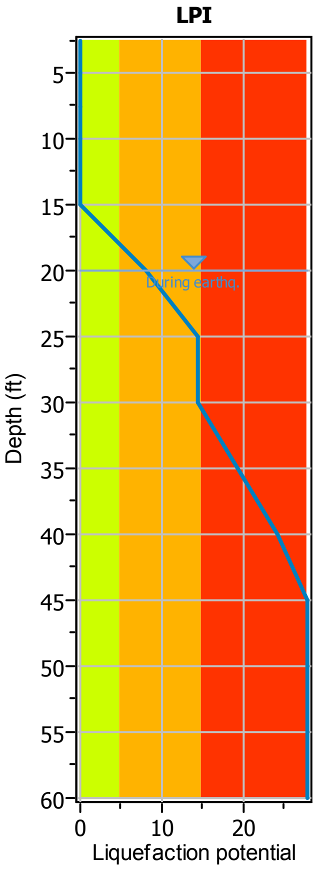
:: Input parameters and analysis properties ::

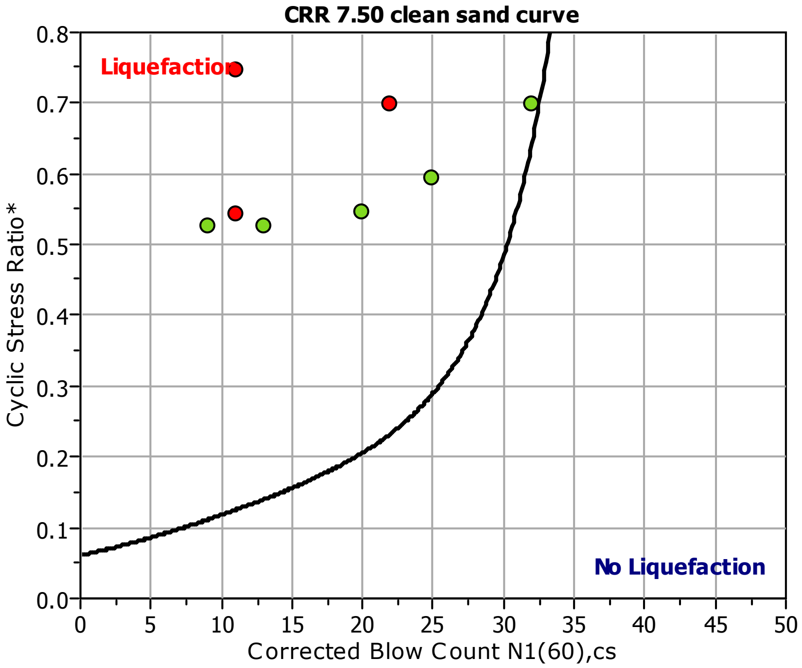
Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	20.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	20.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	8.50 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.79 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.30		







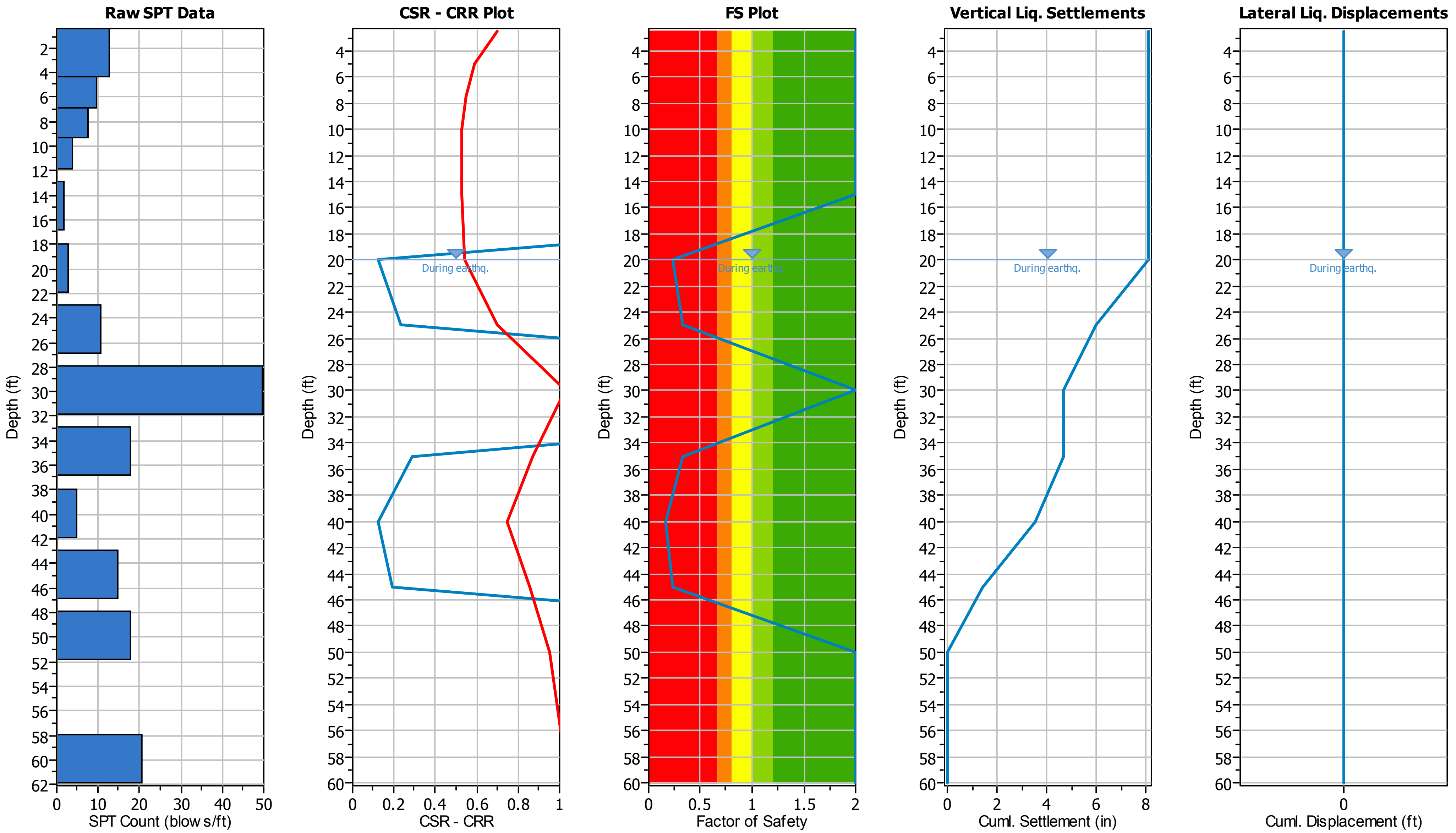




F.S. color scheme
- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme
- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	13	50.00	135.00	2.50	No
5.00	10	50.00	135.00	2.50	No
7.50	8	50.00	125.00	2.50	No
10.00	4	90.00	100.00	5.00	No
15.00	2	90.00	100.00	5.00	No
20.00	3	80.00	100.00	5.00	Yes
25.00	11	70.00	110.00	5.00	Yes
30.00	50	5.00	130.00	5.00	No
35.00	18	5.00	130.00	5.00	Yes
40.00	5	24.00	120.00	5.00	Yes
45.00	15	5.00	125.00	5.00	Yes
50.00	18	8.00	125.00	10.00	No
60.00	21	8.00	125.00	5.00	No

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	13	135.00	0.17	0.00	0.17	0.33	1.70	1.30	1.00	0.75	1.20	26	50.00	5.61	32	4.000
5.00	10	135.00	0.34	0.00	0.34	0.39	1.55	1.30	1.00	0.75	1.20	19	50.00	5.61	25	4.000
7.50	8	125.00	0.49	0.00	0.49	0.43	1.38	1.30	1.00	0.80	1.20	14	50.00	5.61	20	4.000
10.00	4	100.00	0.62	0.00	0.62	0.50	1.30	1.30	1.00	0.85	1.20	7	90.00	5.51	13	4.000
15.00	2	100.00	0.87	0.00	0.87	0.55	1.12	1.30	1.00	0.85	1.20	3	90.00	5.51	9	4.000
20.00	3	100.00	1.12	0.00	1.12	0.54	0.97	1.30	1.00	0.95	1.20	5	80.00	5.54	11	0.125
25.00	11	110.00	1.39	0.16	1.24	0.44	0.93	1.30	1.00	0.95	1.20	16	70.00	5.57	22	0.233
30.00	50	130.00	1.72	0.31	1.41	0.12	0.97	1.30	1.00	1.00	1.20	76	5.00	0.00	77	4.000
35.00	18	130.00	2.04	0.47	1.58	0.41	0.85	1.30	1.00	1.00	1.20	24	5.00	0.00	25	0.290
40.00	5	120.00	2.34	0.62	1.72	0.54	0.77	1.30	1.00	1.00	1.20	6	24.00	4.98	11	0.125
45.00	15	125.00	2.66	0.78	1.88	0.46	0.77	1.30	1.00	1.00	1.20	18	5.00	0.00	19	0.194
50.00	18	125.00	2.97	0.94	2.03	0.43	0.76	1.30	1.00	1.00	1.20	22	8.00	0.37	23	4.000
60.00	21	125.00	3.59	1.25	2.35	0.41	0.72	1.30	1.00	1.00	1.20	24	8.00	0.37	25	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
m: Stress exponent normalization factor
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$ Equivalent clean sand adjustment
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.50	135.00	0.17	0.00	0.17	1.00	0.515	2.12	32	0.67	0.768	1.10	0.698	2.000	🟢
5.00	135.00	0.34	0.00	0.34	1.00	0.514	1.72	25	0.79	0.652	1.10	0.592	2.000	🟢
7.50	125.00	0.49	0.00	0.49	1.00	0.513	1.49	20	0.86	0.600	1.10	0.545	2.000	🟢
10.00	100.00	0.62	0.00	0.62	1.00	0.512	1.26	13	0.92	0.554	1.06	0.525	2.000	🟢
15.00	100.00	0.87	0.00	0.87	0.99	0.509	1.17	9	0.95	0.536	1.02	0.527	2.000	🟢
20.00	100.00	1.12	0.00	1.12	0.99	0.506	1.21	11	0.94	0.540	0.99	0.543	0.231	🔴
25.00	110.00	1.39	0.16	1.24	0.98	0.566	1.58	22	0.83	0.682	0.98	0.697	0.334	🔴
30.00	130.00	1.72	0.31	1.41	0.97	0.610	2.20	77	0.65	0.940	0.92	1.027	2.000	🟢
35.00	130.00	2.04	0.47	1.58	0.96	0.642	1.72	25	0.79	0.813	0.94	0.869	0.334	🔴
40.00	120.00	2.34	0.62	1.72	0.95	0.668	1.21	11	0.94	0.712	0.95	0.747	0.168	🔴
45.00	125.00	2.66	0.78	1.88	0.94	0.686	1.45	19	0.87	0.792	0.93	0.854	0.227	🔴
50.00	125.00	2.97	0.94	2.03	0.93	0.700	1.62	23	0.82	0.856	0.90	0.949	2.000	🟢
60.00	125.00	3.59	1.25	2.35	0.91	0.715	1.72	25	0.79	0.906	0.87	1.041	2.000	🟢

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
CSR : Cyclic Stress Ratio
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted
FS: Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00
7.50	2.000	0.00	8.86	2.50	0.00
10.00	2.000	0.00	8.48	2.50	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	0.231	0.77	6.95	5.00	8.15
25.00	0.334	0.67	6.19	5.00	6.28
30.00	2.000	0.00	5.43	5.00	0.00
35.00	0.334	0.67	4.67	5.00	4.74
40.00	0.168	0.83	3.90	5.00	4.95
45.00	0.227	0.77	3.14	5.00	3.70
50.00	2.000	0.00	2.38	5.00	0.00
60.00	2.000	0.00	0.86	10.00	0.00

Overall potential I_L : 27.82

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

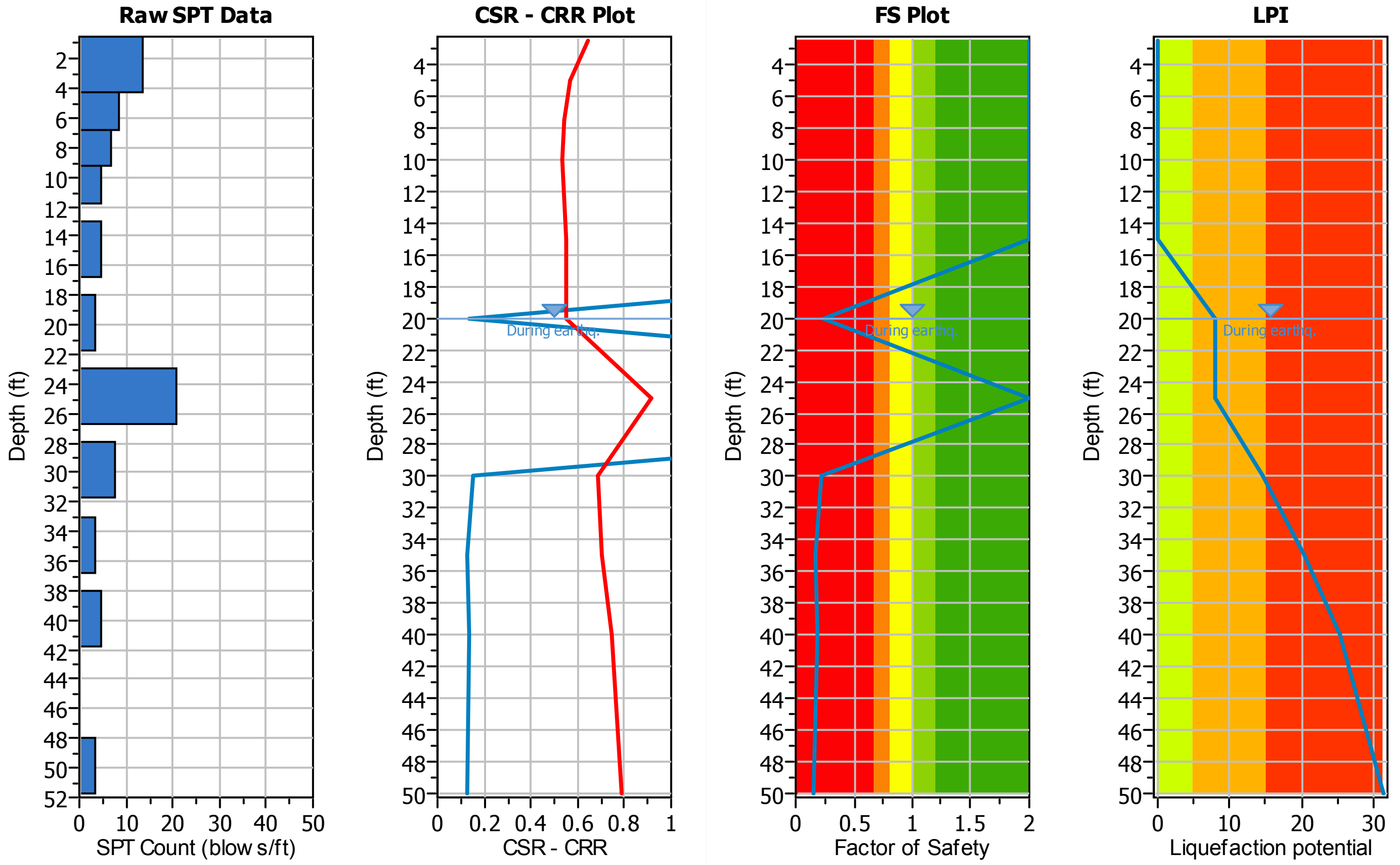
SPT BASED LIQUEFACTION ANALYSIS REPORT

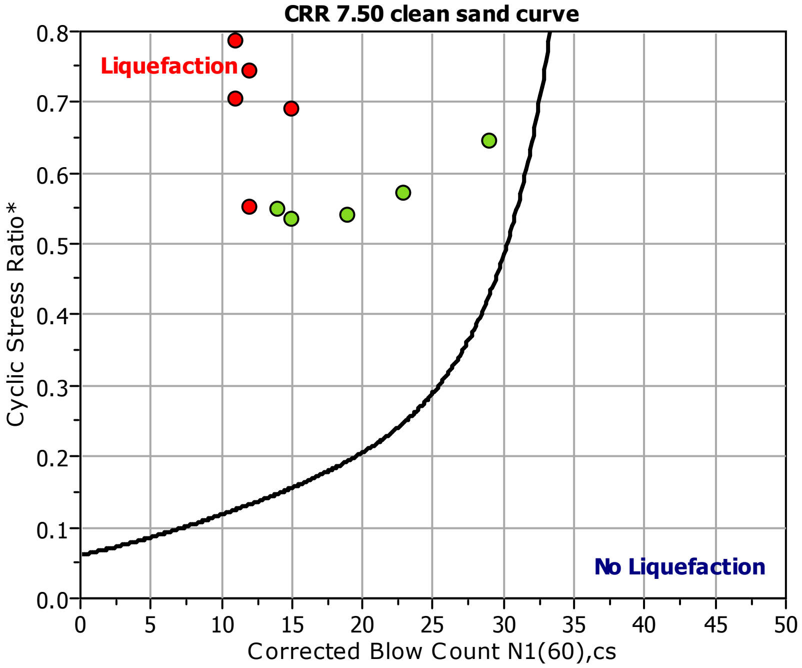
Project title : Redwood Visitor Center **SPT Name: R-19-005**

Location : Orick, CA

:: Input parameters and analysis properties ::

Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	20.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	20.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	8.50 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.79 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.30		





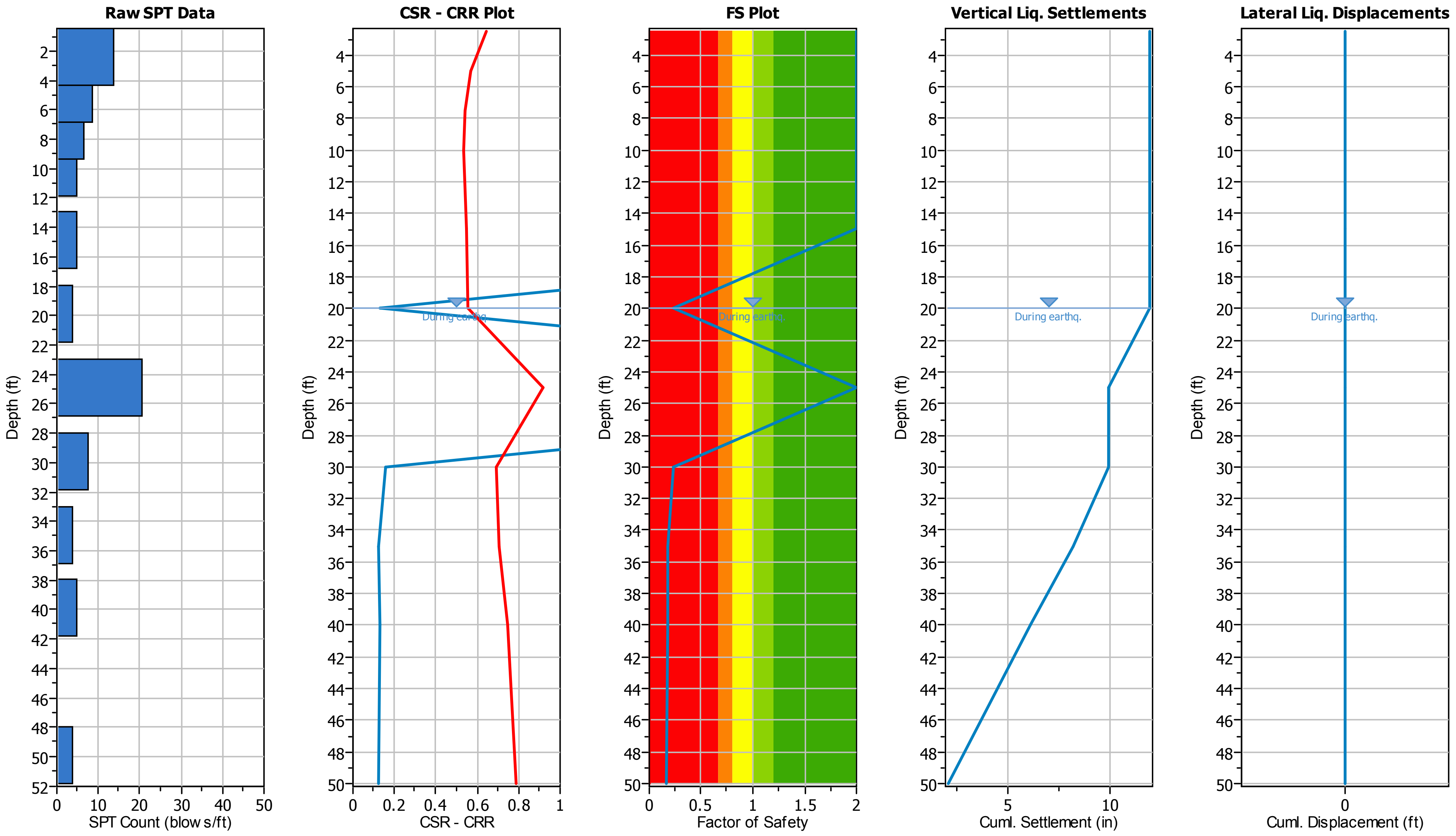
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	14	5.00	135.00	2.50	No
5.00	9	50.00	130.00	2.50	No
7.50	7	50.00	130.00	2.50	No
10.00	5	60.00	120.00	5.00	No
15.00	5	60.00	120.00	5.00	No
20.00	4	64.00	120.00	5.00	Yes
25.00	21	15.00	130.00	5.00	No
30.00	8	15.00	130.00	5.00	Yes
35.00	4	75.00	120.00	5.00	Yes
40.00	5	75.00	120.00	10.00	Yes
50.00	4	75.00	120.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	14	135.00	0.17	0.00	0.17	0.38	1.70	1.30	1.00	0.75	1.20	28	5.00	0.00	29	4.000
5.00	9	130.00	0.33	0.00	0.33	0.40	1.58	1.30	1.00	0.75	1.20	17	50.00	5.61	23	4.000
7.50	7	130.00	0.49	0.00	0.49	0.44	1.40	1.30	1.00	0.80	1.20	13	50.00	5.61	19	4.000
10.00	5	120.00	0.64	0.00	0.64	0.48	1.27	1.30	1.00	0.85	1.20	9	60.00	5.60	15	4.000
15.00	5	120.00	0.94	0.00	0.94	0.51	1.06	1.30	1.00	0.85	1.20	8	60.00	5.60	14	4.000
20.00	4	120.00	1.24	0.00	1.24	0.53	0.92	1.30	1.00	0.95	1.20	6	64.00	5.59	12	0.132
25.00	21	130.00	1.57	0.16	1.41	0.36	0.90	1.30	1.00	0.95	1.20	29	15.00	3.26	33	4.000
30.00	8	130.00	1.89	0.31	1.58	0.51	0.81	1.30	1.00	1.00	1.20	11	15.00	3.26	15	0.156
35.00	4	120.00	2.19	0.47	1.73	0.55	0.76	1.30	1.00	1.00	1.20	5	75.00	5.56	11	0.125
40.00	5	120.00	2.49	0.62	1.87	0.54	0.73	1.30	1.00	1.00	1.20	6	75.00	5.56	12	0.132
50.00	4	120.00	3.09	0.94	2.16	0.57	0.67	1.30	1.00	1.00	1.20	5	75.00	5.56	11	0.125

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
m: Stress exponent normalization factor
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$ Equivalent clean sand adjustment
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.50	135.00	0.17	0.00	0.17	1.00	0.515	1.94	29	0.73	0.710	1.10	0.646	2.000	🟢
5.00	130.00	0.33	0.00	0.33	1.00	0.514	1.62	23	0.82	0.629	1.10	0.572	2.000	🟢
7.50	130.00	0.49	0.00	0.49	1.00	0.513	1.45	19	0.87	0.592	1.10	0.539	2.000	🟢
10.00	120.00	0.64	0.00	0.64	1.00	0.512	1.32	15	0.91	0.564	1.06	0.535	2.000	🟢
15.00	120.00	0.94	0.00	0.94	0.99	0.509	1.29	14	0.92	0.556	1.01	0.549	2.000	🟢
20.00	120.00	1.24	0.00	1.24	0.99	0.506	1.24	12	0.93	0.544	0.98	0.553	0.240	🔴
25.00	130.00	1.57	0.16	1.41	0.98	0.558	2.19	33	0.65	0.856	0.93	0.919	2.000	🟢
30.00	130.00	1.89	0.31	1.58	0.97	0.597	1.32	15	0.91	0.659	0.96	0.689	0.227	🔴
35.00	120.00	2.19	0.47	1.73	0.96	0.629	1.21	11	0.94	0.670	0.95	0.703	0.178	🔴
40.00	120.00	2.49	0.62	1.87	0.95	0.653	1.24	12	0.93	0.702	0.94	0.744	0.178	🔴
50.00	120.00	3.09	0.94	2.16	0.93	0.687	1.21	11	0.94	0.732	0.93	0.786	0.159	🔴

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
CSR : Cyclic Stress Ratio
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted
FS: Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00
7.50	2.000	0.00	8.86	2.50	0.00
10.00	2.000	0.00	8.48	2.50	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	0.240	0.76	6.95	5.00	8.06
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.227	0.77	5.43	5.00	6.40
35.00	0.178	0.82	4.67	5.00	5.85
40.00	0.178	0.82	3.90	5.00	4.89
50.00	0.159	0.84	2.38	10.00	6.10

Overall potential I_L : 31.29

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

Eureka, CA | Arcata, CA | Redding, CA | Willits, CA | Coos Bay, OR | Klamath Falls, OR

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Appendix K – Overview of Historic and Existing Conditions Influencing Channel and Floodplain Morphology and Function, Hydrology and Water Quality at the Redwood National and State Park Visitor Center and Restoration Project (Draft), NHE 2019a

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Engineering – Hydrology – Stream Restoration – Water Resources

DRAFT - TECHNICAL MEMORANDUM

Date: 8 July 2019

To: Jessica Carter
Director of Parks and Public Engagement
111 Sutter Street, 11th Floor
San Francisco, CA 94104

From: Jeffrey K. Anderson, P.E., C50713
Bonnie Pryor, Brian Draeger

Re: Draft – Overview of Historic and Existing Site Conditions Influencing Channel and Floodplain Morphology and Function, Hydrology and Water Quality at the Redwood National and State Park Visitor Center and Restoration Project Area, Orick, CA

INTRODUCTION AND BACKGROUND

This draft technical memorandum provides existing condition information regarding background conditions and monitoring results for specific site conditions and physical processes at the Orick Mill Site property (Figure 1) currently owned by Save the Redwoods League (League). The property is currently undergoing planning, design and compliance efforts to support the Redwood National and State Park Visitor Center and Restoration Project (Project). This information is provided to support CEQA and will ultimately be compiled into a design report for the Project restoration elements. The specific Project area information includes:

- historic site changes and existing conditions that have influenced channel and floodplain morphology and function; and
- hydrology and water quality.

This information may change and/or be expanded as the Project design and analysis advances and more monitoring and site data is collected in the future.

WATERSHED CHARACTERISTICS

The majority of the Prairie Creek basin is contained within Redwood National and State Parks (RNSP). Prairie Creek drains mostly forested terrain and is the largest most northerly tributary to Redwood Creek (Figure 1). Prairie Creek flows into Redwood Creek approximately 3.1 miles above the Pacific Ocean. The 40 mi^2 Prairie Creek basin makes up approximately 14.4% of the 277 mi^2 Redwood Creek basin below the confluence with Prairie Creek.

Prairie Creek and its tributaries support populations of listed Chinook salmon, Coho salmon and Steelhead, as well as Coastal Cutthroat Trout, other fish species and aquatic vertebrates (Wilzbach and Ozaki, 2017). Most of the Prairie Creek basin consists of conifer forests with stands of old growth and second growth redwood, Sitka spruce and Douglas fir. The upper portions of the Prairie Creek basin are relatively undisturbed and provide some of the highest quality salmonid habitat in the Redwood Creek basin (Cannata, 2006).

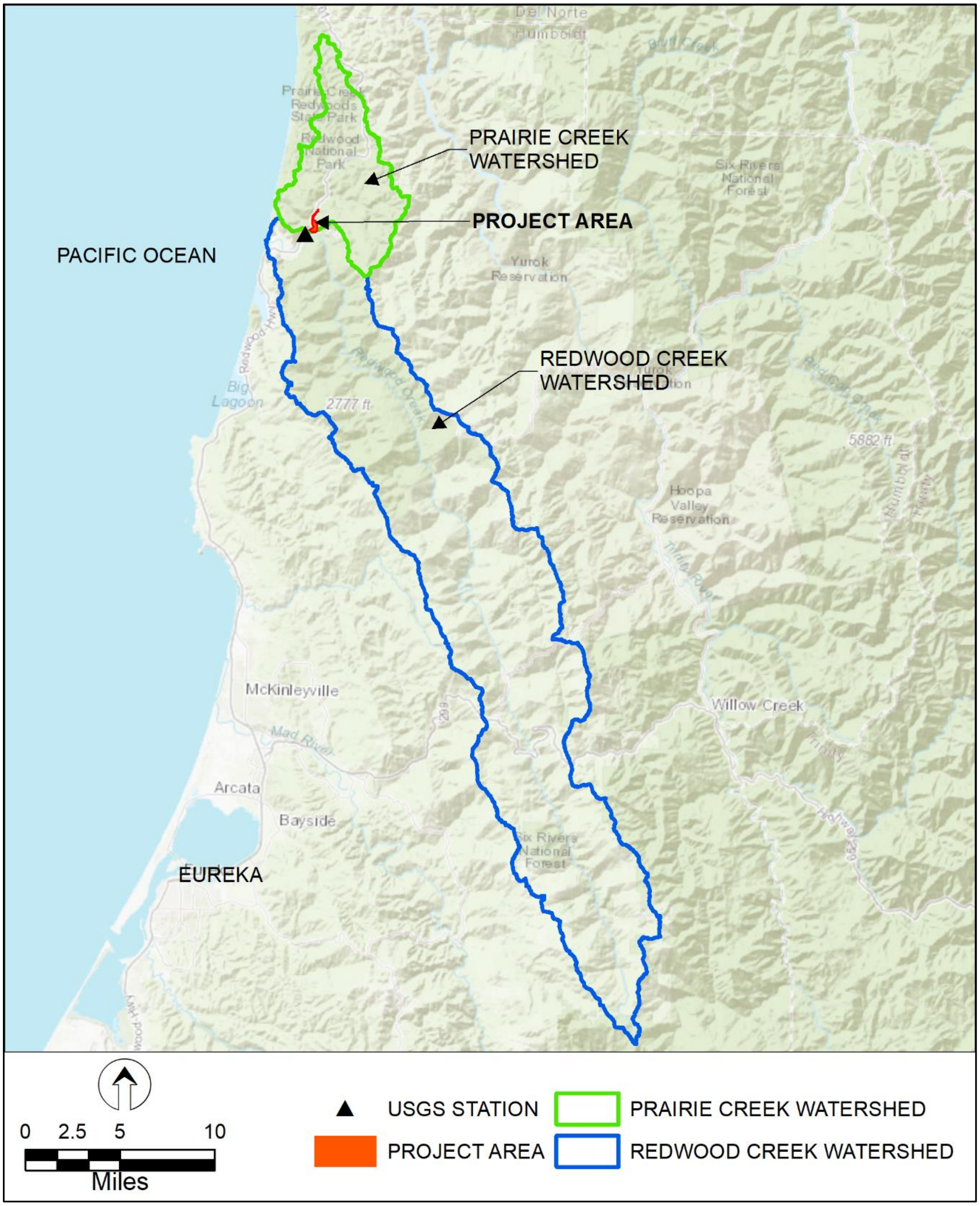

Figure 1. Prairie Creek and Redwood Creek watersheds and Project area location.

REGIONAL CLIMATE

The regional climate of coastal northern California is characterized by mild, wet winters and cool, dry summers (Wilzbach and Ozaki, 2017). The Prairie Creek basin lies adjacent to the Pacific Ocean with its most easterly edge approximately 6 miles from the coast. The predominate influence on climate near the coast is the onshore flow of moist cool marine air generated over the cold coastal ocean waters. This marine air also creates coastal fog, a common daily feature in the summer but can form anytime of the year (Cannata, 2006). These oceanic influences moderate the coastal air temperatures and climate throughout the year.

Daily air temperature and precipitation data have been collected since 1937 in the Prairie Creek basin at the Orick Prairie Creek Park station (NOAA COOP Station No. 046498) located approximately 4.3 miles north of the Project area. Table 1 and Figure 2 provide monthly summaries for the 30-yr period from 1981 to 2010 (data source: Western Regional climate Center). Monthly mean air temperatures ranged from a low of 6.5 °C (43.7 °F) in December to a high of 14.8 °C (58.6 °F) in August, an average seasonal difference of only 8.3 °C (14.9 °F). Precipitation generally falls as rain, with snow fall occasionally occurring at the higher basin elevations. Annual precipitation averaged 168.7 cm (66.4 in), with about 84% of the rainfall occurring between November and April.

Table 1. Summary of monthly air temperature and precipitation data for Orick Prairie Creek Park station (NOAA COOP Station No. 046498) for 1981-2010 period (data source: Western Regional Climate Center).

Month	Mean Min. Temperature (°C)	Mean Temperature (°C)	Mean Max. Temperature (°C)	Mean Precipitation (cm)
Jan	2.7	6.9	11.1	25.3
Feb	2.9	7.7	12.4	23.9
Mar	3.3	8.4	13.6	22.6
Apr	3.9	9.4	14.9	14.0
May	5.9	11.2	16.5	8.5
Jun	7.8	12.9	18.1	4.2
Jul	9.2	14.4	19.7	0.8
Aug	9.2	14.8	20.4	1.0
Sep	7.3	14.0	20.8	2.3
Oct	5.5	11.8	18.2	10.6
Nov	4.0	8.6	13.2	22.9
Dec	2.4	6.5	10.6	32.5
Annual	5.3	10.6	15.8	168.6

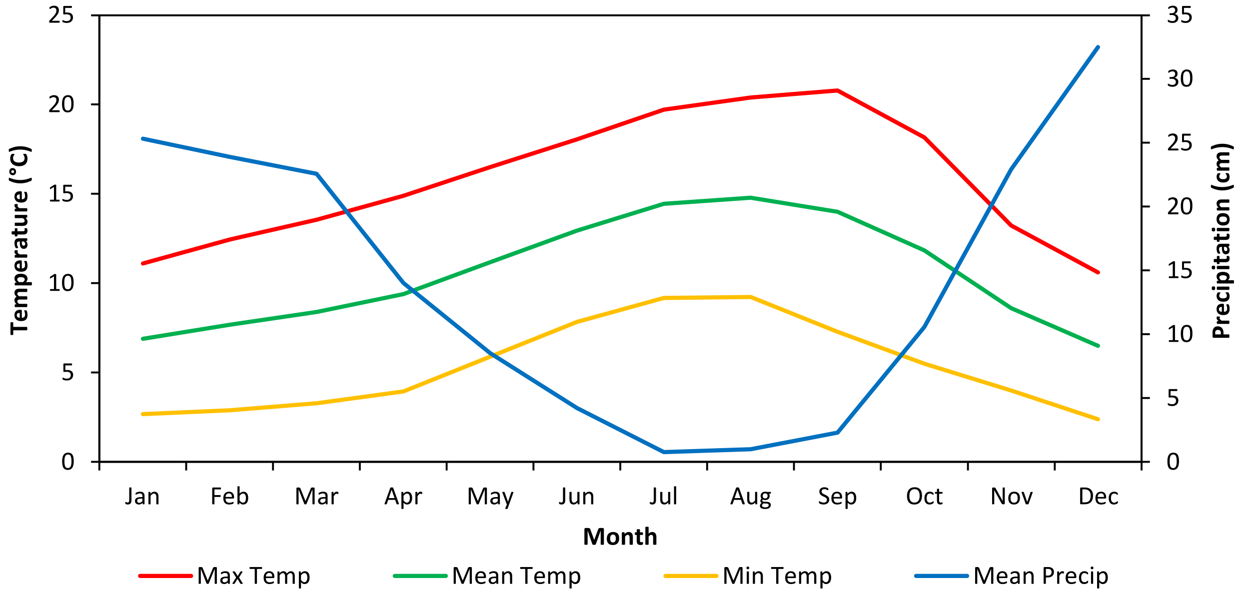

Figure 2. **Monthly air temperature and precipitation data for Orick Prairie Creek Park station (NOAA COOP Station No. 046498) for 1981-2010 period (data source: Western Regional Climate Center).**

PROJECT AREA DESCRIPTION OF CREEKS AND DRAINAGE FEATURES

The Project area is located just north of the confluence of Prairie Creek and Redwood Creek (Figure 1), and bounded by Highway 101 along the west, Bald Hills Road to the south, and steep forested terrain along the north and easterly edges bisected by two roads known as the Upper Road and Lower Road (Figure 3 and Figure 4). Flows entering and exiting the Project area are controlled by the elevated roadways of HWY101 and Bald Hills Road that obstruct floodplain flows and force flows through relatively small crossings at each road. The former Orick Mill (Mill A) occupied the large paved area which is constructed on river run fill and elevated above natural grade to prevent flooding.

Prairie Creek flows along the entire length of the westerly Project area (Figure 3 and Figure 4) before joining Redwood Creek just downstream of the Project area. Four tributaries (Skunk Cabbage Creek, Libby Creek, Otter Creek, and an Unnamed Tributary) join Prairie Creek within the Project area. The remaining portions of the Project area consist of riparian and wetland zones along Prairie Creek, formerly grazed pasture, and the large paved area of the former Mill A site.

Libby Creek, Otter Creek and the Unnamed Tributary flow through culvert crossings at the Upper and Lower Roads before discharging into the easterly wetlands. These tributaries do not have defined channels within the wetland, and the wetland area ultimately drains into a drainage ditch that flows to Prairie Creek. A westerly wetland area exists between the HWY101 road fill prism and Prairie Creek just upstream of the Skunk Cabbage Creek confluence with Prairie Creek that receives flood flows from Prairie Creek and Skunk Cabbage Creek.

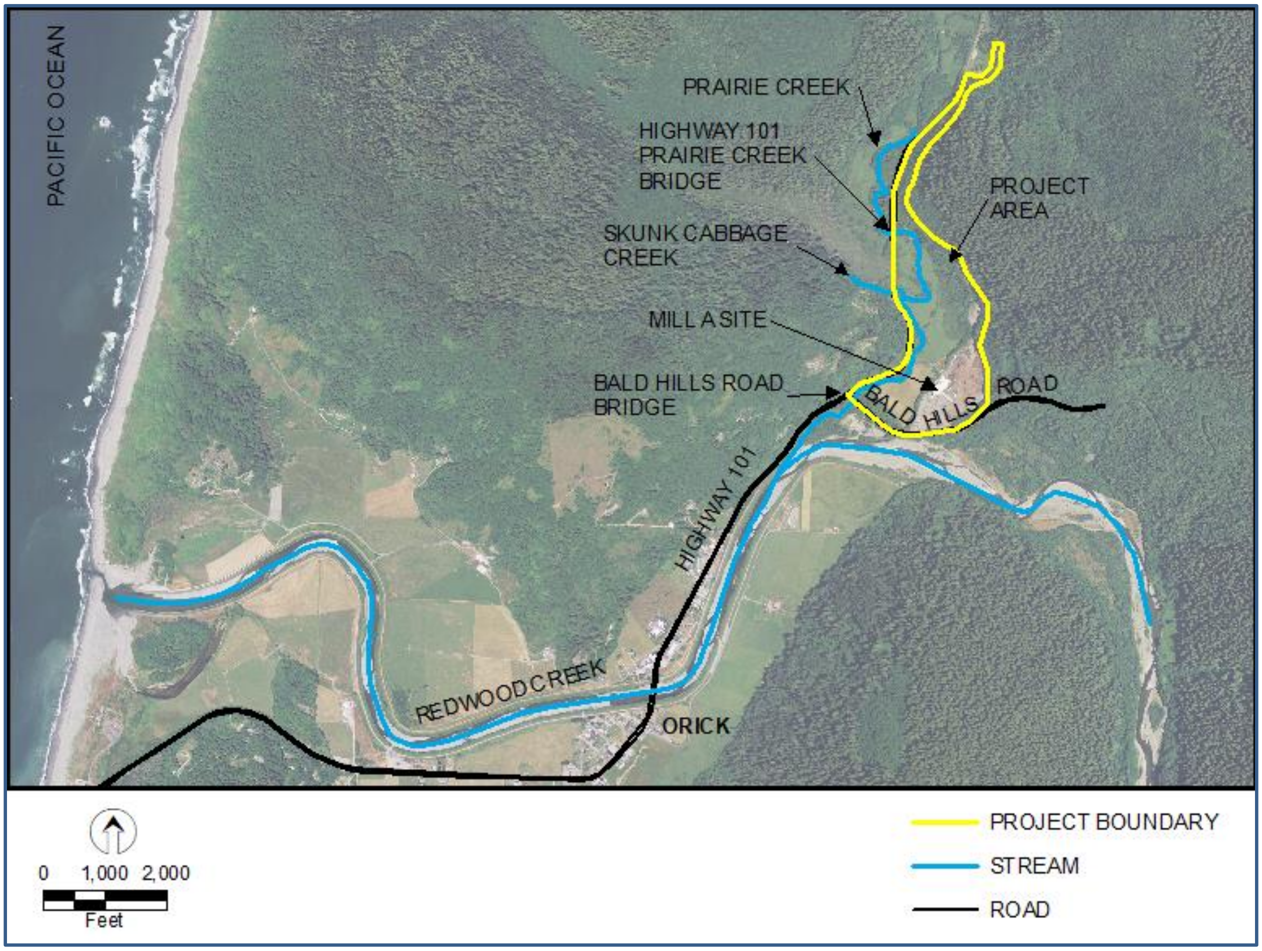

Figure 3. Redwood National and State Park Visitor Center and Restoration (Project) area and vicinity map.

A drainage ditch runs along the eastern and southern ends of the Project area. This drainage ditch does not have a contributing watershed area, but receives precipitation runoff from the large paved area, Bald Hills Road, and limited hillslope drainage. The drainage ditch discharges into a wetland area and does not have a defined flow path in this area. The wetland area ultimately flows into another small drainage channel before discharging into Prairie Creek just above the Bald Hills Road bridge. Precipitation falling on the remainder of the Project area either infiltrates to groundwater, accumulates in the wetland areas, or flows to Prairie Creek or tributaries as surface runoff.

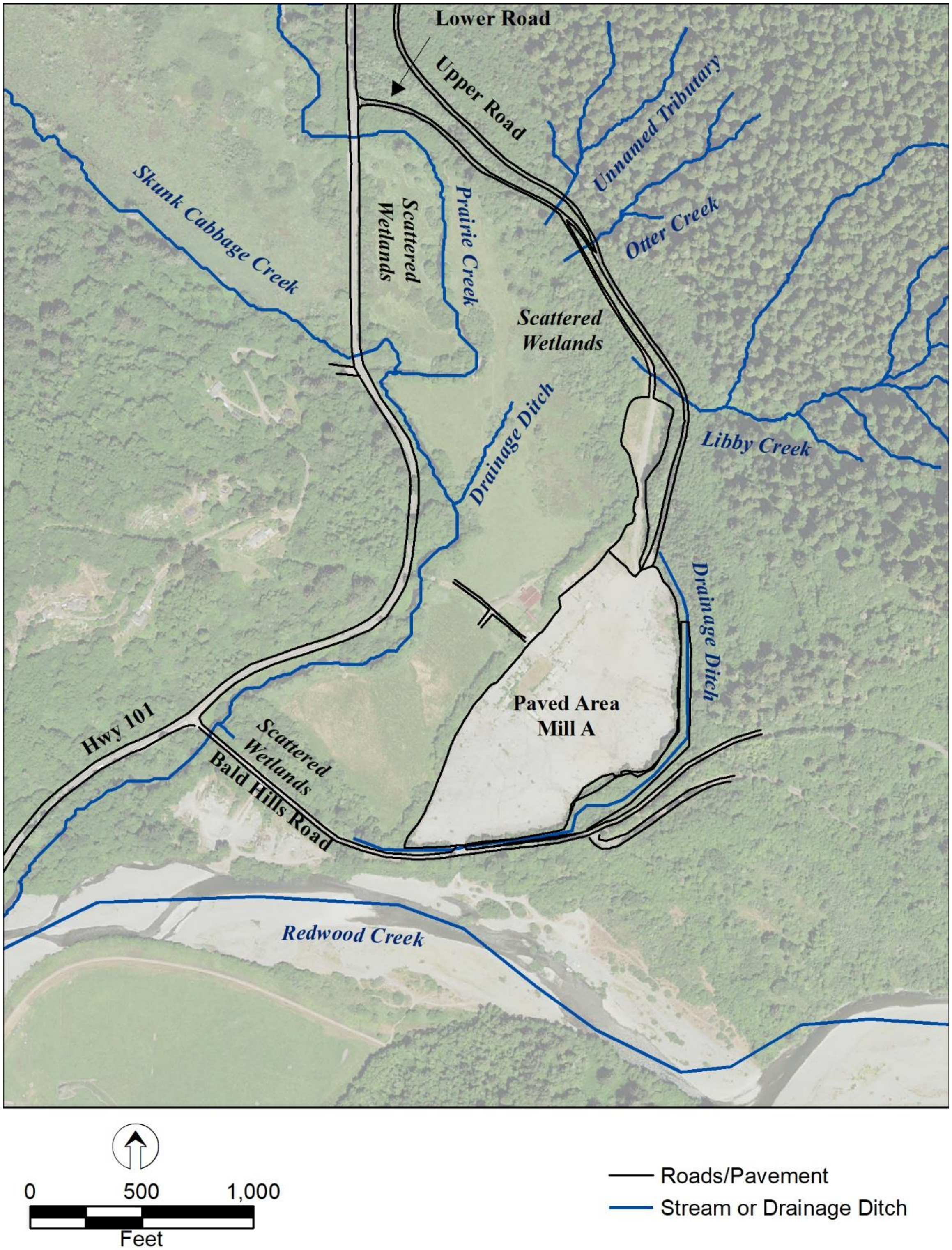

Figure 4. **Project area streams, wetlands and drainage features.**

HISTORICAL PROJECT AREA EVOLUTION

Overview of Project area at earliest record

Historical information for Prairie Creek was summarized from documents compiled and provided by National Park Service (NPS). This compilation of information includes historic maps, aerial photos, oblique photos, resident interviews, and field investigations. The earliest historical maps date back to 1851, aerial photo record date back to 1931, and historical photos date back to 1900 for Prairie Creek outside the Project area and 1920 within the Project area.

Documented Impacts on Channel and Floodplain Morphology

Pre-EuroAmerican Settlement (pre-1850)

The Project area is located within the ancestral lands of the Yurok Tribe and within the "Orick Traditional Cultural Property" (Bueno, 2015). The property may not have been used extensively prior to the EuroAmerican settlement except for trails shown on 1882 Survey Plat (Bueno, 2015).

Prior to settlement, the primary controls on Prairie Creek channel and floodplain morphology within the Project area were natural processes that included geologic controls that formed the valley geometry and slope, stream bed and floodplain materials, sediment supply, vegetation, and stream flows. The Project area is located in the confluence area of Prairie Creek and Redwood Creek, and thus, both systems contributed to the channel and floodplain morphology.

The valley geometry was likely formed by a combination of tectonics, differential erosion, and sedimentation. The valley floor is roughly 1,000 feet wide with relatively low cross-sectional relief (Figure 5). The valley floor contains a longitudinal depression that extends 1,850 feet upstream of the HWY101 Bridge and ends at about the location of the Klamath Wagon Road (later referred to as the Traveled Way and Bald Hills Road) (Figure 5 and Figure 6). The area within the valley depression contains-wetlands, higher channel sinuosity and natural sediment levees are formed along the channel alignment (Figure 5 and Figure 7). Water frequently overtops the banks during storms and a more complex network of high and low flow channels likely occurred in this area prior to EuroAmerican settlement. The floodplain substrates in the depressional area are predominately clay at depth, capped with silt with the exception of a sample collected on one of the natural sediment levees which contained more sand (MA, 2019; LACO, 2015).

Downstream of the Klamath Wagon Road, the floodplain elevation increases (Figure 5 and Figure 6) and appears to be controlled by Redwood Creek fluvial processes, rather than Prairie Creek. The floodplain substrates are coarser than upstream and are predominately silt, sand, and gravel. Aerial photos from 1931 show Redwood Creek channel extended upstream of the current position of Bald Hills Road bridge on the western portion of the Project area and to within 120 feet of the Klamath Wagon Road on the eastern half of the Project area (Figure 8). Widespread sedimentation from Redwood Creek is also documented to the Klamath Wagon Road following a large flood in 1955. Sedimentation patterns were likely similar prior to EuroAmerican settlement.

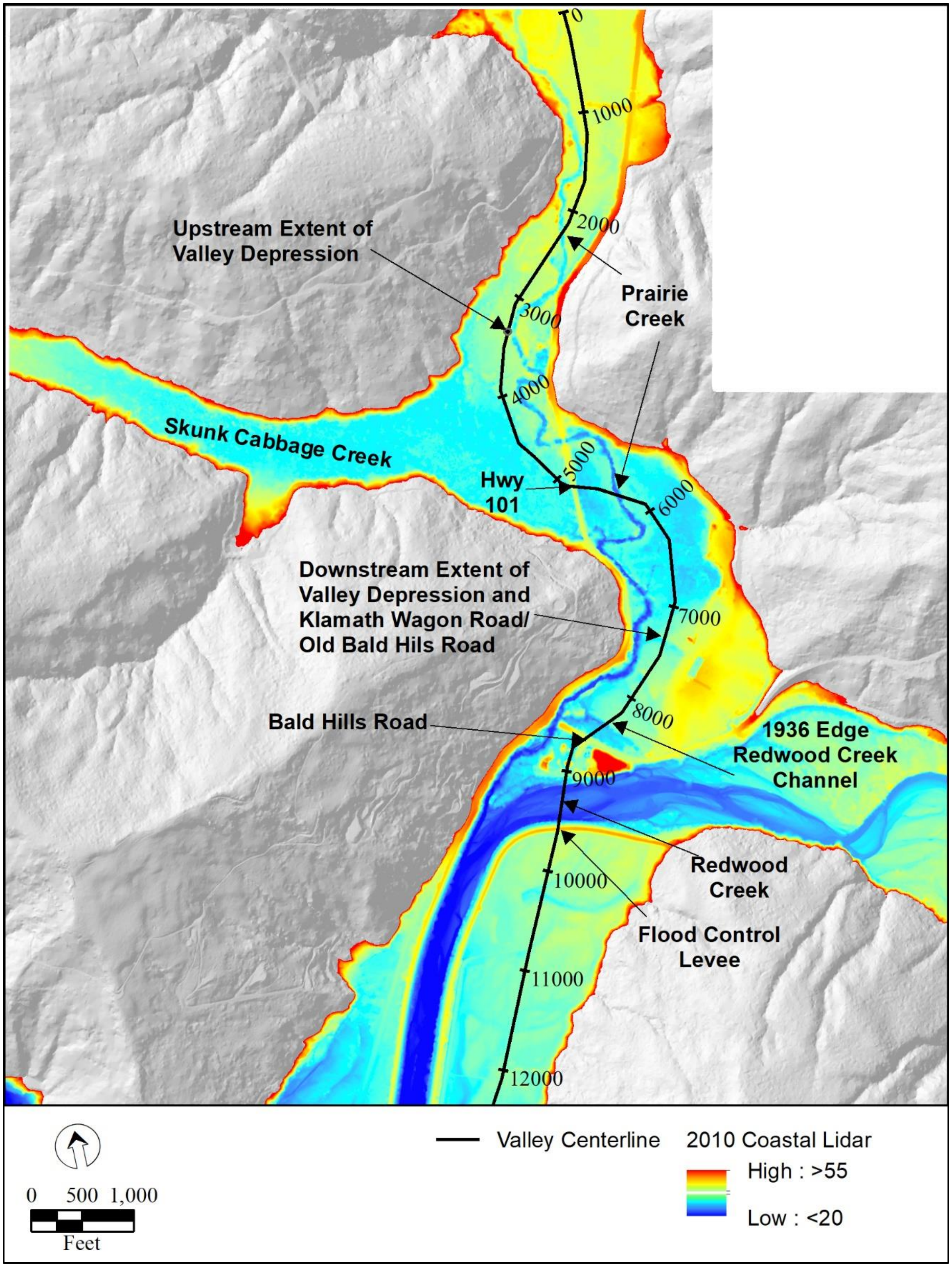

Figure 5. Extents of valley depression and points of interest along the valley centerline. The longitudinal profile of the valley centerline is shown in Figure 6.

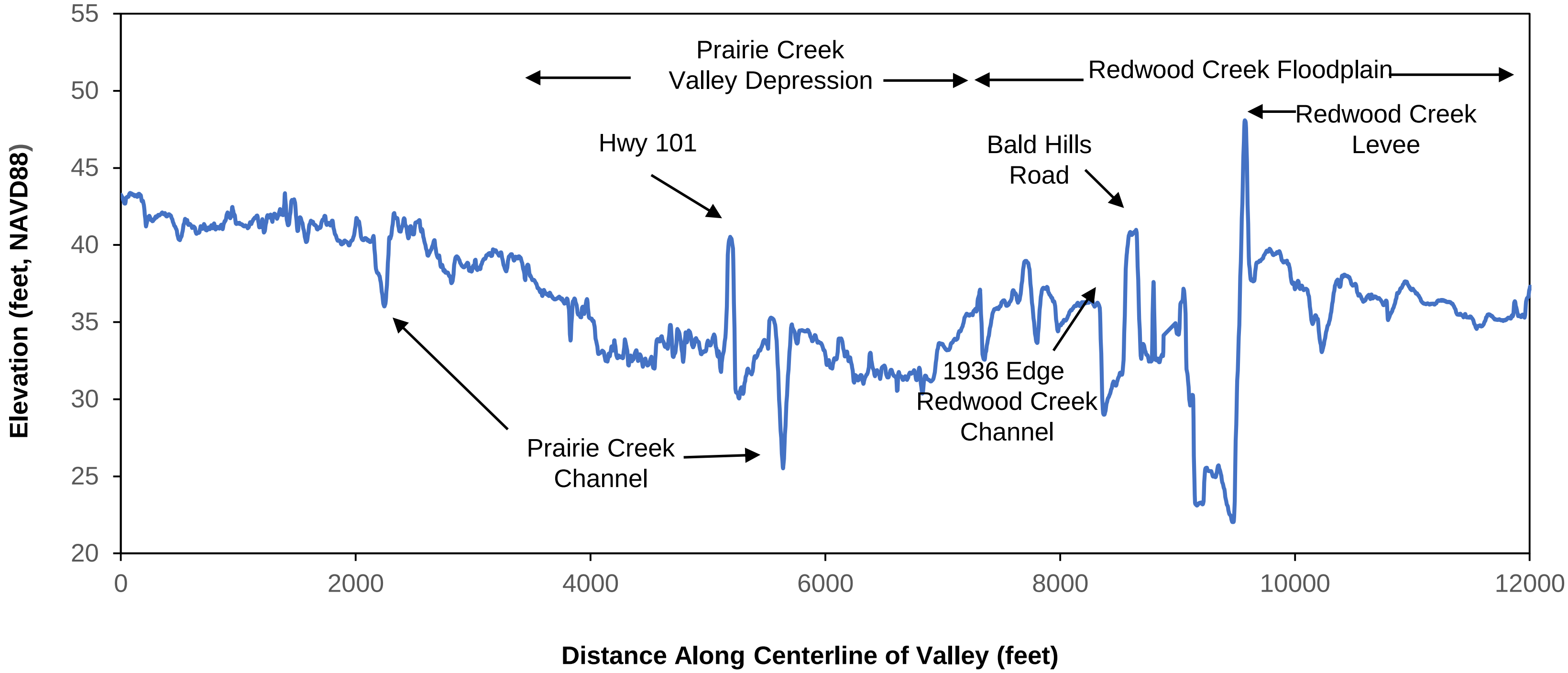

Figure 6. Centerline valley profile through Prairie Creek and Redwood Creek.

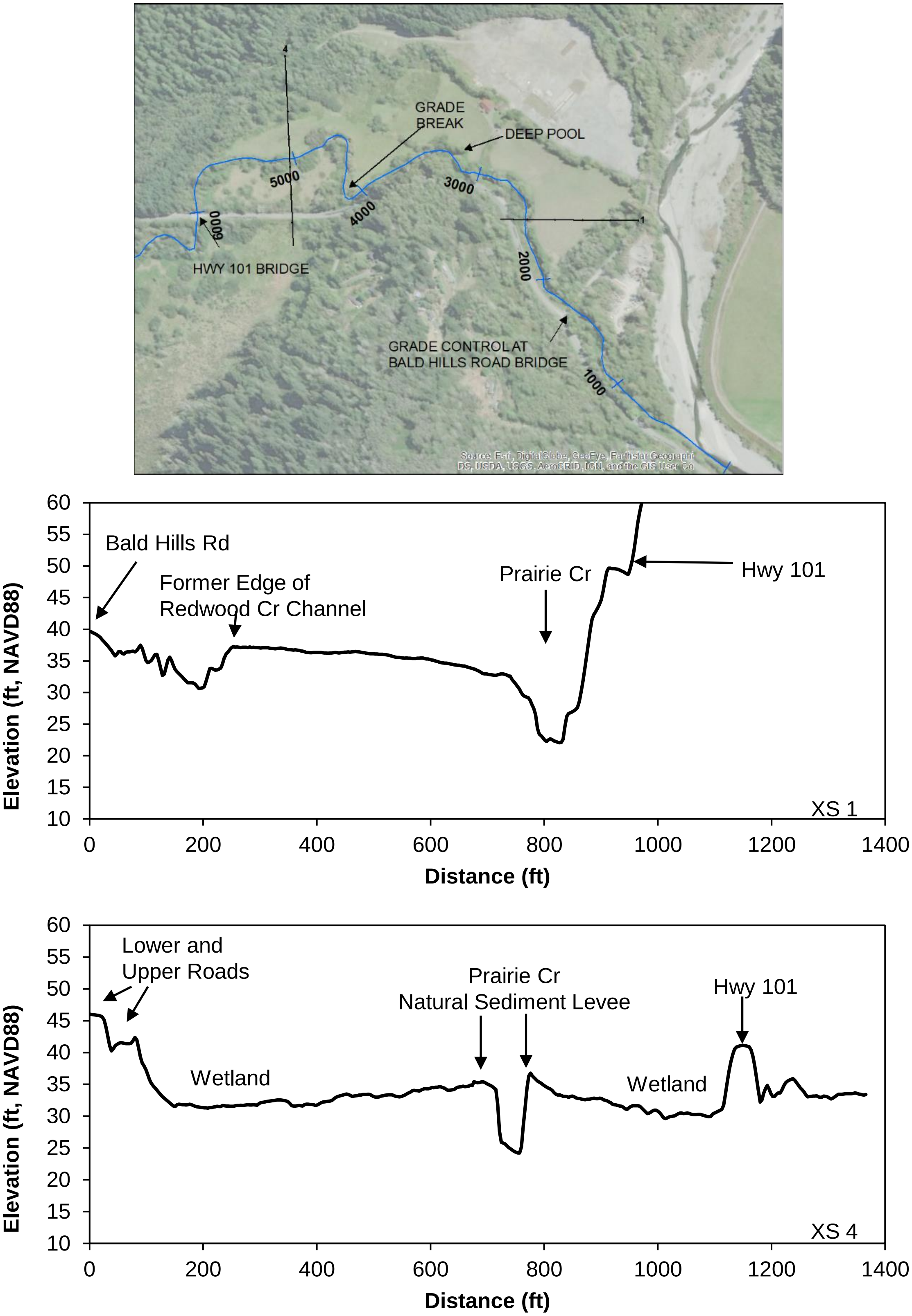

Figure 7. **Cross-sections (looking downstream) depicting the form of Prairie Creek upstream (XS 4) and downstream of the Klamath Wagon Road (XS 1).**

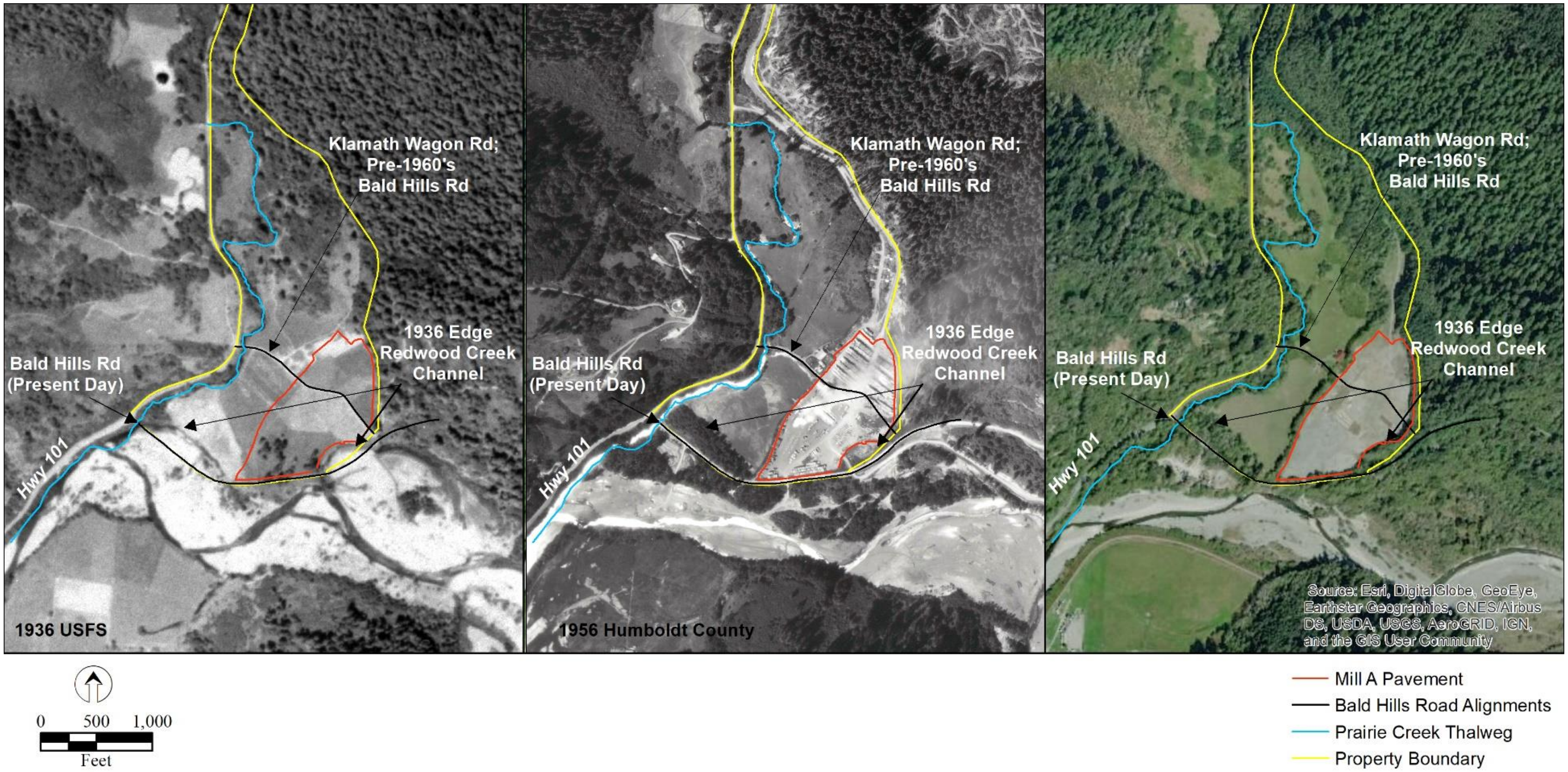

Figure 8. Aerial photo of the Project area in 1936, 1956, and 2018. The former extent of the active channel of Redwood Creek extended into the project area, north of the current alignment of Bald Hills Road. Sedimentation patterns following the 1955 flood show distinctly different sedimentation patterns that contribute to the current floodplain topography. Sediments derived primarily from Redwood Creek cover the valley bottom on the lower portion of the Project area, extending to the pre-1960's Bald Hills Road alignment (the downstream end of the valley depression) and over the majority of the footprint of Mill A. Sedimentation of the upper portion of the Project area (north of the pre-1960's Bald Hills Road alignment) is controlled by Prairie Creek. Sedimentation is highest closer to Prairie Creek, consistent with the formation of natural sediment levees along this section of channel.

The historic channel alignment of Prairie Creek through the Project Area is unknown; however, the earliest maps (1927) show the channel in its current location (Appendix A and Figure 8). The presence of natural sediment levees in the upper portion of the Project area, flanked by low lying wetland areas suggests the channel has occupied this location for an extended period of time. These sediment levees are formed by more concentrated sediment deposition closer to the channel which build up the banks more quickly than more distal areas of the floodplain during overbank flows (Figure 6, Figure 7 and Figure 8). Lateral migration rates in undisturbed reaches of Prairie Creek upstream of the Project area are estimated to be less than one channel width in the last several hundred to 1,000 years. Channel alignment change in the undisturbed reaches of Prairie Creek are likely driven by re-occupation of former channels triggered by the formation of wood jams (Keller et al., 1985). Similar processes likely influenced channel alignments in the Project area prior to removal of wood jams.

Vegetation on the floodplains in the Project area was likely a mix of deciduous riparian vegetation interspersed between ancient Sitka spruce, Douglas fir, and redwood (MA, 2019). These forests would have regularly contributed trees larger than 24 inches in diameter to Prairie Creek, reflecting wood loading rates documented in undisturbed reaches of Prairie Creek upstream of the Project area (Ozaki and Truesdell, 2017). These wood loadings would have contributed to a highly complex floodplain and stream channel.

Early Development (1850-1950)

The Project area was largely un-occupied by Euro-Americans until at least 1850 (Van Kirk, 2015). Trail and road building occurred through the Project area from 1883 to 1900. Major storms occurred in 1860 and 1890 and were similar in magnitude to the regional wide large flood of 1964. These floods would have inundated the entire lower floodplain from valley wall to valley wall including the existing footprint of Mill A site and likely influenced the position of the original road, historically referred to as the "Klamath Wagon Road" which was built in 1894 (Van Kirk, 2015).

The alignment of the Klamath Wagon Road follows the western valley wall north of Orick, then crosses Prairie Creek upstream of the current location of Bald Hills Road, then turns north and follows the eastern valley wall. The more northerly alignment crosses at the point where the valley transitions out of a low, valley wide depression, to the more elevated floodplain influenced by Redwood Creek (Figure 5, Figure 6 and Figure 8).

During this early period (1800's), the North American beaver (*Castor Canadensis*) may have been eliminated from the watershed (Lanman et al. 2013) and was reintroduced in 1946 to Prairie Creek (upstream of the Project area) and Lost Man Creek (CDFG, 1946). The loss of this animal could have contributed to a change in stream morphology and associated aquatic and floodplain habitats. Beaver impoundments have been documented to increase summer flows, improve salmonid winter rearing habitat by adding substantial amounts of large wood to streams, that in turn, increases pool habitat, increases velocity refugia during high flows, and reconnects the stream to floodplain habitats (Gallagher et al. 2012) as well as reducing channel incision. Beavers are currently present in the Project area within Skunk Cabbage Creek.

The first documented use of the property was ranching in the early 1900's (Bueno, 2015). This land use indicates that portions of the valley floor were cleared of vegetation and converted to pasture by this time. The initial size of this ranch is unknown. Progressive clearing occurred in the 1930's from roughly 37 acres in 1931 to 63 acres by 1940. The maximum extent of clearing was ~85 acres in 1954. Buildings were constructed just north of the Klamath Wagon Road in the central portion of the Project area (Figure 8).

The Redwood Highway (HWY101) within the Project area was completed by 1928 and paved by 1930. The road follows the west valley wall then bisects the Prairie Creek floodplain and crosses Prairie Creek at the upstream end of the Project area. The maps of the proposed alignment from 1927 detail the center line of the road and the position and shape of the Prairie Creek channel, which appears to have the same general planform as the channel does today (Appendix A). Elsewhere in Prairie Creek the plans indicate channel realignments to accommodate the road, but there are not indications of channel re-alignment as a result of HWY101 construction within the Project area. The channel may have been affected by side casting material which is documented in photos (exact location is unknown) and other bank stabilization efforts for the road which are visible in the channel today. The section of HWY101 that bisects the Prairie Creek floodplain between Skunk Cabbage Creek and Prairie Creek substantially altered the hydrologic connection upstream and downstream of the road, resulting in backwatering of high flows upstream of the road, decreasing velocities, and limited flow paths through the road fill. Channel and floodplain flow were routed through HWY101 in a 122-foot reinforced concrete girder bridge constructed over Prairie Creek, a 4-foot x 4-foot concrete box culvert approximately 330 feet upstream of Skunk Cabbage Creek and a 20-foot reinforced concrete bridge over Skunk Cabbage Creek.

The Klamath Wagon Road was retained through the Project area following the construction of HWY101 as the primary connection to Bald Hills Road.

Mill A Operations and Flood Control (1950-2019)

Timber harvesting occurred over half the Prairie Creek watershed between 1880 and 1977 with the most intensive logging occurring between 1950’s and 1960’s (Wilzbach and Ozaki, 2017). Timber harvesting and associated road construction on hillslopes increased sediment supply to Prairie Creek (Wilzbach and Ozaki, 2017).

During this period of intensive logging, Mill A was constructed in the Project area. Development of the Project area began in early 1950’s. By 1954, the entire Project area (~85 acres) was cleared of vegetation with the exception of a few patches along the Prairie Creek channel and HWY101. The eastern wetland area was completely cleared, and ditches drained the wetland area. Housing was constructed by 1954 along the east valley wall just south of Libby Creek. Borings and test pits conducted by LACO (2010) indicate variable depths of fill was added to the floodplain across the Mill A site that range from 2-10 feet. The site was subsequently paved and additional berms were added around the Mill A site (Figure 8).

The road network around the Project area was expanded. Klamath Wagon Road/Old Bald Hills Road which ran through the middle of the Mill A site was moved south by 1960. The new alignment, Bald Hills Road, was built within the historic active channel of Redwood Creek (Figure 8). Bald Hills Road reduces the frequency that overbank flows from Redwood Creek inundate the Project area. The portion of the Klamath Wagon road that paralleled the eastern valley wall (now called the “Lower Road” (Figure 4 and Figure 8)) was widened and trees adjacent to the road harvested. A new road, referred to as the “Upper Road” (Figure 4 and Figure 8) was built to transport logs between mill sites. Along the Upper Road, additional spur roads were constructed where trees were harvested. Road development and timber harvesting was limited to near the base of the valley wall and old-growth redwood remained intact upslope.

Construction of the Mill A paved area and Bald Hills Road fill prisms created the drainage ditch that runs along the eastern and southern edges of the Project area (Figure 4). This drainage ditch primarily receives precipitation runoff from the large paved area and Bald Hills Road. Historic photographs of the Mill A site show this drainage ditch as a prominent feature.

Substantial channel modifications continued to occur in Redwood Creek after 1960 which likely influenced the lower reaches of Prairie Creek and may have extended into the Project area. The Redwood

Creek Flood Control Project was constructed in 1968. The project consisted of levee construction and gravel excavation to create a trapezoidal channel with a specified flood capacity. Levees on the south side of the river extended to the valley wall upstream of Prairie Creek and the levee on the north side extended to Prairie Creek. A levee does not protect Bald Hills Road or the Mill A site. Gravel was excavated from the river to the low flow thalweg. This excavation action had the potential to initiate channel incision in Prairie Creek. The berm constructed around the Mill A site was likely built in response to the 1964 flood and Redwood Creek Flood Control Project as the project has the potential to increase flood elevations at the Mill A site because the south Redwood Creek floodplain was blocked by the constructed levee.

Redwood Creek did not retain the excavated dimensions following construction of the Flood Control Project. The channel began infilling shortly after construction and was excavated again in 1987-1988 and began infilling again shortly thereafter (NHE, 2010). These massive excavations and subsequent infilling created an unstable base level at the Prairie Creek confluence that influenced incision and depositional patterns upstream (Figure 9). Similar changes in base level may have occurred in the past due to natural lateral channel migration of Redwood Creek and episodic sediment supply from large floods. However, the creek was likely more susceptible to changes in Redwood Creek following removal of wood and stream side vegetation.

Bald Hills Road bridge was replaced in the 1980's. The bridge replacement resulted in a headcut in Prairie Creek (Figure 9). A boulder grade control structure was installed at the bridge to prevent further incision of the creek channel. [This information is anecdotal and requires more documentation prior to including in CEQA or report. County of Humboldt is working on providing supporting information.]

Stream bank armoring (riprap) of Prairie Creek occurs along 303 feet of channel on the left (east) bank and 752 ft of channel on the right (west) bank between the HWY101 and Bald Hills Road bridges (Ozaki and Truesdell, 2017, supplemental data). The timing of installation of the bank armoring is unknown, but was likely installed over time in response to bank erosion which may have been part of the natural evolution of the stream channel, and/or exacerbated by instabilities caused by vegetation and wood removal, changes to sediment supply, incision, and proximity of the erosion to important infrastructure (e.g., HWY101), or loss of pasture.

Mill A was closed in 2009 and the property was sold to the League in 2013. Green Diamond Resource Company removed the lumber mill and conducted site clean-up, with the exception of the large paved area. Ranching operations ended in 2016 and the barn was recently removed from the Project area.

Summary of Historical Impacts on the Project area

Collectively, the construction of HWY101, the systematic removal of vegetation and wood from the stream and floodplain of Prairie Creek, the construction of Bald Hills Road that has isolated the Redwood Creek floodplain within the Project area, the installation of drains and ditches in the wetland areas and channelization of tributaries surrounding the Mill A site, and filling and paving a large portion of the floodplain has collectively degraded the natural environment and associated habitats. These actions have increased the vulnerability of the channel and floodplain to damage from storm flows, modifications to Redwood Creek, and colonization by non-native and invasive species. A timetable of actions and impacts on the channel and floodplain are summarized in Table 2.

Stream Evolution

Historically, the primary controls on the morphology of the Prairie Creek channel and floodplain within the Project area were geologic controls that formed the valley geometry and slope, stream bed and floodplain materials, sediment supply, vegetation, and stream flows.

The floodplain south of Klamath Wagon Road was likely more influenced by Redwood Creek than Prairie Creek historically, and is perhaps better characterized as the area where Prairie Creek traverses through the Redwood Creek floodplain. Thus, floodplain morphology, including floodplain height and sedimentary characteristics are more typical of the larger adjacent Redwood Creek river system. The floodplain elevations are roughly equivalent to a 2-year flood in Redwood Creek, whereas Prairie Creek only floods these surfaces in a 10-year event. Substantial sediment deposits from the 1955 flood are visible extending from Redwood Creek, across the floodplain to the original location of Bald Hills Road (Klamath Wagon Road), whereas deposits originating from Prairie Creek upstream of Klamath Wagon Road area are less pronounced (Figure 8).

The elevated floodplains predominately built by Redwood Creek resulted in a more entrenched channel (higher width to depth ratio) in the lower portion of the Project area. The frequency of flooding has been substantially reduced since the construction of Bald Hills Road in the 1960s. The channel within this lower region of Prairie Creek remains influenced by Redwood Creek backwatering at higher flows.

Characterizing the stream in terms of an evolutionary model such as Cleur and Thorne (2013) assumes there is a disturbance mechanism resulting in differing evolutionary forms. The stream channel upstream of the Klamath Wagon Road may have historically been similar to a Stage 0 channel (anastomosing wet woodland). The creek flows through the valley depression and is flanked by low wetland areas. Channel confinement was likely controlled by overbank sedimentation that created low natural sediment levees. Conversion of the property to predominately agriculture and ranching, removal of wood from the channel, drainage of wetlands and extensive timber harvest upstream may have resulted in accelerated erosion (incision), in conjunction with further confinement due to accelerated deposition on the natural levees resulting in a transition to a Stage 1-2 (sinuous single thread to channelized) channel. Downstream of the Klamath Wagon Road, the undisturbed channel form was likely heavily influenced by the channel form of Redwood Creek and may have been a Stage 1 (sinuous single thread) channel. Lateral channel migration was likely to be low due to dense stands of vegetation and the dominance of Redwood Creek may have shifted Prairie Creek toward the western valley wall. Anthropogenic disturbance has now altered the channel to a Stage 3 (Arrested Degradation) channel in this location.

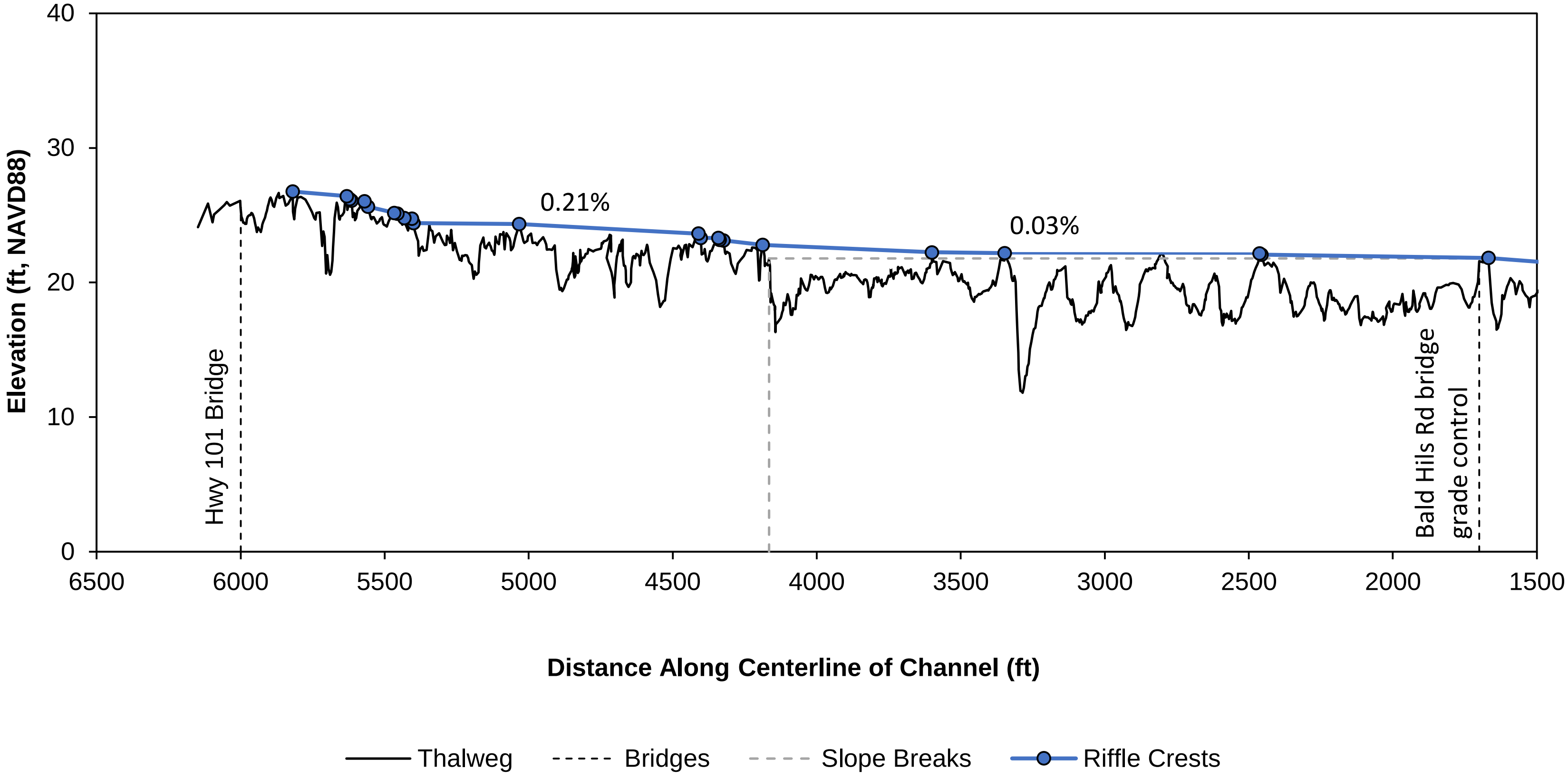

Figure 9. **Thalweg profile of channel between HWY101 Bridge and Bald Hills Road. A grade control structure installed at Bald Hills Road bridge creates a nearly flat stream gradient up to the confluence with Skunk Cabbage Creek.**

Table 2. Summary of impacts to the channel and floodplain morphology and associated habitat within the Project area.

Time Period	Action	Impact on Project area
1894	Construction of Klamath Wagon Road	Localized impacts to the creek channel at the bridge crossing. Minimal alteration of the floodplain at the location of the road. Gravel was added to roads. Alteration of the east valley wall.
Late 1800's – present.	Progressive clearing of floodplain, streamside vegetation, and wood from channel. Maximum extent of vegetation removal occurred by 1954.	Increased erosion of stream, reduced cover, channel simplification, reduced quality of habitat. Degraded floodplain habitat and eliminated stream side forests and wetlands and associated habitats. Wood removal from Prairie Creek likely made the channel more susceptible to base levels changes at Redwood Creek resulting from natural channel migration and human disturbance (sediment excavation as part of the flood control project in 1968 and 1987, stream crossing construction and removal). Increase in non-native vegetation and invasive species establishment
1880-1977	Timber harvest and associated road building	Reduced infiltration and increased surface runoff entering the Project area. Increased sediment supply and alteration of erosion and depositional patterns likely accentuated the height and width of the natural sediment levees and increased sedimentation in the wetland areas and increased stream bank erosion in the channel. Increased road crossing of tributaries entering the Project areas.
1928-1930	HWY101 construction	Obstructed floodplain connectivity with connections limited to Skunk Cabbage Creek, a culvert, and the Prairie Creek channel. Reduced access to floodplain habitat. Backwatered high flows in Prairie Creek altering flow paths and sedimentation patterns. Armored stream banks to protect the road. Potential impacts to stream channel from side casting material into the channel during construction.
~1960-present	Floodplain fill and berm construction associated with Mill A Construction and Operation	Reduced floodplain connectivity and floodplain habitat quantity and quality. Altered natural flow paths, reduced infiltration, and increased runoff from the paved surfaces.
~1954-present	Channelization of tributaries and drainage of wetlands	Reduced infiltration of surface flow. Altered quality and quantity of floodplain/off-channel habitat. Increased surface runoff directly to Prairie Creek that contributed to increased erosion.
~1960	Bald Hills Road construction	Filled in portions of the active channel of Redwood Creek. Obstructed floodplain connectivity with Redwood Creek over most flows with the exception of backwatering through the Prairie Creek channel. Reduced access to floodplain habitat from Redwood Creek. Backwatered high flows in Prairie Creek in the Project area altering flow paths and sedimentation patterns.
1968	Redwood Creek Flood Control Project levee construction and excavation	Potentially results in higher water levels in the Project area during large floods due to reducing floodplain access on the south side the channel. Initial excavation of the Redwood Creek channel may have altered the base level of the Prairie Creek channel and resulted in upstream channel adjustments (incision).
1980's	Bald Hills Road bridge replacement	Current understanding is that a headcut was initiated in Prairie Creek when the bridge was replaced. Humboldt County responded by installing boulder grade control. The channel has not filled to the grade set by the grade control. [Additional information and reference needed]
1987-1988	Sediment removal from Redwood Creek	Sediment excavation in Redwood Creek could have led to channel adjustments upstream (incision).
1980's	Re-vegetation and possibly bank stabilization	Redwood Community Action Agency (RCAA) conducted a revegetation project that would have aided in bank stabilization, increase in shade and cover of the stream channel. [Additional information and reference needed.]

SURFACE WATER HYDROLOGY

This section describes the existing surface water hydrology of Prairie Creek and its tributaries within the Project area and general vicinity and includes specific surface water information regarding nearby Redwood Creek.

Surface Water Flow

Restoration and/or enhancement projects are being proposed on Prairie Creek, Skunk Cabbage Creek, Libby Creek, and culvert crossing upgrades are proposed for Otter Creek and the Unnamed Tributary. To support stream and wetland restoration/enhancement efforts surface water flow information are provided for Prairie Creek, Skunk Cabbage Creek and Libby Creek. Peak-flow estimates are provided for each tributary to support channel and culvert designs, and the 100-yr flow provides a regulatory threshold to analyze project effects. Mean daily flows (MDF) and flow duration curves (FDC) are also provided to aid in design efforts and provide information for fisheries habitat evaluations. Table 3 summarizes basic watershed characteristics for these three streams and Redwood Creek below the confluence with Prairie Creek.

Table 3. Watershed characteristics for streams in the Project area and vicinity[1].

Stream	Watershed Area (mi^2)	Mean Annual Precipitation (in)	Mean Basin Elevation (ft, NAVD88)	Q2 Ratio with Prairie Creek at HWY101[3]
Prairie Creek at Bald Hills Road Bridge	39.7	73.4	785	NA
Prairie Creek at HWY101 Bridge	37.0	74.6	816	NA
Skunk Cabbage Creek	2.3	56.8	383	0.06208
Libby Creek	0.2	58.5	631	0.00703
Redwood Creek below confluence with Prairie Creek[2]	277.0	83.4	1,831	NA

1. Information from USGS StreamStats Program.
2. Same location as USGS Redwood Creek at Orick, CA streamflow gaging station (11482500).
3. Q2 ratio used to scale a tributary to the Prairie Creek at HWY101 flow duration curve.

Although NPS and others have collected streamflow data on the upper mainstem Prairie Creek and various tributaries for decades, flow data for lower Prairie Creek at or near the Project area were not collected historically (Vicki Ozaki, personal communication). NHE has collected water level information at three locations (HWY101, SKUNK and TURNOUT) on Prairie Creek within the Project area (Figure 10) since February 2015. Continuous water level data is collected at 15-minute intervals at all three sites. Discharge was measured at the upstream site (HWY101) to develop a stage-discharge rating that translates the water level record to a 15-minute discharge record. Additional depth, velocity and discharge measurements were collected within the Project area to better characterize site flow conditions and calibrate numerical models.

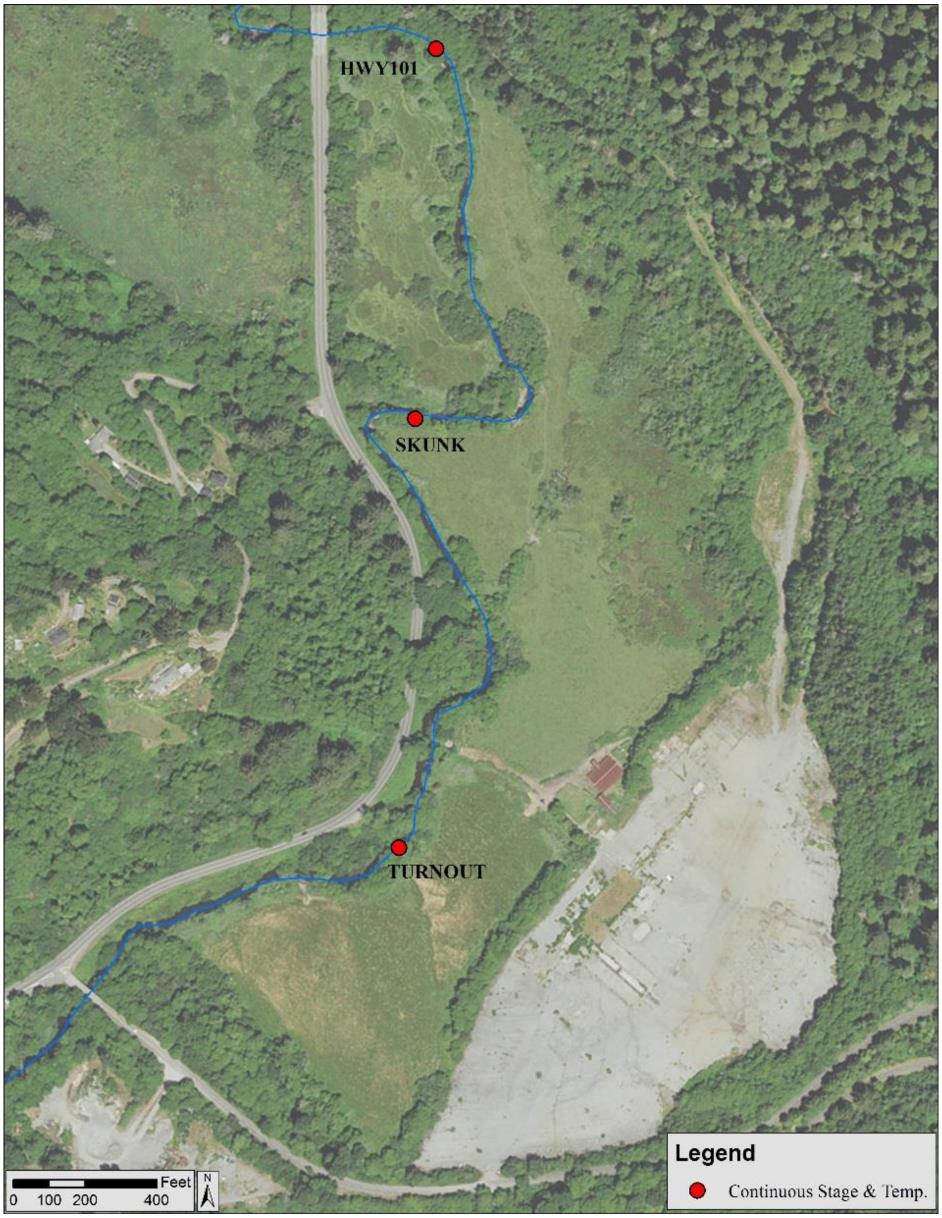

Figure 10. Location of continuous water level loggers.

Mean Daily Flow Observations

A MDF record for Prairie Creek at HWY101 was determined from the continuous 15-minute discharge record for the observation period from February 2015 to 2018 (Figure 11), which covers three complete water years (WY 2016, 2017 and 2018) and the latter portion of the 2015 WY. Streamflow is dependent on regional precipitation patterns with higher flows in the winter, lower flows in the summer, and a long flow recession over the drier summer and fall period.

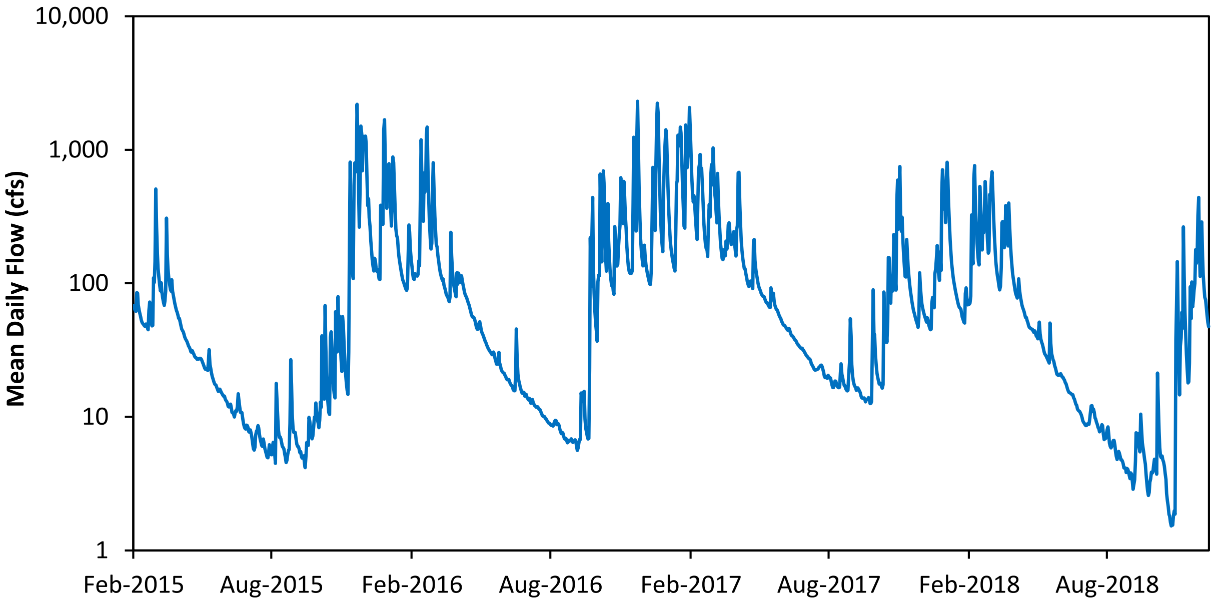

Figure 11. Prairie Creek at HWY101 mean daily flow for February 2015 to December 2018.

The MDF record provides seasonal streamflow information for lower Prairie Creek within the Project area (Table 4), and allows a direct comparison of streamflow in Redwood Creek below the confluence with Prairie Creek (Table 5) at the USGS Redwood Creek at Orick streamflow gauging station (11482500). For the overlapping WY periods the ratio of Prairie Creek to Redwood Creek mean and maximum flows range from 13 to 20%, consistent with the 13.4% watershed area ratio between the two sites. However, Prairie Creek makes up a significant component of the Redwood Creek measurable surface flows downstream of the confluence during low-flow periods. The ratio of Prairie Creek to Redwood Creek minimum flows range from 35 to 167%, significantly greater than the 13.4% watershed ratio. This demonstrates the importance of Prairie Creek flows for maintaining Redwood Creek low flows below the confluence.

Table 4. Summary of Prairie Creek at HWY101 mean daily flow (MDF) and maximum peak flow data (DA = 37.0 mi^2)[1].

Water Year	Mean MDF (cfs)	Min MDF (cfs)	Max MDF (cfs)	7-day Min MDF (cfs)	Max Peak Flow (cfs)
2015	NA	4.48	NA	5.16	NA
2016	162.4	4.17	2,191	4.82	2,604
2017	256.6	6.77	2,306	6.29	2,605
2018	102.7	2.87	807	3.36	1,116

1. NA is not applicable due to short water year record or unavailable information.

Table 5. Summary of USGS Redwood Creek at Orick, CA (11482500) mean daily flow (MDF) and maximum peak flow data (DA = 277.0 mi^2)[1].

Water Year	Mean MDF (cfs)	Min MDF (cfs)	Max MDF (cfs)	7-day Min MDF (cfs)	Max Peak Flow (cfs)
2015	592.6	7.78	11,700	8.02	13,300
2016	1,039	3.70	10,900	4.06	18,800
2017	1,624	4.06	11,500	16.8	15,200
2018	769.6	8.17	4670	8.75	NA

1. NA is not applicable due to short water year record or unavailable information.

Flow Duration Curves

Annual and seasonal FDCs were estimated for Prairie Creek, Skunk Cabbage Creek and Libby Creek to better understand streamflow variability and provide design flow criteria (Figure 12). The 3.6-year MDF short-record for Prairie Creek at HWY101 was extended to 64 years (WY 1956-2018) using the maintenance of variance extension Type 1 (MOVE1) technique (Hirsch, 1982) and the long-record USGS Little River near Trinidad station (11481200). The correlation coefficient (r = 0.978) between Prairie Creek at HWY101 and Little River near Trinidad indicates high correlation between concurrent mean daily flows (Figure 12a). The extended record FDC was used for interpretation and computations. The Prairie Creek at HWY101 monthly and annual exceedance flows are summarized in Table 6.

Figure 12b shows the annual FDC and the FDC for the 15 November to April period, a period of winter and spring flows requested by the Prairie Creek Restoration Planning Committee to provide restoration/enhancement habitat design targets. The 15 November to April FDC represents the upper portion of the annual FDC where higher flows are exceeded only about 30 to 40% of the time. Seasonally Prairie Creek flows are high in the fall/winter (November to January) and winter/spring (February to April) periods, decrease in spring/summer (May to July) months, and significantly decrease in the summer/fall period (August to October) (Figure 12c). The November to January seasonal flow period has the greatest flow variability, while the other seasonal periods demonstrate less variability with more consistent flows.

Annual FDCs were estimated for Skunk Cabbage Creek and Libby Creek (Figure 12d) by scaling the Prairie Creek at HWY101 FDC using the Q2 ratio method (Corps of Engineers, 2001). This method is similar to scaling flows by the ratio of tributary watershed areas but uses the ratio of 2-year (yr) peak-flows between two tributaries. Q2 scaling estimates between Prairie Creek at HWY101 and Skunk Cabbage Creek and Libby Creek are listed in Table 3. Skunk Cabbage Creek and Libby Creek have mean daily flows that are approximately one and two orders magnitude lower than Prairie Creek flows, respectfully. Although these tributaries have flows significantly lower than Prairie Creek, they can provide year-round or seasonal flows to help maintain fisheries and wetland habitats in the Project area.

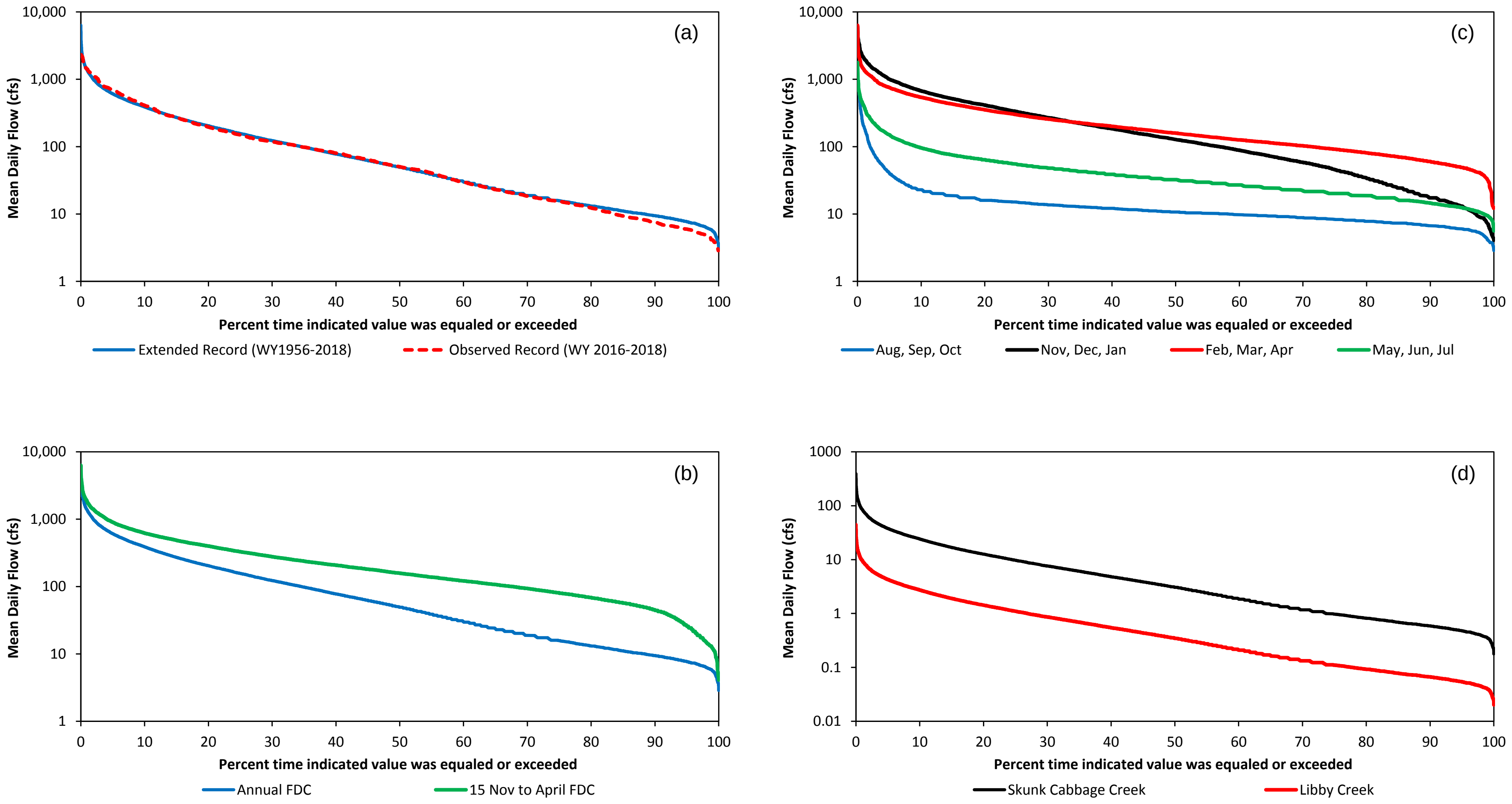

Figure 12. Flow duration curves (FDC) for Prairie Creek at HWY101, Skunk Cabbage Creek and Libby Creek. (a) Prairie Creek at HWY101 FDC for observed record (WY 2016-2018) and MOVE1 extended record (WY 1956-2018). (b) Prairie Creek at HWY101 FDC for annual period and 15 November to April period. (c) Prairie Creek at HWY101 seasonal FDCs. (d) Skunk Cabbage Creek and Libby Creek annual FDCs estimated by scaling the Prairie Creek at HWY101 annual FDC (a) by the ratio of 2-yr peak-flow between each tributary and Prairie Creek at HWY101.

Table 6. Summary of monthly and annual mean daily flow by percent time equaled or exceeded for Prairie Creek at HWY101.

Percent Equaled or Exceeded	Mean daily flow (cfs)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
5	108.2	613.8	1235.3	1134.9	994.0	769.0	472.8	254.2	98.7	37.5	20.2	21.5	607.0
10	52.9	408.6	790.8	783.8	687.5	576.9	339.9	167.1	68.9	31.0	18.5	15.2	389.2
15	33.7	277.1	591.7	615.4	534.6	465.0	272.8	128.5	57.4	27.3	16.6	13.2	271.1
20	25.6	202.6	487.1	500.1	442.4	400.6	231.4	108.2	50.4	25.6	15.8	12.5	204.1
25	21.2	152.7	399.7	419.8	374.7	343.1	202.2	94.8	45.4	23.7	15.1	11.6	156.4
30	17.4	120.3	331.8	354.6	320.9	301.2	178.4	84.1	41.5	22.6	14.3	11.0	122.7
35	15.7	92.8	279.6	299.4	270.2	263.1	157.1	77.3	38.8	21.5	13.6	10.5	98.3
40	14.1	74.4	234.3	253.5	239.2	235.2	138.3	70.8	36.0	20.0	13.1	10.2	77.4
45	12.8	58.7	196.5	215.5	210.4	211.9	122.8	66.4	33.7	18.8	12.5	9.9	62.3
50	11.6	47.8	164.6	186.4	186.5	190.4	112.4	61.4	31.9	18.2	12.0	9.5	49.2
55	10.4	37.6	138.1	162.4	165.0	171.4	102.1	57.5	29.7	17.3	11.4	9.2	38.9
60	9.8	31.0	116.8	138.9	147.5	155.1	91.6	52.7	28.3	16.0	11.0	8.8	30.0
65	9.3	25.7	98.5	122.7	132.7	137.3	85.3	49.1	27.0	15.7	10.4	8.4	23.6
70	8.7	21.6	79.2	105.2	118.1	123.2	77.3	46.2	25.6	14.8	10.2	8.1	18.8
75	8.1	18.7	63.9	89.2	107.0	110.1	70.7	42.7	23.7	13.9	9.6	7.5	15.7
80	7.8	15.9	51.6	75.2	95.0	99.3	63.5	38.9	22.3	13.1	9.0	7.0	13.2
85	7.3	14.2	36.4	61.9	82.1	85.9	56.7	36.1	21.3	12.5	8.4	6.7	11.1
90	6.7	11.5	25.6	49.1	68.9	71.7	51.0	32.4	19.1	11.6	7.7	6.2	9.5
95	5.9	8.8	17.8	35.3	52.7	57.1	43.5	29.5	17.4	10.1	7.0	5.6	7.7

Flood Frequency Analysis

Observed annual peak-flow data for upper Prairie Creek and tributaries were obtained from NPS (Vicki Ozaki, personal communication). Review of the peak-flow data indicate that the largest gauged watershed area is less than 50 percent of the Prairie Creek watershed area at the Project area, precluding use of the NPS data for estimating lower Prairie Creek annual peak-flows (Ries, 2007). Consequently, it was necessary to use regional regression equations to estimate Prairie Creek annual peak-flows in the Project area.

Flood-frequency estimates for Prairie Creek at two locations, Skunk Cabbage Creek and Libby Creek (Table 7) were determined using the regional flood-frequency equations for California (Gotvald et al., 2012). The regional equations provide flow estimates for the 2-yr to 500-yr flood events. More frequent peak-flows (e.g. 1.1-yr to 1.5-yr events) were determined using an approach for extending flood-frequency analysis developed by NHE based on a log-Pearson Type III (LP3) distribution and least-squares optimization. As a point of reference, the LP3 flood-frequency estimates for Redwood Creek at Orick determined by NHE and Manhard (2013) to support FEMA's floodplain mapping for Redwood Creek and the community of Orick are also listed in Table 7.

Table 7. Summary of flood-frequency estimates for Prairie Creek, Skunk Cabbage Creek and Libby Creek based on regional flood-frequency equations (Gotvald et al., 2012), and Redwood Creek at Orick (NHE and Manhard, 2013).

Percent Chance Exceedance	Return Interval (yr)	Flood-frequency estimates (cfs) by basin				
		Prairie Creek at Bald Hills Road Bridge	Prairie Creek at HWY101	Skunk Cabbage Creek	Libby Creek	Redwood Creek at Orick
95	1.053	854	819	40	4	6,720
90	1.111	1,200	1,150	60	6	8,870
80	1.25	1,770	1,690	94	10	12,100
66.67	1.5	2,470	2,360	139	15	15,800
57.14	1.75	2,990	2,850	174	20	18,500
50	2	3,460	3,300	205	23	20,500
20	5	5,850	5,570	384	45	31,900
10	10	7,510	7,140	512	61	39,000
4	25	9,640	9,160	681	82	47,100
2	50	11,200	10,600	809	98	52,600
1	100	12,800	12,200	943	116	57,700
0.2-	500	16,300	15,500	1,240	154	68,000

The flow history of Prairie Creek can be characterized by the long-term streamflow record at the USGS Redwood Creek at Orick station (11482500) located immediately downstream of the Project area, just below the confluence of Prairie Creek and Redwood Creek (Wilzbach and Ozaki, 2017). Redwood Creek experienced several large annual peak-flow events between the 1950s to mid-1970s (Figure 13). The flood of record is 50,500 cfs on December 22, 1964, with similar flows in WY 1953 (50,000 cfs), 1956 (50,000 cfs), 1972 (49,700 cfs) and 1975 (50,200 cfs), all of which were just below the 50-yr flood event. In WY 1950, 1964 and 1971 three events were near the 10-yr flood. However, peak-flows have exceeded the 5-yr flood event only once since WY 1975, when the WY 1997 peak-flow exceeded the 10-yr flood event. Since WY 2006 no annual peak-flow on Redwood Creek has exceeded a 2-yr flood event.

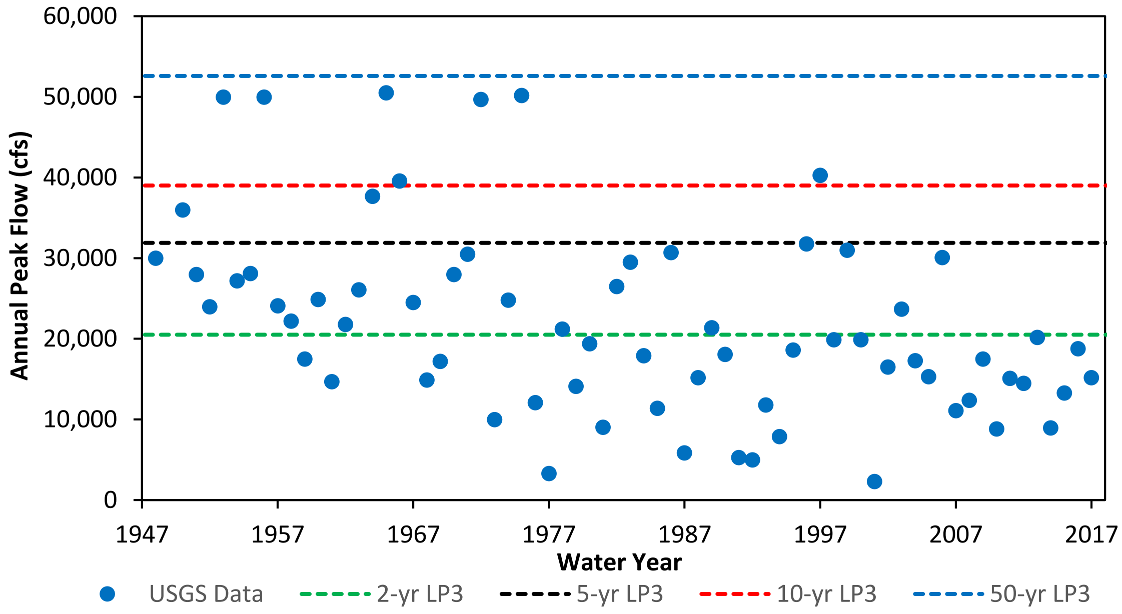

Figure 13. **Annual peak-flows at the USGS Redwood Creek at Orick, CA station (11482500) and the 2-yr, 5-yr, 10-yr and 50-yr Log-Pearson Type III (LP3) flood-frequency estimates for Redwood Creek at Orick (Table 7) by NHE and Manhard, 2013.**

Point Depth and Velocity Data

NHE and Stillwater Sciences collected instantaneous depth and velocity measurements (Figure 14) in Prairie Creek within the Project area to better understand reach conditions and for hydrodynamic model calibration using ADCP and wading measurements. Field observations were collected on two separate days and the streamflow conditions during sampling are described below:

- <u>24 March 2015 sample</u>: discharge ranged from 500 to 750 cfs during sampling with a MDF of 508 cfs, which is equaled or exceeded approximately 7% of the time annually and 14% during the 15 November to April period.
- <u>26 March 2015 sample</u>: discharge ranged from 150 to 170 cfs during sampling with a MDF of 167 cfs, which is equaled or exceeded approximately 24% of the time annually and 48% during the 15 November to April period.

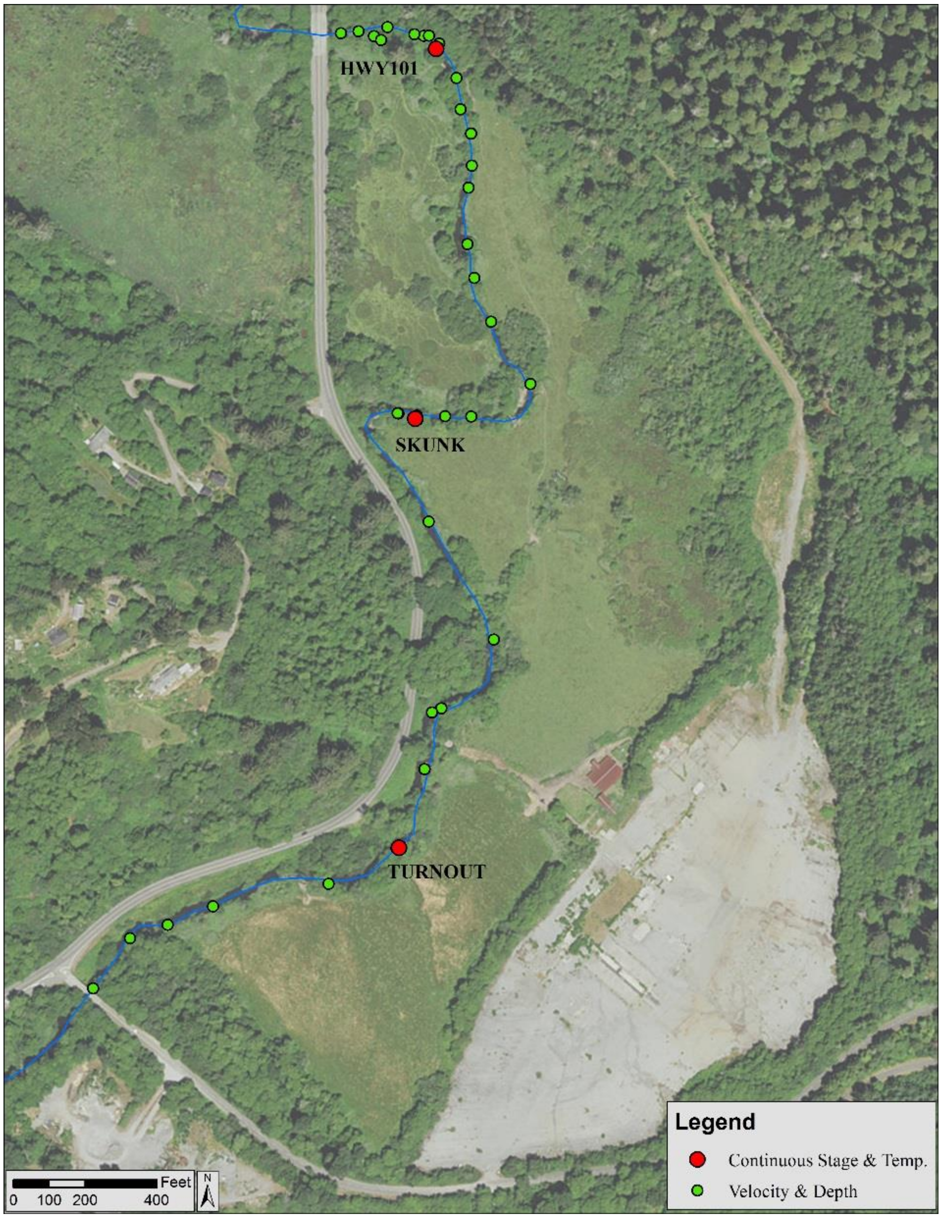

Figure 14. Location of depth and velocity measurements within Project area.

Results from these two days of sampling indicate that flow depth in Prairie Creek ranged from approximately 2 to 7 ft with flow velocities between 1 to 4 ft/s (Figure 15). Although flow depths are deep within the Project reach, velocities are relatively high with most exceeding the 1 ft/s upper velocity shelter criteria for salmonid habitat (salmonid habitat criteria from Prairie Creek Restoration Planning Committee).

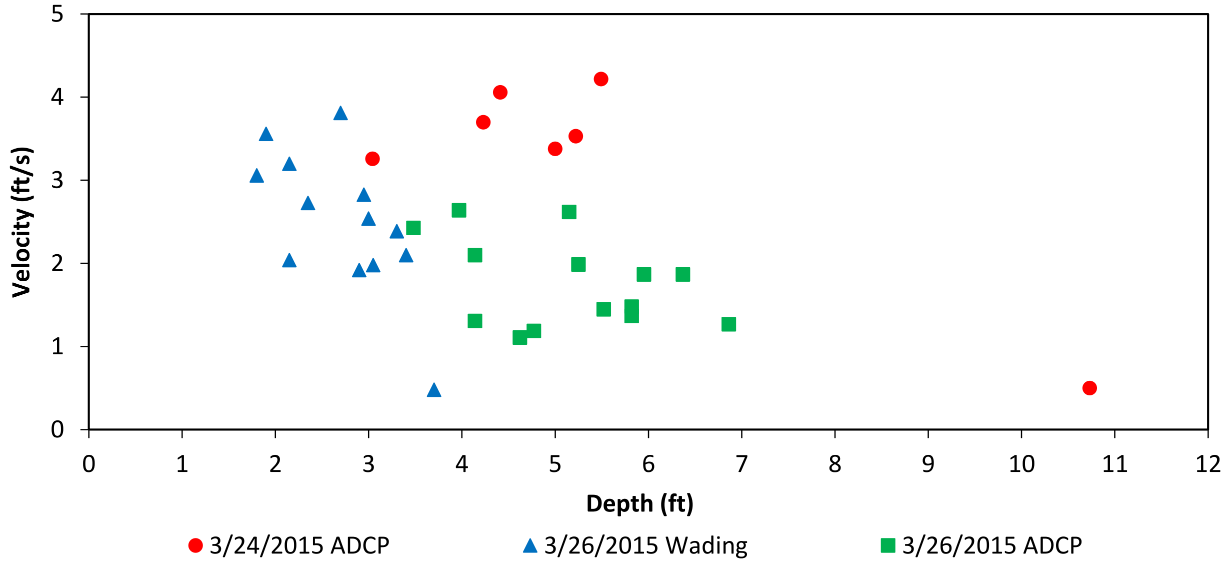

Figure 15. Prairie Creek observed depth and velocity within the Project area for two sampling periods. Mean daily flow on 3/25/2015 was 508 cfs, and 167 cfs on 3/26/2015.

PRAIRIE CREEK SURFACE WATER FLOW CONDITIONS

Flow patterns within the Project area are controlled by Prairie Creek channel and floodplain conditions and anthropogenic features. The Prairie Creek channel is narrow and entrenched over most of the Project reach with limited to no backwater or off-channel features and floodplain connectivity except at higher streamflows. Upstream and downstream flows to the Project area are controlled by two elevated roadways (HWY101 and Bald Hills Road) that block/obstruct floodplain flows and force flows through relatively small bridge crossings at each road. Only the largest peak-flows (5-yr peak-flow and greater) overtop the roadways. When flows are high enough to overtop channel banks and flow onto the floodplains in the upper half of the Project area, the historic Klamath Wagon Road (or historic Bald Hills Road) that perpendicularly crosses the floodplain and the isolated former Redwood Creek floodplain located on the lower half of the Project area, along with the elevated former Mill A site paved area along the easterly edge obstruct and redirect floodplain flows back into the channel and against HWY101.

To better understand existing surface water flow conditions and patterns in Prairie Creek within the Project area, a two-dimensional (2D) model was developed using the Bureau of Reclamation SRH-2D model (Lai, 2008). A description of the SRH-2D model development, calibration and validation will be provided in the Project design report (in progress).

Flow field plots of depth and velocity (Figure 16 to Figure 21) are provided for a range of discharge values (49, 150, 900, 1,700, 3,300, and 5,750 cfs). A Prairie Creek 49 cfs MDF (Figure 16) is equaled or exceeded approximately 50% of the time annually, and 88% of the time between 15 November and April of each year. At this discharge, all flow is contained within the Prairie Creek channel. Like observed conditions (Figure 15), most in-channel flow depths are greater than 2 ft and velocities are generally above 1 ft/s. However, velocities along some of the channel margins and in the lower portions of the Project reach are below 1 ft/s. The large easterly wetland area has shallow depths and low velocities but with limited connectivity.

A Prairie Creek 150 cfs MDF (Figure 17) is equaled or exceeded approximately 26% of the time annually, and 52% of the time between 15 November and April of each year. Flow conditions are similar to those predicted at 49 cfs, except that depths and velocities are higher. No alcove or backwater features are apparent. The large easterly wetland area has shallow depths and low velocities but with limited connectivity.

The 900 cfs Prairie Creek flow is about 100 cfs greater than the 1.053-yr peak-flow, and as a MDF is equaled or exceeded only 3.0% of the time annually and 6.3% of the time for the 15 November to April period. All flow is still confined to the Prairie Creek channel with limited floodplain connectivity (Figure 18). Limited alcove features are apparent along the channel margins. At this discharge in-channel flow depths are deep (> 7 ft) and in-channel flow velocities are above 2.5 ft/s. Low velocity areas (< 1 ft/s) appear along the channel margins and alcove features. The easterly wetland area has shallow depths and low velocities but with limited connectivity.

The 1,700 cfs Prairie Creek flow is the 1.25-yr peak-flow and is only equaled or exceeded 0.6% of the time annually and 1.2% of the time for the 15 November to April period as a MDF. At this flow multiple flow paths connect the channel to the floodplain in the upper half of the Project area (Figure 19). Channel flow depths are at 10 ft and floodplain depths are 5 ft or less. Note that the easterly floodplain flow is blocked by the former mill site and road fill and only flows back into Prairie Creek through the drainage ditch. Flows are mostly confined to the channel in the lower half of the Project area, although some limited alcove and backwater areas exist. In channel velocities are all above 2.5 ft/s, and approach 5 ft/s in the lower half of the channel reach as the elevated floodplain topography confines the channel flow. Most floodplain flow velocities in the upper half of the Project area are less than 1 ft/s, except along the channel margins were flow leaving the channel is accelerated over the elevated channel banks. Flow velocities are also low in the mainstem along the channel margins and within alcoves and backwater features in the lower half of the Project area.

A flow of 3,300 cfs Prairie Creek is the 2-yr peak-flow and is rarely exceeded annually (< 0.1%) and 0.2% of the time for the 15 November to April period as a MDF. At the 2-yr peak-flow, about three-quarters of the floodplain is inundated with dry areas occurring downstream of the Klamath Wagon Road (Figure 20). In channel flow depths are deep (> 10 ft) along the entire reach, and floodplain depths exceed 5 ft in many locations. Floodplain flows are directed back towards HWY101 by the elevated former Mill A site and Redwood Creek floodplain. Flows overtop the Klamath Wagon Road fill prism, but do not overtop HWY101 or Bald Hills Road. At this flow, downstream backwater affects from the elevated topography significantly reduce in-channel velocities in the upper half of the Project reach. However, in-channel velocities are still high in the lower half of the Project area but lower than the 1,700 cfs peak-flow (Figure 19) due to increased floodplain flow and potential backwatering from the Bald Hills Road bridge. This flow condition indicates a potential reduction in sediment transport potential through the Project reach at the higher peak-flows. Floodplain velocities in the upper half of the Project area increase some over the 1,700 cfs flow due to increased downstream floodplain connectivity at the Klamath Wagon Road, but large low-velocity (< 1 ft/s) areas still exist.

The 5-yr peak-flow (5,570 cfs) has an extremely low MDF exceedance annually (< 0.016%) and for the 15 November to April period (< 0.035%). At flow the Project area floodplains are fully inundated and connected to the channel (Figure 21). Only the roadways (except for a portion of HWY101) and paved areas in the Project area are dry. Flow depths exceed 20 ft in portions of Prairie Creek, and the floodplain depths reach 10 ft in the upper half of the Project area. At this flow HWY101 begins to overtop between Skunk Cabbage Creek and the HWY101 bridge. In-channel flow velocities in the upper half of the Project reach are still backwatered by downstream controls, but in-channel and margin velocities increase over the 2-yr peak-flow in the lower half of the Project area due to channel confinement from the elevated topography. Floodplain velocities exceed 1 ft/s over much of the floodplain flows, but low velocity (< 1 ft/s) areas still exist along the margins of the Project area floodplains.

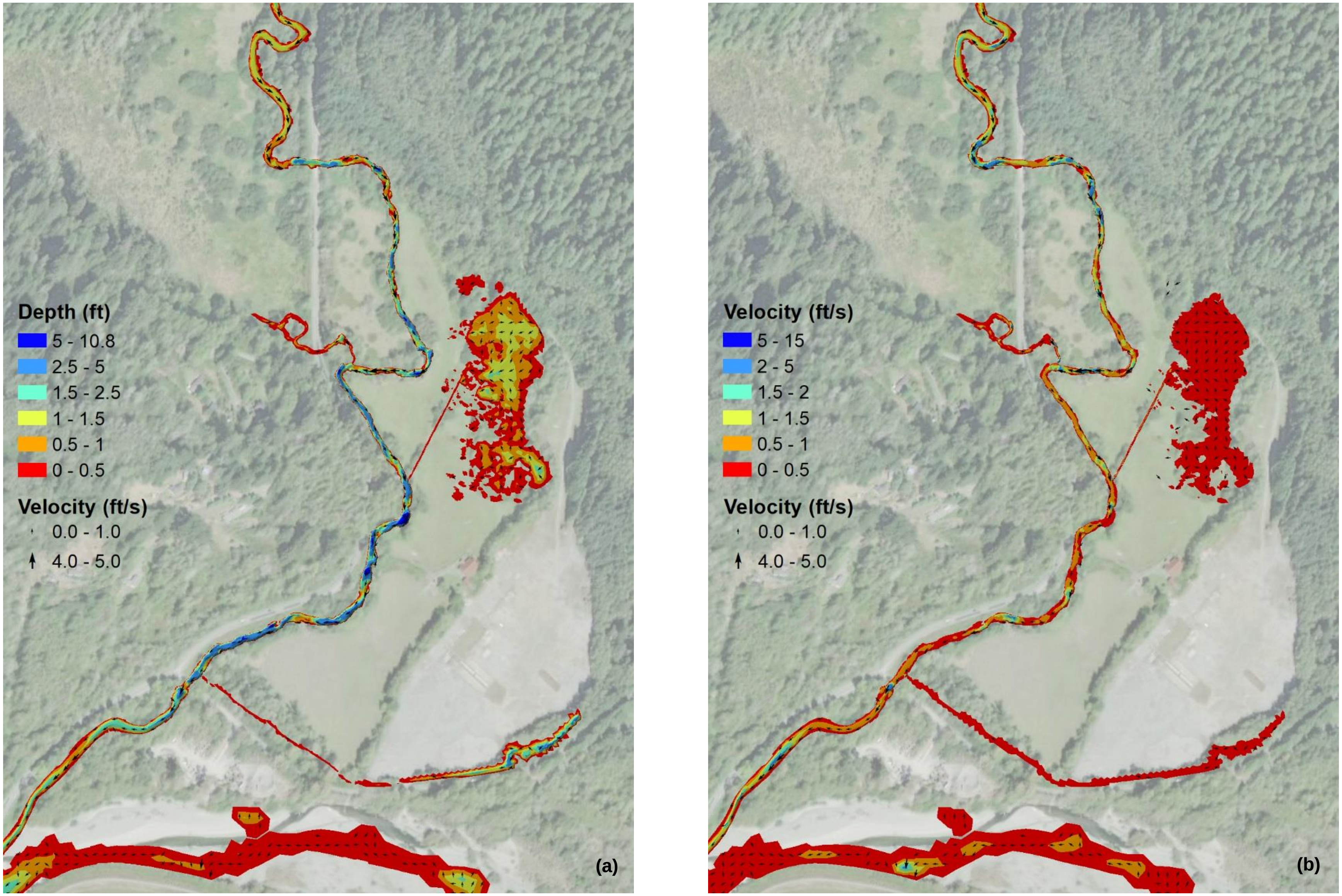

Figure 16. Predicted existing condition Prairie Creek depth and velocity vectors (a), and velocity magnitude and vectors (b) flow fields within the Project area for the 49 cfs flow.

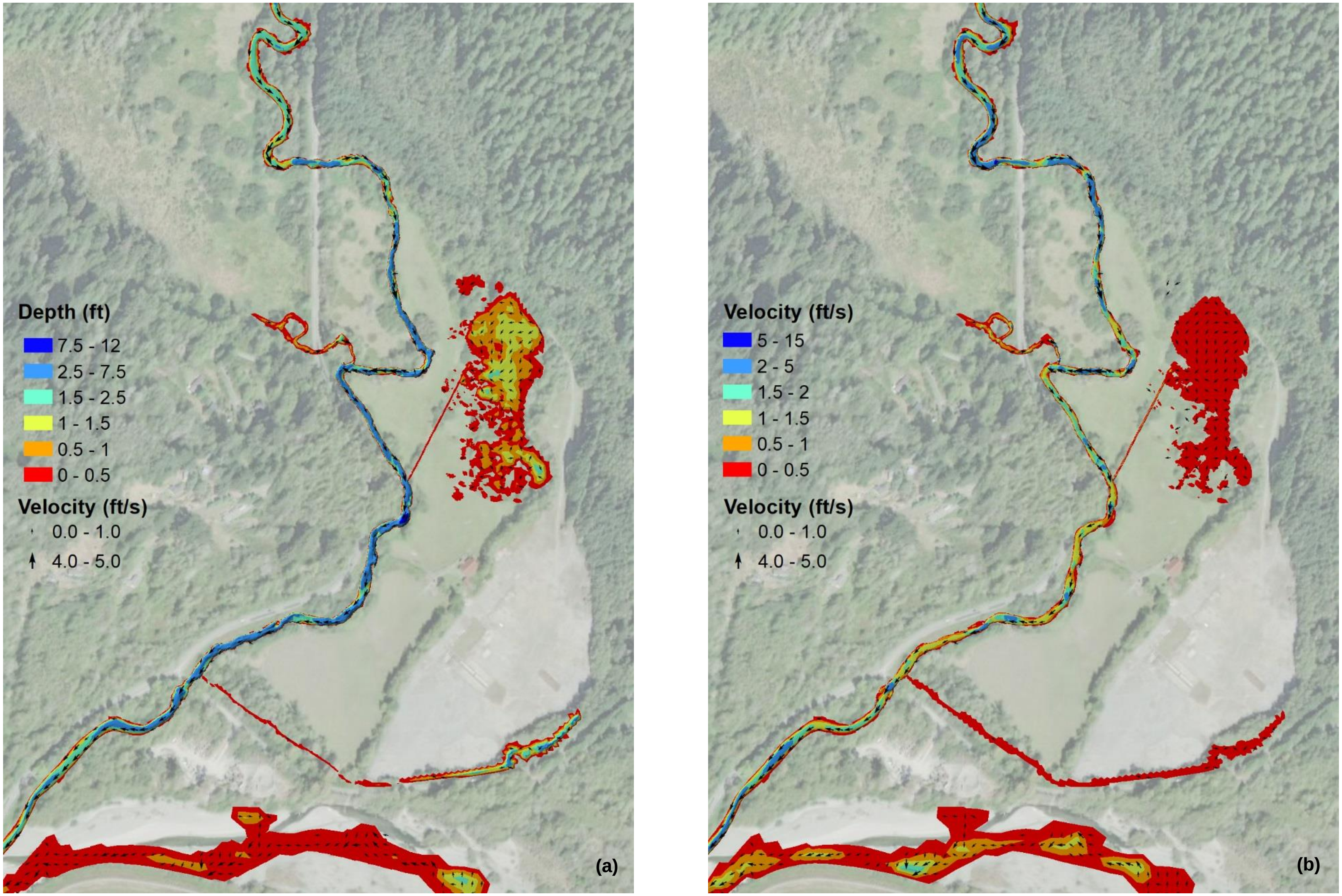

Figure 17. Predicted existing condition Prairie Creek depth and velocity vectors (a), and velocity magnitude and vectors (b) flow fields within the Project area for the 150 cfs flow.

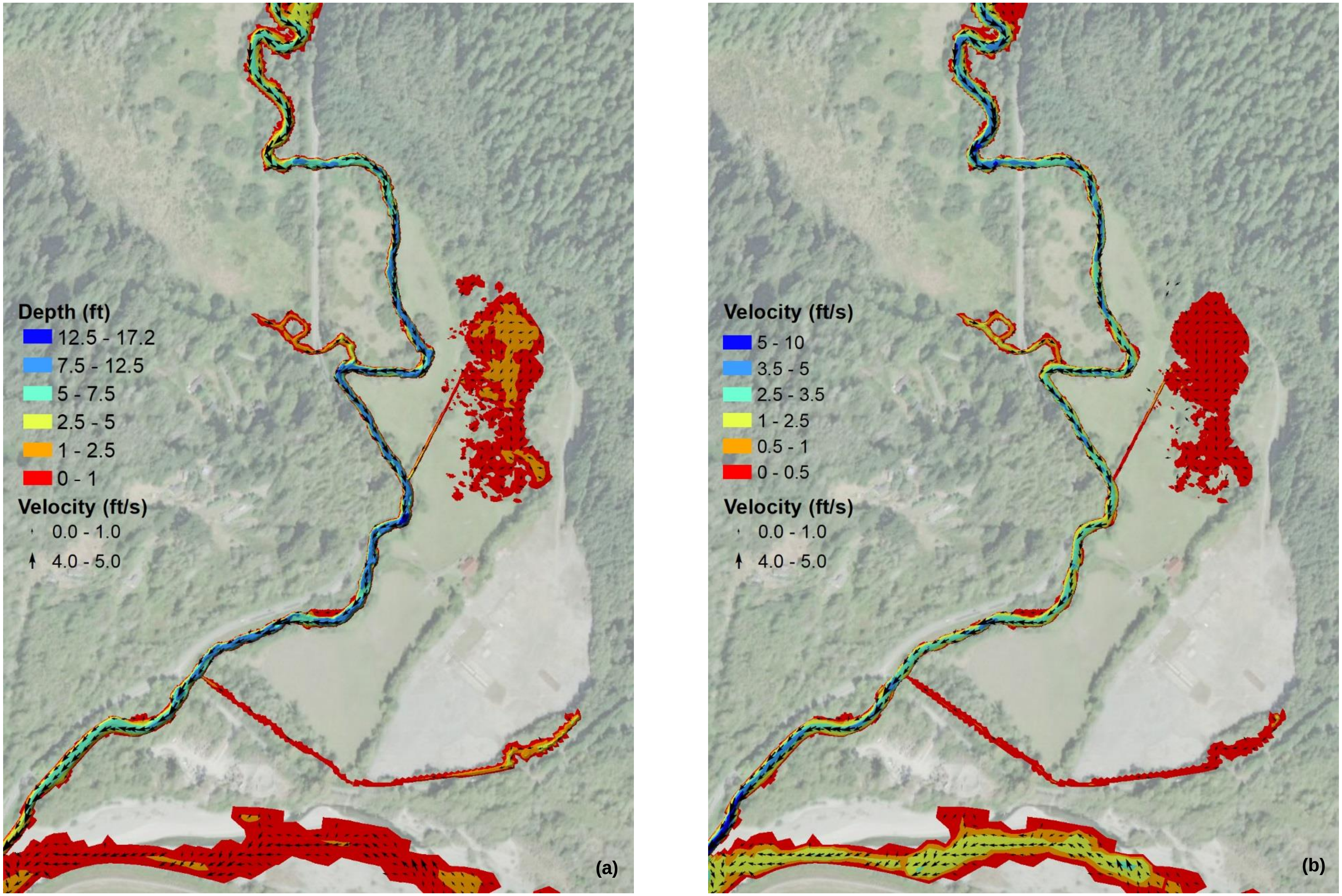

Figure 18. Predicted existing condition Prairie Creek depth and velocity vectors (a), and velocity magnitude and vectors (b) flow fields within the Project area for the 900 cfs flow.

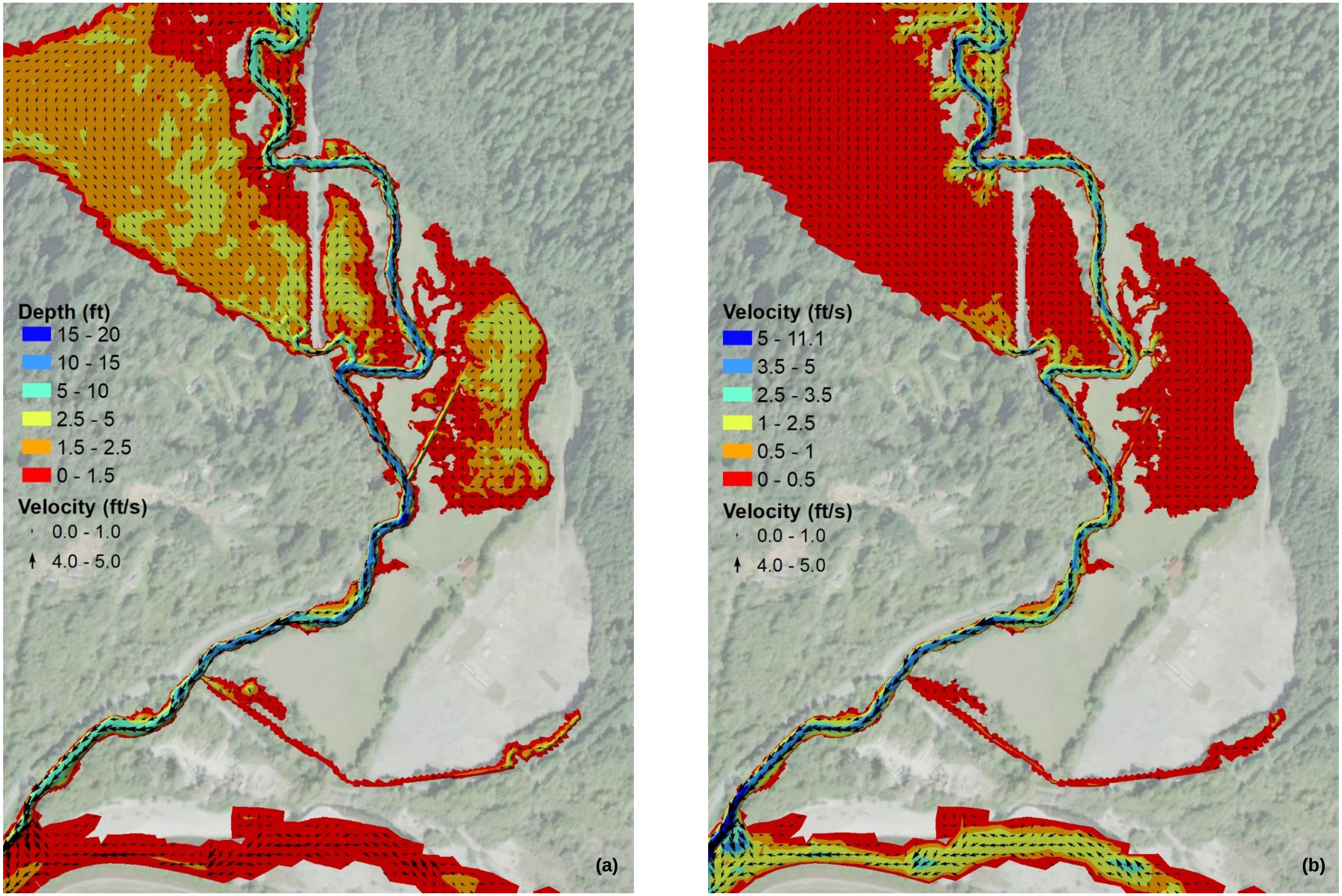

Figure 19. Predicted existing condition Prairie Creek depth and velocity vectors (a), and velocity magnitude and vectors (b) flow fields within the Project area for the 1,700 cfs flow (1.25-yr peak-flow).

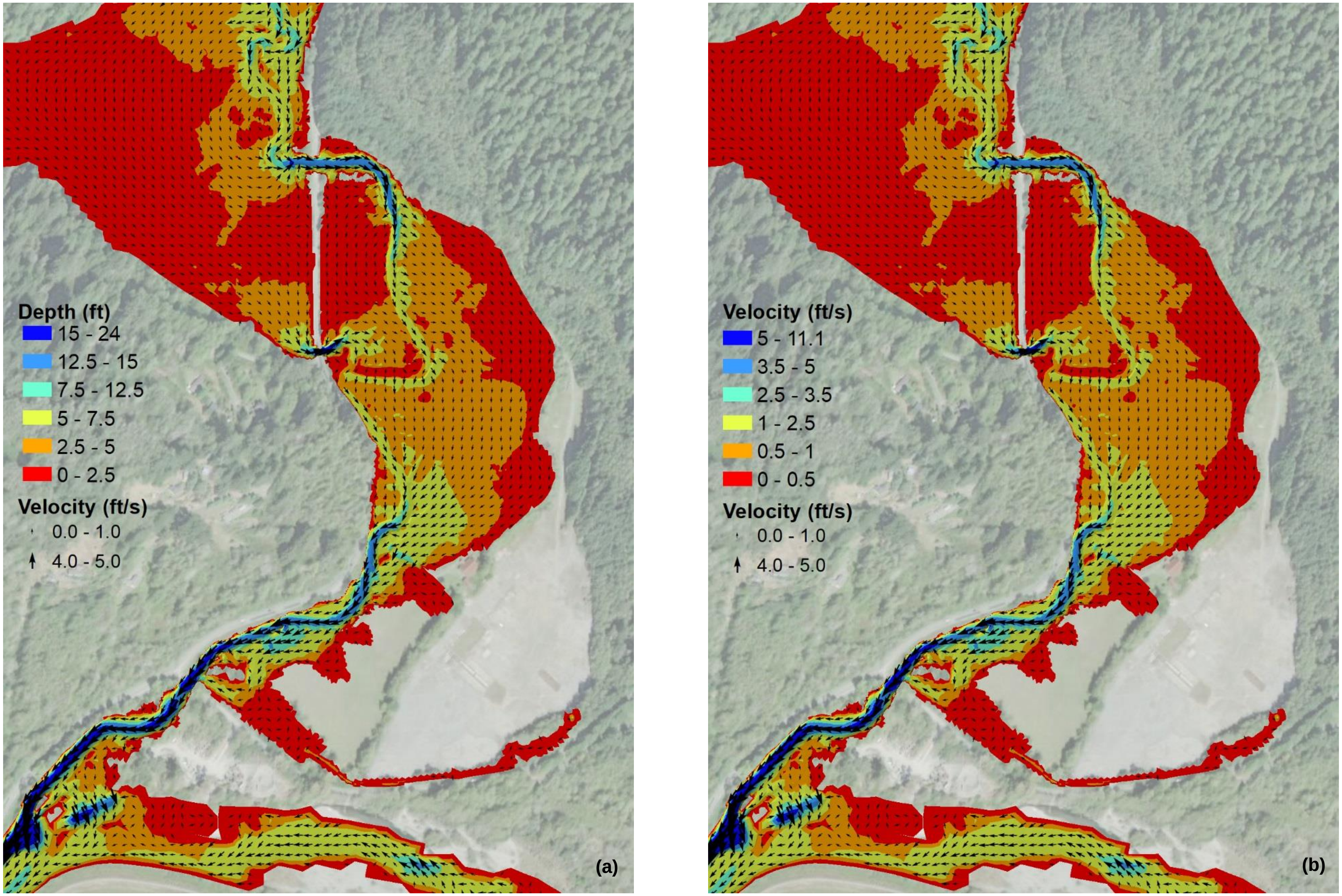

Figure 20. Predicted existing condition Prairie Creek depth and velocity vectors (a), and velocity magnitude and vectors (b) flow fields within the Project area for the 3,300 cfs flow (2-yr peak-flow).

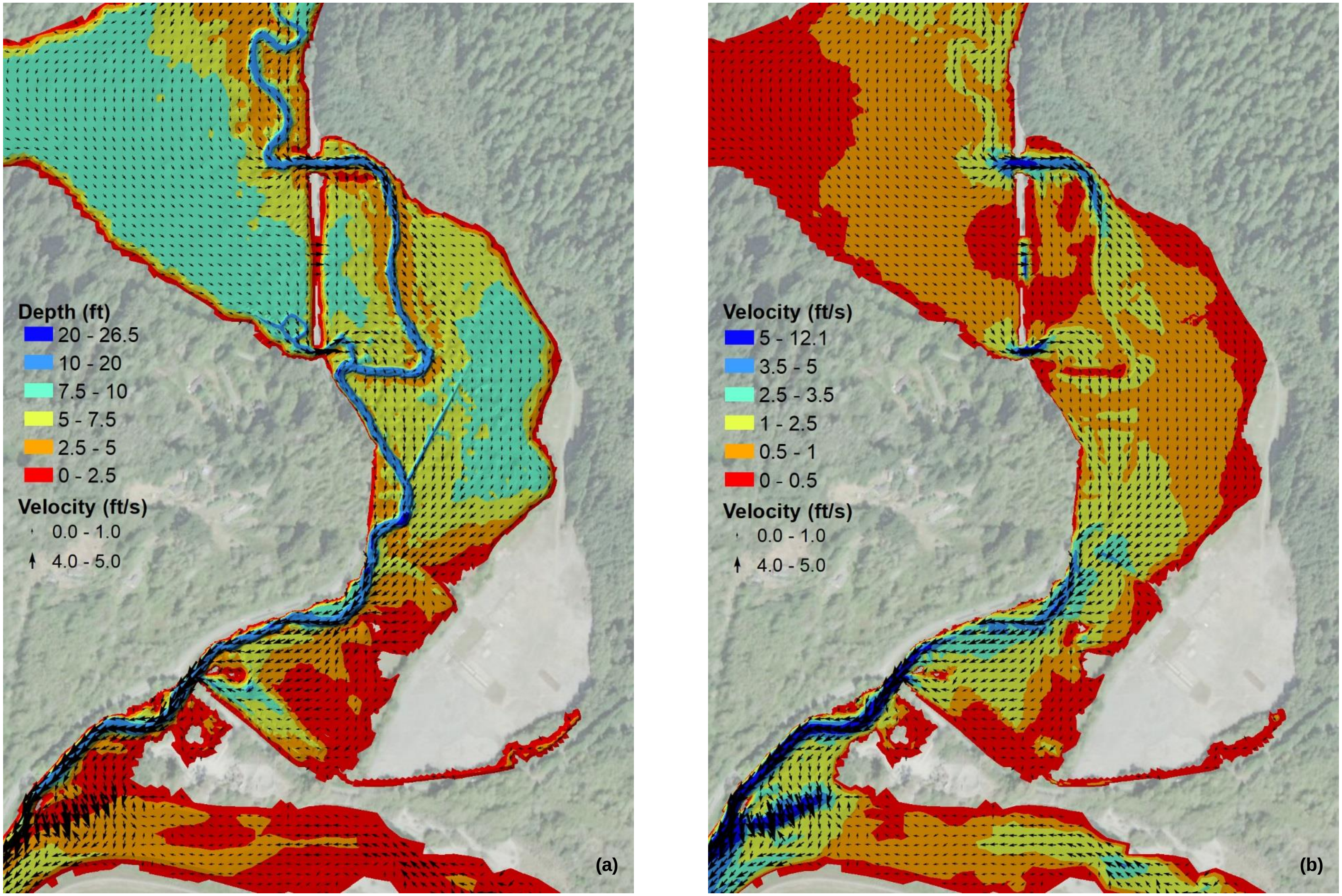

Figure 21. Predicted existing condition Prairie Creek depth and velocity vectors (a), and velocity magnitude and vectors (b) flow fields within the Project area for the 5,570 cfs flow (5-yr peak-flow).

GROUNDWATER

The Project area and lower Prairie Creek basin to the confluence with Little Lost Man Creek are part of the Redwood Creek Area groundwater basin (Basin No. 1-26) which is 2,000 acres (3.1 mi^2) in size (DWR, 2003 and 2016). Based on a 1996 survey, the California Department of Water Resources (DWR) estimates groundwater extraction in the Redwood Creek Area at 500 acre-feet for agricultural use and 80 acre-feet for municipal and industrial use (DWR, 2003). The Redwood Creek Area groundwater basin is classified as very low priority as it relates to the California Statewide Groundwater Elevation Monitoring (CASGEM) program and the Sustainable Groundwater Management Act (SGMA), and the basin does not currently have a sustainable groundwater management plan. A groundwater well currently exists at the Project area that provided domestic/industrial water for the former Orick Mill A site.

Hydrogeologic information for the Redwood Creek Basin is limited to site specific studies and information. Over the past few years several studies have been conducted to better understand groundwater and subsurface conditions at the Project area. LACO (2010) conducted a preliminary onsite wastewater suitability investigation of the Project area focused on providing information on soil and groundwater conditions below the large paved area of the former Mill A site. In 2011, LACO (2011a) conducted a water well production test on the existing groundwater well. Also, in 2011, LACO (2011b) conducted a detailed wet-weather testing and site suitability evaluation of soil and groundwater conditions below the paved area for an onsite wastewater system. Beginning in 2015, McBain Associates (MA) installed eight monitoring wells in the pasture area west of the paved area to better understand shallow groundwater conditions to support restoration and revegetation activities at the Project area (MA, 2019; LACO, 2015). Continuous groundwater levels have been collected since 2015 at 15-minute intervals in six of the monitoring wells (MA, 2019). Figure 22 shows the location of the LACO temporary piezometers, MA monitoring wells, and NHE water level loggers at the Project area.

This section briefly summarizes the four Project area studies described above to provide a basic overview of site hydrogeologic and groundwater conditions. These documents should be reviewed for a more detailed description and discussion of site groundwater, soil and hydrogeologic conditions and available data.

Hydrogeology

The Project area occupies a low-gradient, elongated stream valley underlain by a thick sequence of stream and overbank deposits from Prairie and Redwood Creeks that overly bedrock (LACO, 2010 and 2011b). The existing groundwater well was installed to a depth of 118 feet. Based on the well driller logs, as reported by LACO (2011b), “yellow clay” exists from 0- to 35-feet and “blue clay” exists from 35- to 80-feet, underlain by “cemented gravels and water gravels”. During drilling the initial depth to groundwater was 95 feet, and the static level following well completion was 15 feet. Given this information regarding groundwater response in the drilled well and the presence of thick clay layers overlying deeper gravels, LACO (2010 and 2011b) concluded that the deeper aquifer was partially to fully confined.

Based on subsurface investigations and groundwater level monitoring below the paved area LACO (2011b) also identified a shallow zone of perched groundwater to exist at the Project area. Subsequent groundwater level monitoring and monitoring well log information (MA, 2019) indicates the shallow perched groundwater zone extends over the entire low-lying area of the Project area. LACO (2011b) interpreted seasonal groundwater level response to indicate that the shallow perched groundwater layer is an open, unconfined water table aquifer that is separate from the deeper confined aquifer.

Testing of the existing groundwater well at the Project area by LACO (2011a) indicated that the well could produce 23 gallons per minute with a 0.35-foot drawdown over 24-hours. However, this rate was considered a minimum due to pump limitations and LACO estimated that the existing well could produce about 35 gallons per minute with less than 1-foot drawdown.

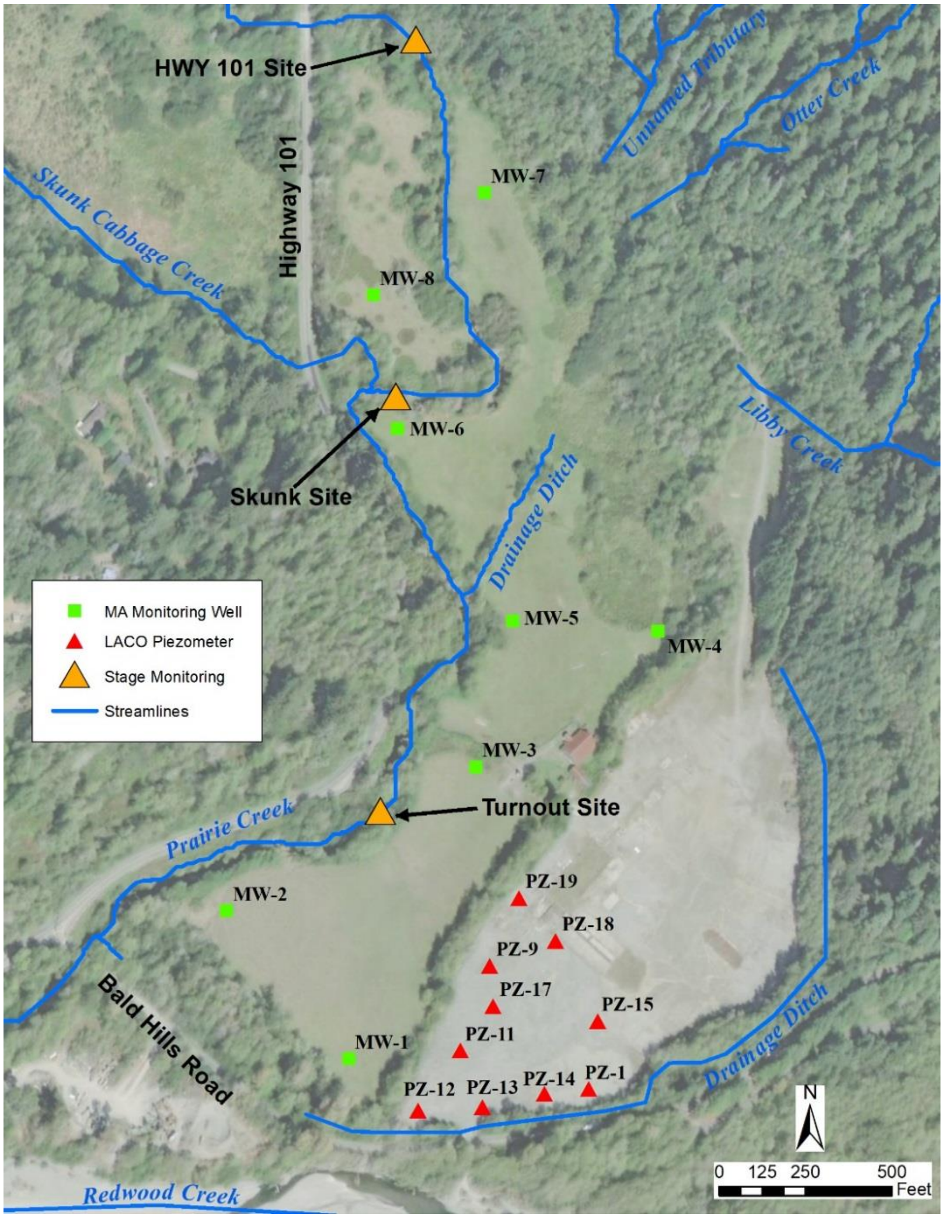

Figure 22. Location of LACO temporary piezometers, MA monitoring wells, and NHE water level loggers within the Project area.

Native, subsurface soil conditions are based on continuous cored borings and test pits by LACO (2010 and 2011b) and monitoring well logs (MA, 2019; LACO 2015). The southerly portion of the Project area closest to Redwood Creek consists of loam soils grading to sandy loam and loamy sand and then to sand, and likely represent overbank deposits from Redwood Creek. The lower sandy layers are interbedded with coarser sands and gravels and are interpreted to represent former channel deposits within abandoned Redwood and Prairie Creek meander bends (LACO, 2011b). Soils in the northerly portion of the Project area consist of finer grained sand, silts and clays then exist on the southerly end and likely originate from Prairie Creek overbank deposits. The northerly soils consist of silt and silty sand grading to sandy clays and dense, fine grained clays.

Shallow Groundwater Levels

Between 18 February and 9 March 2011, LACO (2011b) manually measured groundwater levels in 13 temporary piezometers (Figure 22) located in the paved area immediately following significant precipitation events to determine maximum groundwater levels or minimum depths to groundwater. This period of monitoring represents wet-weather conditions (winter and spring) and observed groundwater gradients were gently sloping to the west towards Prairie Creek. Groundwater monitoring of 8 monitoring wells (Figure 22) in the westerly pasture area has been conducted by MA (2019) since 2015, with a focus on understanding minimum groundwater levels or maximum depths to groundwater to support restoration and revegetation efforts. Consistent with LACOs findings, observed groundwater gradients are east-to-west towards Prairie Creek during the wet-weather periods (winter and spring) when groundwater levels are the highest. However, during the dry period (summer and fall) when groundwater levels are low, groundwater gradients shift and slope north-to-south towards Redwood Creek (MA, 2019).

Continuous groundwater level measurements have been made by MA in six of the monitoring wells since 2015. These measurements provide information on how groundwater water levels respond seasonally to infiltration across the site and Prairie Creek water levels. Figure 23 shows the groundwater elevations in monitoring wells compared to the Prairie Creek water surface elevations measured at the closest monitoring sites (Figure 22). Maximum groundwater levels occur in the winter to spring period and drop through the summer; minimum levels occur in the fall. These seasonal groundwater levels are consistent with Prairie Creek flow and water levels and demonstrate the connection between Prairie Creek, the shallow unconfined aquifer and precipitation patterns in the Project area. MA (2019) also noted that Prairie Creek gains water from shallow groundwater during winter and loses water to the adjacent groundwater in summer and fall. However, evaluation of the groundwater data and Prairie Creek profile and water level data indicates that the summer and fall Prairie Creek to groundwater relation is complicated and Prairie Creek may gain and lose water to groundwater over the Project area dependent on location to surface water sources.

Maximum and minimum depths to groundwater were estimated in the Project Area (Figure 24). These estimates are referenced to native ground elevations which were estimated below the paved area of the former Mill A site. Both minimum and maximum groundwater depths are a function of time of year, location to surface water sources and existing ground topography. Figure 24a shows the minimum depth to groundwater (maximum groundwater elevations) below native ground levels at both the LACO (2011b) piezometers for the 18 February and 9 March 2011 observation period, and the MA (2019) monitoring wells for the 2015 to 2018 period. Although these minimum groundwater depth observations occurred over different years, they demonstrate groundwater patterns within the Project Area. Figure 24b shows the maximum depth to groundwater (minimum groundwater elevations) at the MA (2019) monitoring wells observed for the 2015 to 2018 period.

Groundwater Summary

Based on Project area studies, the site consists of at least two distinct aquifers; a deep, fully or partially confined aquifer separated from a perched unconfined aquifer by a thick layer of clay material. The lower confined aquifer supports domestic water well development. Water levels in the perched unconfined aquifer are seasonally responsive to infiltration of precipitation, surface water, and Prairie Creek and Redwood Creek water levels. Shallow groundwater gradients are east-to-west towards Prairie Creek during the wet-weather period (winter and spring) when groundwater levels are highest and shift north-to-south towards Redwood Creek in the dry period (summer and fall) when groundwater levels are low.

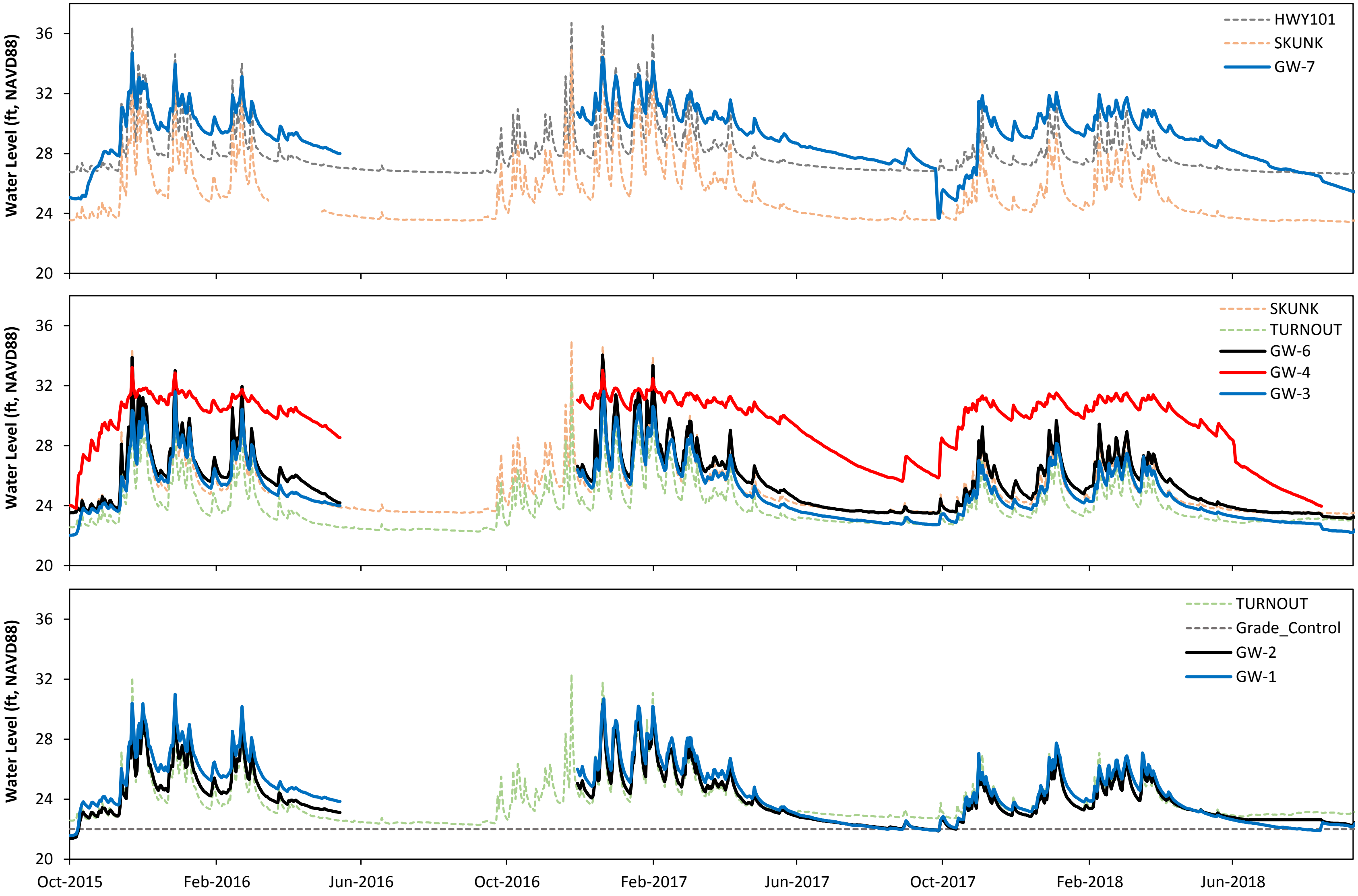

Figure 23. **Observed MA monitoring well groundwater elevations compared to bounding NHE Prairie Creek water surface elevations. (a) MW-7 compared to HWY101 and SKUNK, (b) MW-6, MW-4 and MW-3 compared to SKUNK and TURNOUT, and (c) MW-1 and MW-2 compared to TURNOUT and the grade control elevation at the Bald Hills Road bridge which controls Prairie Creek water levels.**

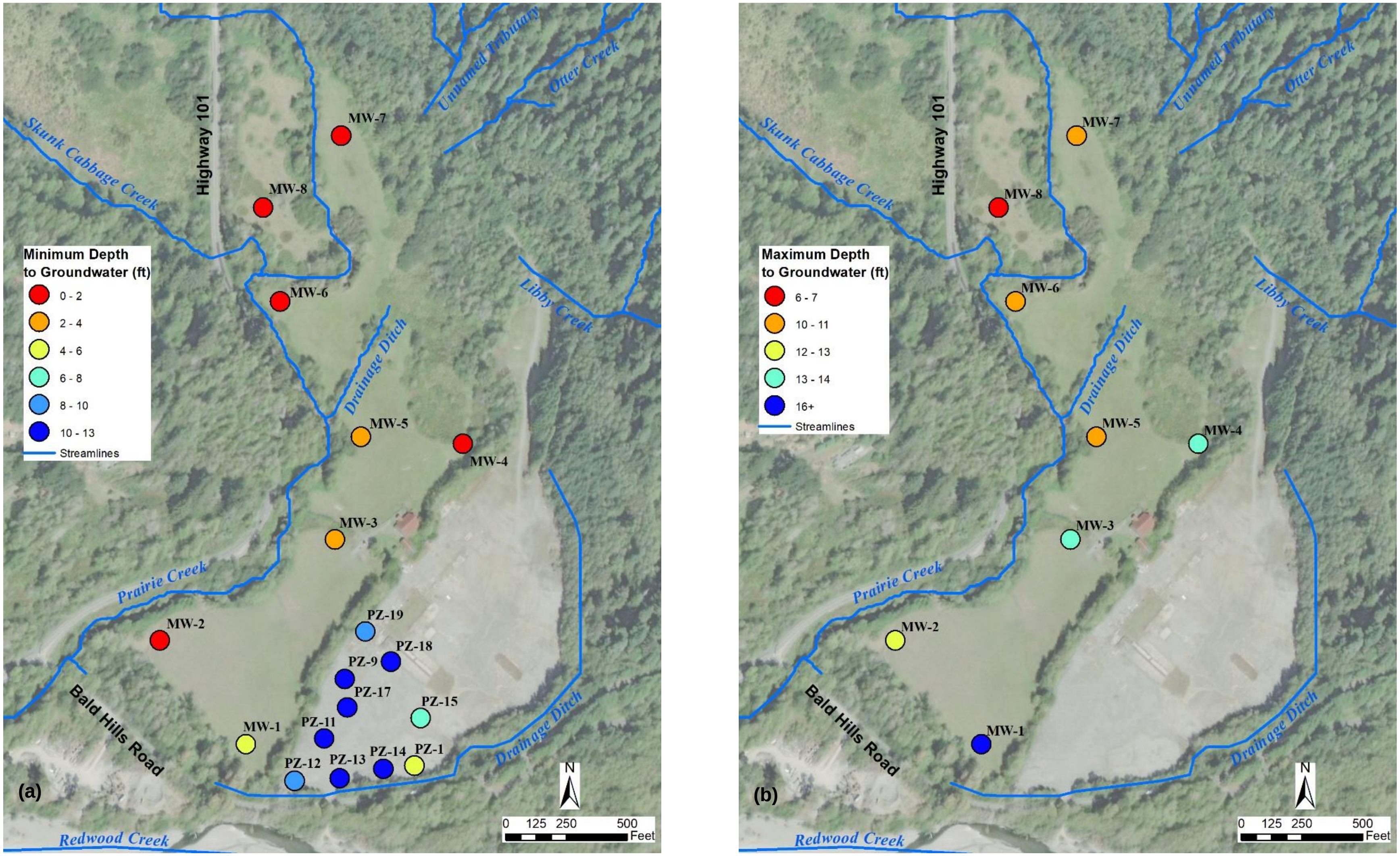

Figure 24. Observed minimum (a) and maximum (b) depth to groundwater below native ground based on LACO temporary piezometer observations (18 February and 9 March 2011) and MA monitoring well observations (2015 to 2018). The depths to groundwater are related to the estimated native ground elevations below the paved area.

WATER QUALITY

Water quality observations of surface water within the Project area is limited and only available for Prairie Creek and Skunk Cabbage Creek. No water quality observations exist for the other surface waters or groundwater within the Project area.

Temperature

It has been well documented (e.g. Cannata, 2006; Wilzbach and Ozaki, 2017) that the Prairie Creek basin maintains suitable water temperatures for salmonids due to channel shade, climate conditions and coastal fog which moderates air and water temperatures. The USEPA (2003) designated 16 °C as the maximum weekly maximum temperature (MWMT) (also known as the 7-day average of the daily maximum temperatures (7-DADM)) that should not be exceeded in areas designated as core rearing locations.

Cannata (2006) noted that the maximum weekly average temperature (MWAT) (maximum 7-day running average of daily temperatures) at two locations on mainstem Prairie Creek located above the Project area was 13.9 °C (57 °F) from 1997 to 2001. Maximum daily water temperatures in Prairie Creek during the 1997 to 2001 period ranged from 14.4 to 17.2 °C (58 to 63 °F). Wilzbach and Ozaki (2017) provided a summary of MWMT spanning 1997 to 2015 for Prairie Creek and tributaries (Figure 17 in Wilzbach and Ozaki, 2017). Based on this information they concluded that water temperatures in the Prairie Creek basin were suitable throughout the year to support salmonids and other cold-water species. Although they noted that prior to 2007 MWMT exceeded 16 °C (by approximately 1 °C) for some years in Prairie, Lost Man and Little Lost Man Creeks. Recently, Ozaki and Truesdell (2017) collected continuous water quality data (temperature, dissolved oxygen, pH and conductivity) using YSI Sondes for 2-week periods at multiple locations in lower Prairie Creek and tributaries in late spring and early fall in 2016, which included sampling within the Project area. Prairie Creek below the HWY101 bridge was sampled twice on 26 April to 11 May 2016 and 21 June to 7 July 2016, and Skunk Cabbage Creek was sampled on 24 May to 9 June 2016 and 13 September to 3 October 2016. Given the sampling regime, MWAT and MWMT estimates could not be determined, but the maximum observed temperatures during the sampling periods was 15.6 °C (60 °F) in Prairie Creek below the HWY101 bridge, and 15.3 °C (59 °F) in Skunk Cabbage Creek upstream of HWY101. Ozaki and Truesdell (2017) monitoring documented no change in average temperatures between Prairie Creek above Wolf Creek bridge and Prairie Creek below HWY101 bridge (located approximately 3.7 stream miles apart) but did document a 0.9 °C increase in maximum temperatures between the two sites.

As part of the NHE sampling efforts, continuous water temperature has been collected at 15-minute intervals at HWY101, SKUNK and TURNOUT sites (Figure 10) since February 2015. This temperature information provides three continuous WYs of water temperatures and four years of summer MWAT and MWMT values at each sampling site within the Project area. The continuous water temperature data at all three sampling sites is summarized in Table 8, and the continuous mean weekly average temperatures at each site is shown in Figure 25. The maximum value each year in Figure 25 would be the MWAT value.

Table 8. Summary of Prairie Creek water temperatures at HWY101, SKUNK and TURNOUT sampling sites.

Prairie Creek Sampling Site	Water Year	Temperature (°C)					
		MWAT	MWMT	Avg 15-min Data	Min 15-min Data	Max 15-min Data	Max Diurnal Change
HWY101	2015	15.9	17.0	12.9	7.2	17.8	3.0
SKUNK		16.0	16.8	13.0	7.3	17.4	3.0
TURNOUT		16.2	16.9	13.1	7.3	17.4	2.8
HWY101	2016	15.0	16.2	11.6	5.3	16.5	3.0
SKUNK		15.1	16.0	11.8	5.4	16.3	2.5
TURNOUT		15.3	15.9	11.8	5.4	16.2	2.7
HWY101	2017	15.0	15.9	11.1	5.5	16.2	2.7
SKUNK		15.2	16.0	11.2	5.6	16.2	2.6
TURNOUT		15.4	16.0	11.3	5.5	16.1	2.5
HWY101	2018	14.5	15.7	10.7	4.7	16.0	3.1
SKUNK		14.7	15.8	10.8	4.9	16.0	3.0
TURNOUT		15.0	15.7	11.0	4.9	15.9	2.9

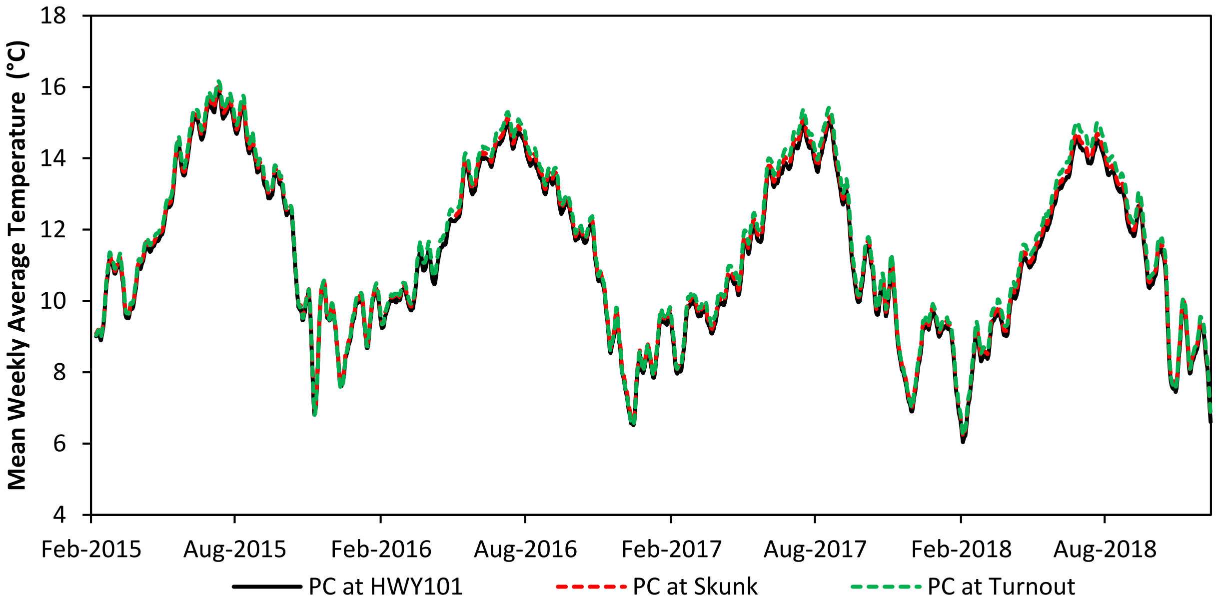

Figure 25. Prairie Creek continuous mean weekly average temperature at HWY101, SKUNK and TURNOUT sampling sites for February 2015 to December 2018. The maximum value each year is the maximum weekly average temperature (MWAT) value.

Collected data indicate that Prairie Creek and Skunk Cabbage Creek water temperatures within the Project area are suitable for salmonid production and consistent with other Prairie Creek observations and suitability conclusions. MWMT for WY 2016, 2017 and 2018 are all at or below the 16 °C threshold, with the WY 2015 MWMT slightly above at 17 °C. In general Prairie Creek MWMT changes little within the Project reach, although MWAT and average temperatures do increase slightly (~ 0.3 and 0.5 °C) between the upstream HWY101 site and the downstream TURNOUT site.

Dissolved Oxygen, PH and Conductivity

The only available water quality data in the Project area describing water quality constituents other than temperature is the dissolved oxygen, pH and conductivity continuous Sonde data collected by Ozaki and Truesdell (2017). The North Coast Regional Water Quality Control Board (RWB) has established water quality objectives to support beneficial uses for inland surface waters (RWB, 2018) applicable to Prairie Creek. The dissolved oxygen objective is

- Cold Freshwater Habitat (COLD): daily minimum = 6 mg/L; 7-day moving average = 8 mg/L,
- Spawning, Reproduction and/or Early Development (SPWN): daily minimum = 9 mg/L; 7-day moving average = 11 mg/L.

The pH objective for the Redwood Creek basin has a minimum and maximum range of 6.5 to 8.5. The specific conductance objective for the Redwood Creek basin is a 90% upper limit of 220 micromhos, and a 50% upper limit of 125 micromhos.

The Ozaki and Truesdell (2017) data were not collected long enough to establish meaningful 7-day averages for dissolved oxygen or 50% and 90% limits for specific conductance. However, the reported mean results and constituent plots do provide basic background information regarding dissolved oxygen, pH and specific conductivity levels in Prairie Creek and Skunk Cabbage Creek within the Project area.

Reported average dissolved oxygen, pH and conductivity in Prairie Creek below the HWY101 bridge for the 26 April to 11 May 2016 and 21 June to 7 July 2016 sampling periods was 9.8 mg/L, 7.0 pH units, and 81.4 uS/cm, respectively. Plots of these three constituents for Prairie Creek (Appendix C in Ozaki and Truesdell, 2017) show little sampling period or diurnal variation. The average dissolved oxygen concentration of 9.8 mg/L exceeds the COLD and SPWN objectives, and the average pH of 7 meets the Redwood Creek objective. Although the specific conductivity data were not collected for a sufficient amount of time to compute the 50% and 90% limits for specific conductance objectives, the reported mean specific conductivity of 81 uS/cm is low.

Reported average dissolved oxygen, pH and conductivity in Skunk Cabbage Creek above HWY101 for the 24 May to 9 June 2016 and 13 September to 3 October 2016 sampling periods was 1.4 mg/L, 5.9 pH units, and 95.9 uS/cm, respectively. Plots of these three constituents for Skunk Cabbage Creek (Appendix C in Ozaki and Truesdell, 2017) also show little period or diurnal variation over the sampling periods. Dissolved oxygen and pH levels in Skunk Cabbage Creek are low and do not meet RWB objectives. Wilzbach and Ozaki (2017) also reported a low pH value of 5.9 for Skunk Cabbage Creek based on NPS sampling during the summer of 2014 that may reflect leaching of humic acids into the channel from the wetland vegetation. The observed dark tannin color of the Skunk Cabbage Creek water and low dissolved oxygen and pH values likely support the premise that Skunk Cabbage Creek water quality is likely affected by the large upstream wetland and observed reed canary grass mats on the creek surface.

Ozaki and Truesdell (2017) and Wilzbach and Ozaki (2017) concluded that except for Skunk Cabbage Creek, Prairie Creek and tributary mean dissolved oxygen levels have not been problematic and are suitable for rearing salmonids. However, despite the low dissolved oxygen and pH levels observed in Skunk Cabbage Creek, December 2016 fish sampling in Skunk Cabbage Creek captured Coho, Steelhead and other fish species 300 to 400 meters upstream of HWY101 (Nicholas P. Van Vleet via Bob Pagliuco, personal communication).

Water quality data is not available in Prairie Creek downstream of the confluence with Skunk Cabbage Creek to understand how Skunk Cabbage Creek affects Prairie Creek dissolved oxygen and pH levels. To provide some insight, a simple mass balance was conducted between the Prairie Creek and Skunk Cabbage Creek mean dissolved oxygen and pH values reported by Ozaki and Truesdell (2017) and the ratio of streamflow between these two tributaries (Table 3). Results of the mass balance are summarized below.

- Dissolved oxygen: Using a mean Prairie Creek value of 9.8 mg/L, a Skunk Cabbage Creek value of 1.4 mg/L, and a Skunk Cabbage Creek to Prairie Creek flow ratio of 0.06208, the mass balance gives a combined Prairie Creek dissolved oxygen level of 9.3 mg/L. The resulting downstream Prairie Creek dissolved oxygen value is approximately 5% lower than the value upstream of the Skunk Cabbage Creek confluence.
- pH: Using a mean Prairie Creek value of 7.0, a Skunk Cabbage Creek value of 5.9, and a Skunk Cabbage Creek to Prairie Creek flow ratio of 0.06208, the mass balance (in non-Log units) gives a combined Prairie Creek pH level of 6.98. The resulting downstream Prairie Creek pH value is approximately 5.4% lower than the value upstream of the Skunk Cabbage Creek confluence.

Results of this simple mass balance exercise indicate that the low Skunk Cabbage Creek dissolved oxygen and pH values have minimal effect on the Prairie Creek values that exist above the confluence of these two creeks. The resulting Prairie Creek dissolved oxygen and pH levels below the confluence of Skunk Cabbage Creek still meet RWB objectives. Furthermore, given that the Skunk Cabbage Creek tannin colored water likely consists of refractory dissolved organic carbon that decomposes slowly and would not exert a significant oxygen demand, the cold water temperatures and streamflow conditions promoting re-aeriation, dissolved oxygen levels in Prairie Creek would likely begin to increase immediately downstream of the confluence with Skunk Cabbage Creek.

Sediment

The Redwood Creek basin (Figure 1) was listed as sediment impaired in 1992 on California's Clean Water Act Section 303(d) list. Road building and timber harvest were identified as the primary cause of elevated sediment production; however, the TMDL acknowledged that Prairie Creek was less impacted than the rest of the Redwood Creek watershed (Wilzbach and Ozaki, 2017). RNSP began operating flow and suspended sediment concentration (SSC) gages in Prairie Creek in 1990 (Wilzbach and Ozaki, 2017); however, these gauges may not reflect conditions in the Project reach because they are either located in pristine areas of the watershed, or on smaller tributaries to Prairie Creek where the majority of the watershed was heavily disturbed by logging and road building. In addition, the gauge locations were situated to detect certain impacts from actions within those watersheds including the construction of the HWY101 Prairie Creek Bypass and road removal projects in Lost Man Creek (Wilzbach and Ozaki, 2017). Impacts from the HWY101 bypass were detected with relatively short duration impacts with the exception of Boyes Creek which continued to have elevated sediment concentrations for the full 7-year monitoring period (Wilzbach and Ozaki, 2017). Elevated suspended sediment yield occurred following road removal projects (completed in 2010) and were expected to decline in the following years (Wilzbach and Ozaki, 2017).

A recent study examined turbidity, a measure of water clarity that is often used as a surrogate for suspended sediment data. Klein et al. (2011) summarized chronic turbidity levels for 9 stations in the Prairie Creek basin for data records from approximately 2003 to 2005 (data range varies for each station). These stations were also concentrated in the upper part of the watershed (upstream of Lost Man Creek). Using NMFS (2014) recovery criteria metric of numbers of hours per year exceeding 25 FNU, Prairie Creek above Brown Creek, Godwood Creek, Prairie Creek above Boyes Creek ranked very good, Little Lost Man (pristine) ranked good, and Lost Man Creek ranked good to fair (Wilzbach and Ozaki, 2017).

These studies indicate that the suspended sediment concentrations in the upper reaches of Prairie Creek (above May Creek) are not substantially elevated. However, disturbance increases substantially downstream of May Creek and no gauging occurs in Prairie Creek within the heavily disturbed section of creek where most of the area was logged prior to the establishment of Forest Practice Rules, and road building and ranching activities occurred. In addition to the sediment inputs from the tributaries, the stream channel was actively eroding the bank material, leading to armoring of the channel banks at numerous locations throughout lower Prairie Creek (Ozaki and Truesdell, 2017). Although sediment inputs are higher in disturbed reaches, it is uncertain how much sediment is conveyed downstream towards the Project area, and the magnitude of increase associated with the disturbance because Prairie Creek flows through broad floodplains where sediment may settle, rather than being routed downstream. In addition, HWY101 obstructs the downstream movement of overbank flows, forcing all water through the HWY101 bridge, Skunk Cabbage Creek culvert, or the culvert just north of Skunk Cabbage Creek. This obstruction further slows velocities both in the channel and across floodplains upstream of the site, further promoting sedimentation upstream of HWY101. Thus, it is uncertain how different suspended sediment concentrations are when they enter the Project area relative to upstream gauging stations.

The disturbed portions of Prairie Creek are on a trajectory of recovery as a result of natural recovery processes as well as projects implemented to address specific disturbances such as extensive road removal projects, rehabilitation of the Mill B site, revegetation, and wetland recovery.

Within the Project area, the main tributaries are Skunk Cabbage on the west side of the valley and Libby Creek, Otter Creek and an unnamed tributary on the east side of the valley. The tributaries entering from the east flow through undisturbed old-growth Redwood Forest with the exception of the lowest portion of the tributaries which cross the Upper and Lower Roads. The tributaries enter a broad wetland area that likely traps a significant portion of the sediment prior to entering Prairie Creek. Skunk Cabbage was heavily disturbed during logging and has been channelized, but sediment deliveries are not likely to be substantially elevated to Prairie Creek due to the extensive low gradient wetland areas the channel passes through prior to entering Prairie Creek and the flow impoundment that is created by HWY101 during high flows that further reduces velocities and promotes sedimentation.

Bank erosion along the Prairie Creek channel within the Project area has been halted along much of channel length by previous bank armoring. However, zones of elevated bank erosion still exist due to alteration of the vegetation and bank instabilities resulting from ranching operations that occurred prior to 2013.

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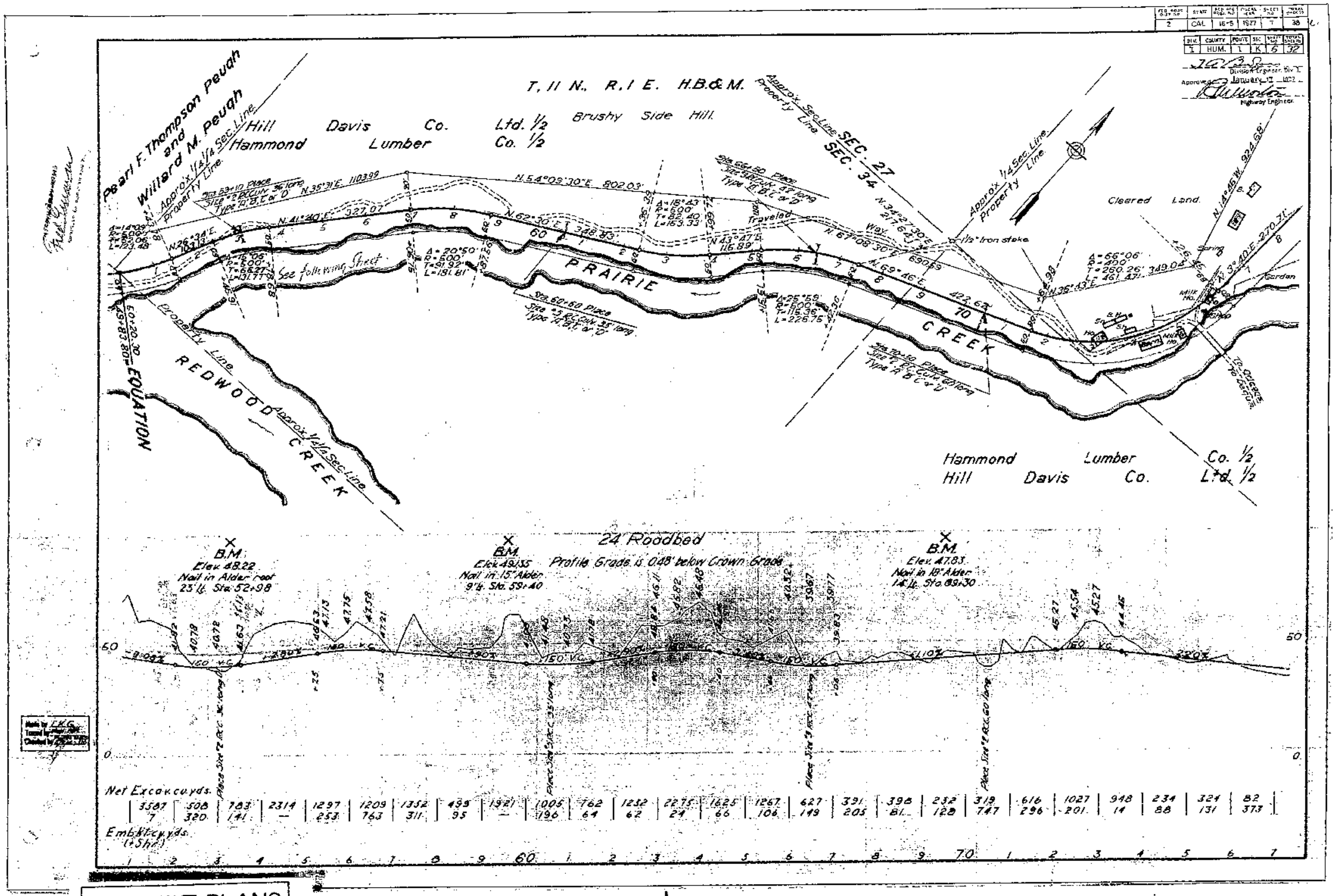
APPENDIX A

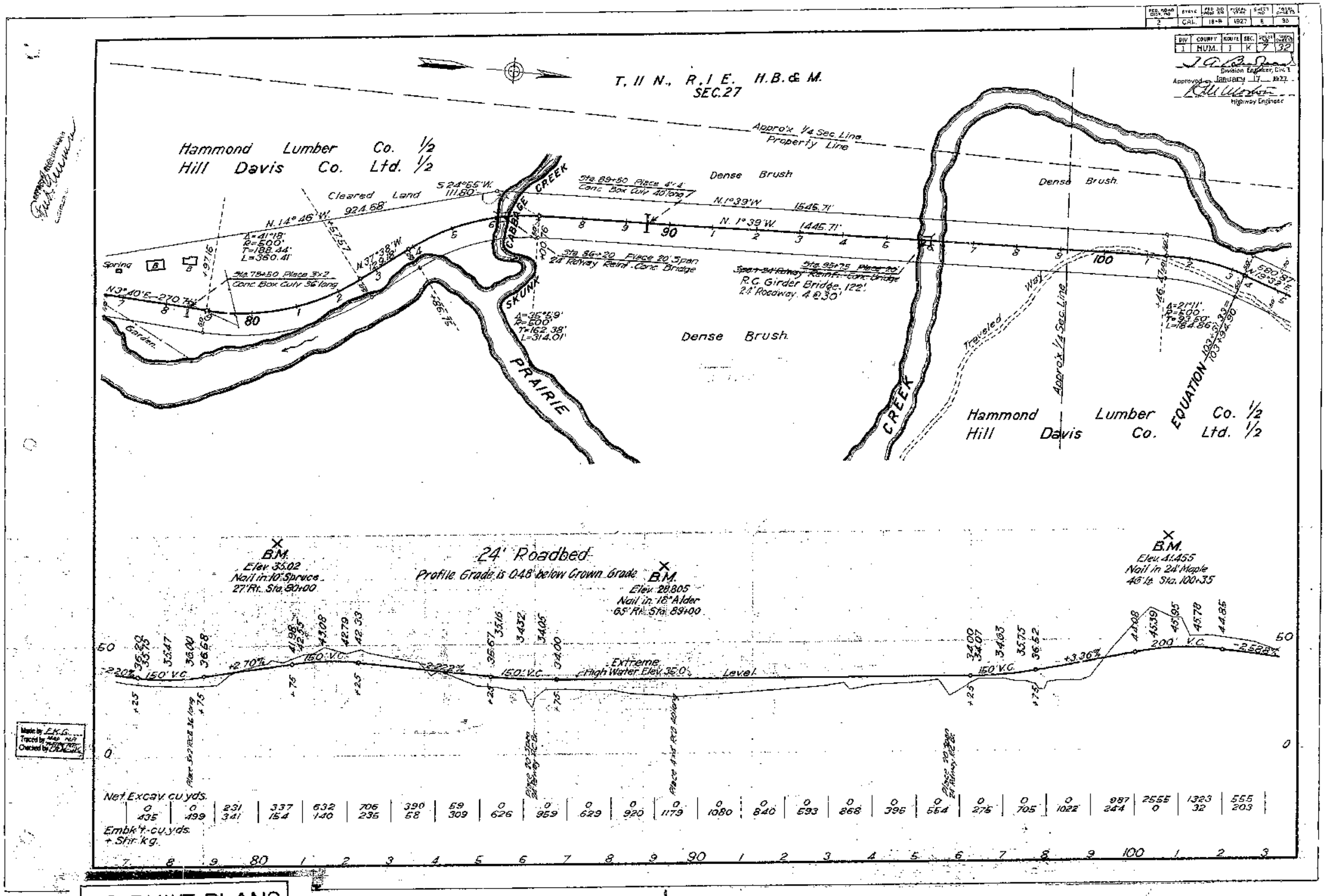
1927 As-Built Plans of HWY101 Construction



AS BUILT PLANS
Contract No. 524
Date Completed
Document No. 10001354

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 1-24-73 SIGNATURE TITLE Sr. Rmo



AS BUILT PLANS
Contract No. 524
Date Completed ——
Document No. 10001384

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DATE 1-24-73 SIGNATURE James E. Court TITLE S/R Rmo

Appendix L – 100-year Flood Comparison between Existing Condition and the Integrated Project at Redwood National and State Park Visitor Center and Restoration Project Area, Orick CA (Draft), NHE 2019b

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Engineering – Hydrology – Stream Restoration – Water Resources

DRAFT - TECHNICAL MEMORANDUM

Date: 5 July 2019

To: Jessica Carter
Director of Parks and Public Engagement
111 Sutter Street, 11th Floor
San Francisco, CA 94104

From: Jeffrey K. Anderson, P.E., C50713
Brian Draeger

Re: Draft – 100-year Flood Comparison between Existing Condition and the Integrated Project at the Redwood National and State Park Visitor Center and Restoration Project Area, Orick, CA

INTRODUCTION AND BACKGROUND

The Orick Mill site property is currently owned by Save the Redwoods League (League) and is undergoing planning, design and compliance efforts to support the Redwood National and State Park Visitor Center and Restoration Project (Project). This draft technical memorandum provides a brief comparison of 100-year flood levels between existing conditions at the Orick Mill site property (Figure 1) and the current design level of the Project.

In the fall and winter of 2018, the League and Project team consultants and partners participated in a multi-day planning/design effort to integrate all proposed Project components into a single cohesive project known as project integration. Prior to project integration the various components of the Project, such as the Visitor Center or Prairie Creek restoration, were more-or-less being developed independent of each other. One goal of integration was to develop a cohesive integrated Project that maximized restoration and development potential of the entire Project site. The resulting product was the Integrated Project Conceptual Design for the Redwood National and State Park Visitor Center and Restoration Project (Integrated Project) which includes the following components:

- Visitor Center Site
- Prairie Creek Channel and Floodplain
- Ceremonial Brush Dance Site
- Libby Creek Enhancement
- Westside Interface
- Eastside Restoration Area
- Upper Road
- Lower Road
- Southern Drainage Ditch Improvements

NHE developed a preliminary design grading surface of the Integrated Project (dated 2/28/2019). This preliminary design surface was modeled to understand the effects of the Integrated Project on existing 100-year flood levels in the Project area.

The information in this memo is provided to support CEQA and will ultimately be compiled into a design report or stand-alone document for the Project. Furthermore, this information may change and be expanded as the Project design advances, more site data is collected, and additional analysis is conducted in the future.

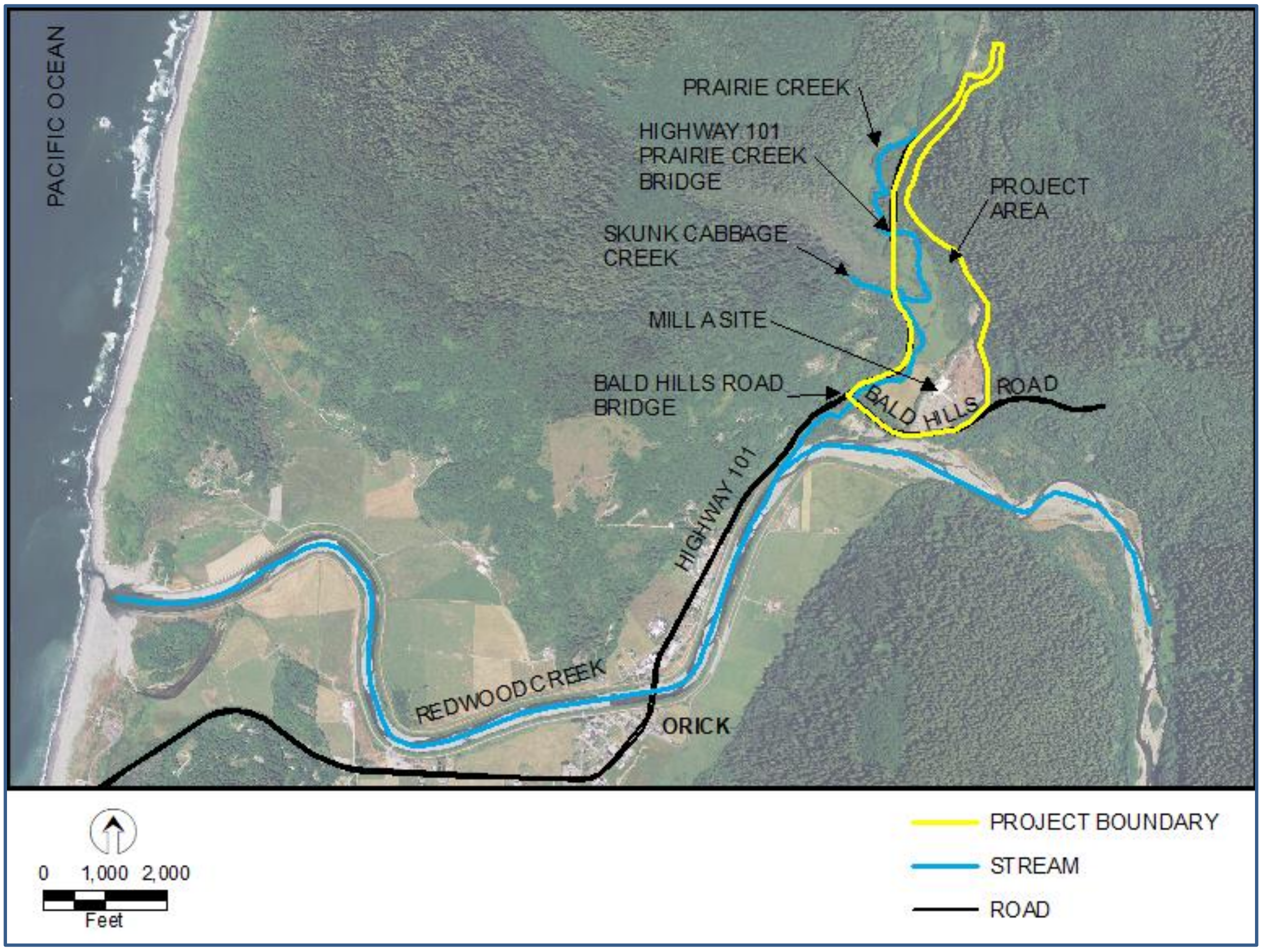

Figure 1. Redwood National and State Park Visitor Center and Restoration Project area and vicinity map.

PROJECT AREA DESCRIPTION AND FLOOD FLOW PATTERNS

The Project area is located just north of the confluence of Prairie Creek and Redwood Creek (Figure 1 and **Error! Reference source not found.**), and bounded by Highway 101 (HWY101) along the west, Bald Hills Road to the south, and two roads known as the Upper Road and Lower Road along the easterly edge. Steep forested terrain occurs along the north and easterly edge of the Project area, and Prairie Creek flows along the westerly edge before joining Redwood Creek just downstream of the Project area. Four tributaries (Skunk Cabbage Creek, Libby Creek, Otter Creek, and an Unnamed Tributary) join Prairie Creek within the Project area. The remaining portions of the Project area consist of riparian and wetland zones along Prairie Creek, formerly grazed pasture, and the large paved area of the former Orick Mill (Mill A).

Libby Creek, Otter Creek and the Unnamed Tributary flow through culvert crossings at the Upper and Lower Roads before discharging into the easterly wetland area which ultimately drains into a ditch that flows into Prairie Creek. A westerly wetland area exists between the HWY101 road fill prism and Prairie Creek and receives flood flows from Prairie Creek and Skunk Cabbage Creek. A drainage ditch located along the southern and eastern edges of the Project area receives runoff from the large Mill A paved area and localized hillslope runoff but does not have a contributing watershed area.

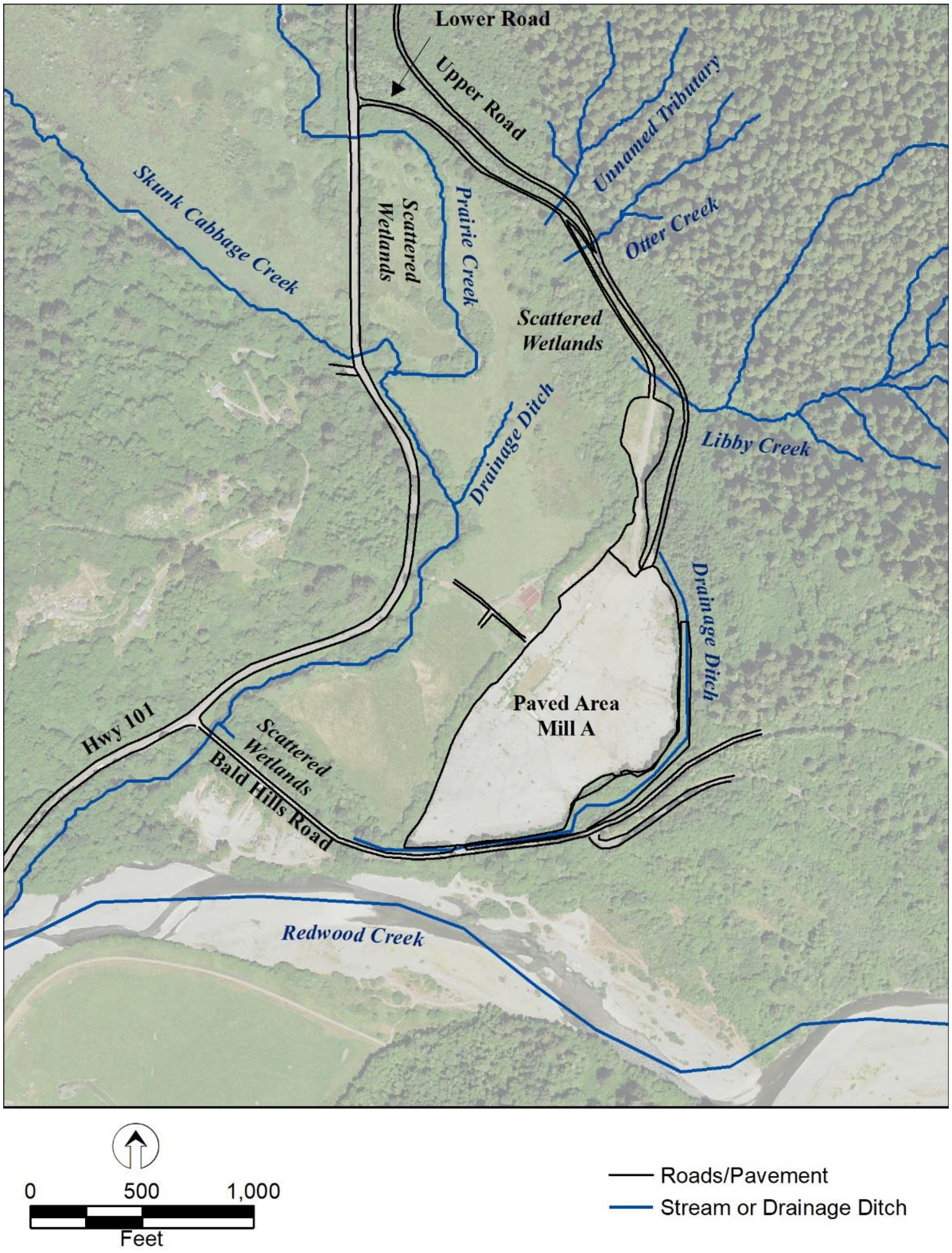

Figure 2. Project area streams, wetlands and drainage features.

Flood flow patterns within the Project area are controlled by Prairie Creek channel and floodplain conditions and anthropogenic features. Flows entering and exiting the Project area are controlled by the elevated roadways of HWY101 and Bald Hills Road that obstruct floodplain flows and force flows through relatively small crossings at each road. Larger peak-flows overtop these elevated roadways. The former Mill A site occupied the large paved area which is constructed on river run fill and elevated above natural grade to prevent flooding of the paved surface. Flood flows within the Project area are directed back towards Prairie Creek and HWY101 by this elevated paved area and the isolated former Redwood Creek floodplain located on the lower half of the Project area.

100-YEAR FLOOD MODELING

In 2014, NHE (2014) conducted a flood analysis to support planning efforts for restoration and development options at the Project area. That flood analysis used a one-dimensional HEC-RAS model (1D model) to predict 100-year flood levels within the Project area based on Prairie Creek flood flows and Redwood Creek backwater conditions. Two cases were analyzed to determine highest 100-year flood levels within the Project area:

- Case 1 consists of analyzing flood conditions assuming a 100-year flood flow in Prairie Creek and that Redwood Creek is not simultaneously flooding.
- Case 2 consists of analyzing flood conditions assuming a 100-year flood in Redwood Creek, but Prairie Creek does not have a simultaneous peak flood. For this case Prairie Creek flood flows were determined by scaling the Redwood Creek 100-year flood estimate (NHE and Manhard, 2013a), and downstream water surface elevations in Redwood Creek were obtained from FEMA 100-year flood profiles (NHE and Manhard, 2013b).

The NHE (2014) 1D model used an approach for modeling the confluence of Prairie Creek and Redwood Creek that did not allow flows over Bald Hills Road (assumed ineffective flow area) and effectively forced all flows through Bald Hills Road bridge. This approach simplified the complex flow conditions that occurs at the downstream end of the Project area due to the confluence of Prairie and Redwood Creeks but provided conservatively high flood levels within the Project area. Using this approach, the 1D model predicted maximum 100-year flood levels within the Project area for Case 1 flood conditions.

NHE recently developed a two-dimensional hydraulic model (2D model) of the Project area using the Bureau of Reclamation SRH-2D model (Lai, 2008) to support Prairie Creek restoration planning efforts. A description of the SRH-2D model development, calibration and validation will be provided in the Project design report and/or other supporting documents (in progress). An advantage of the 2D model over the 1D modeling approach is that the 2D model better simulates the complex flow field conditions at the downstream end of the Project area due to Bald Hills Road and the confluence of Prairie and Redwood Creeks.

To provide estimates of Integrated Project effects on 100-year flood levels, the existing condition topography (Figure 3a) and Integrated Project preliminary design surface (Figure 3b) were modeled using the developed 2D model. Topographic sources included NHE and LACO ground surveys (Prairie Creek and paved area), 2010 Coastal LiDAR (Project area), 2016 NPS LiDAR (areas upstream of HWY101), 2014 Humboldt County LiDAR (upstream reach of Redwood Creek) and the Integrated Project design surface. Both Case 1 and Case 2 flood conditions were analyzed and 2D model results indicate that Case 2 flood conditions provided the highest flood levels within the Project area. This result contrasted the previous flood analysis using the 1D model (NHE, 2014) where Case 1 flood conditions provided higher flood levels. Furthermore, the 2D model provided lower 100-year flood levels (approximately 1-foot lower) in the Project area than the 1D model due to flow condition assumptions at Bald Hills Road.

Table 1 summarizes the 2D model boundary conditions for the Case 2 flood conditions as defined in NHE (2014). It was necessary to modify the flood flow values for input into the 2D model as tributary flows were handled differently between the 1D and 2D models. The downstream water surface elevation in Redwood Creek was extracted from the FEMA 100-year flood profile (NHE and Manhard, 2013b) at the correct cross-section location. For the 2D model a flow boundary was applied to Libby Creek, but Otter Creek and the Unnamed Tributary flows were incorporated into the Prairie Creek flow boundary.

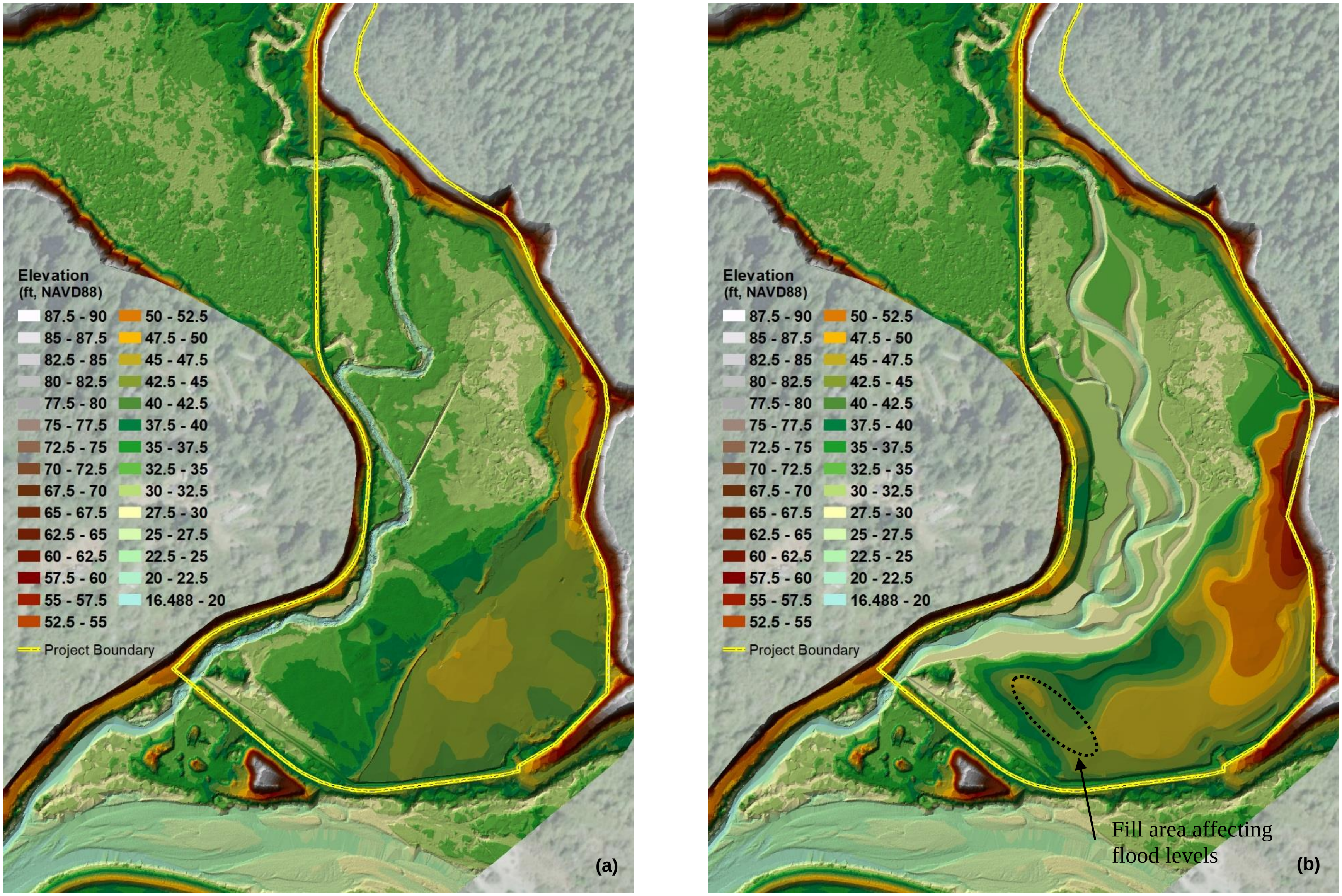

Figure 3. **Project area and 2D model domain existing condition topography (a) and Integrated Project preliminary design surface (b).**

Table 1. Summary of 2D model boundary conditions for Case 2 100-year flood flows (NHE, 2014).

Tributary	Boundary Condition Type	Unit	Value
Prairie Creek at HWY101	flow	cfs	6,822
Skunk Cabbage Creek	flow	cfs	380
Libby Creek	flow	cfs	31.8
Redwood Creek - Upstream	flow	cfs	50,466
Redwood Creek - Downstream	water surface elevation	feet, NAVD88	40.04

PROJECT AREA 100-YEAR FLOOD LEVELS AND VELOCITIES

Predicted down-valley 100-year food profiles crossing HWY101 and Bald Hills Road for existing conditions and the Integrated Project are shown on Figure 4, and the 100-year water surface elevations within the Project area are provided in Figure 5. Depth and velocity vectors and velocity magnitude and vectors are provided in Figure 6 and Figure 7, respectively, for existing conditions and the Integrated Project. Modeling results indicate that the Integrated Project increases existing 100-year flood levels within the Project area and upstream by approximately 0.1 to 0.2 feet.

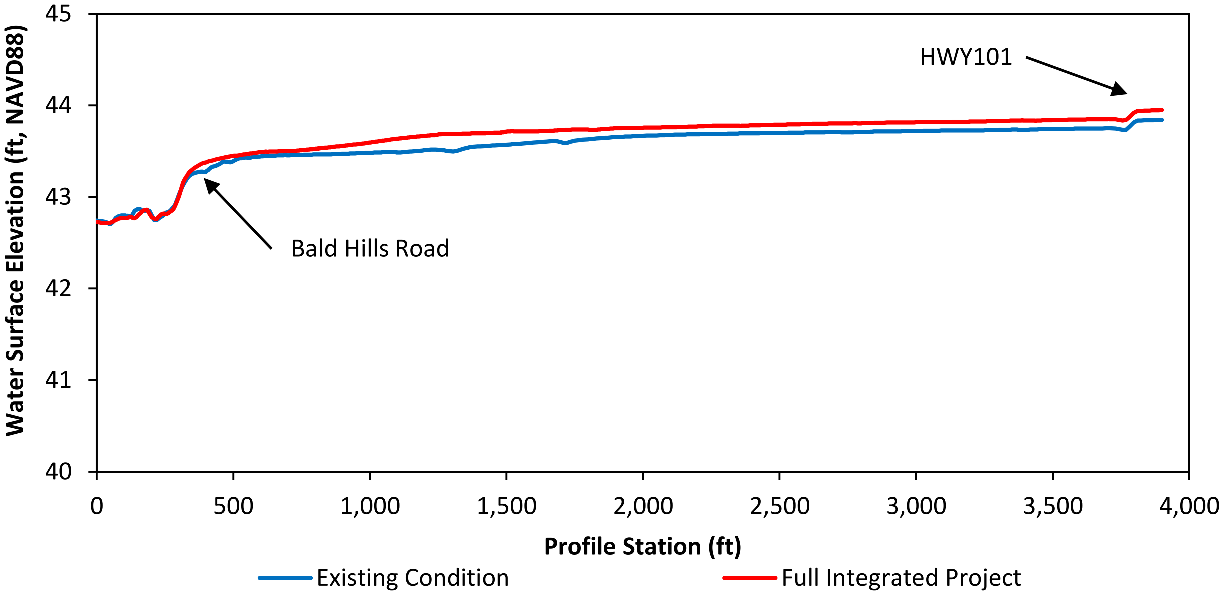

Figure 4. Predicted 100-year down-valley flood profiles for existing condition and the Integrated Project preliminary design surface.

It appears that the proposed floodplain grading at the south end of the Project area and east of the Visitor Center (Figure 3) obstructs flood flows in this area, particularly the area just east of the Visitor Center entrance. This area was elevated to provide a pedestrian trail to Prairie Creek along the southern end of the Project area. If the 0.1- to 0.2-foot increase in 100-year flood levels for the Integrated Project is deemed significant in CEQA, then lowering the proposed grading in this area would eliminate this effect and make the Integrated Project flood neutral at a minimum (i.e. no increase in existing 100-year flood levels within the Project area).

The Integrated Project grading locates the Visitor Center building well above the 100-yr flood level (Figure 5). Although not indicated on Figure 5, the proposed Visitor Center roadway, parking lots, and water and wastewater system components are also located above the 100-yr flood level.

Modeling results indicate that the Integrated Project slightly increases 100-yr flood velocities in Prairie Creek at the upstream and downstream ends of the Project and near the HWY101 and Bald Hill Road bridge crossings (Figure 7). The proposed Prairie Creek restoration project grading (Figure 3) removes channel and floodplain constrictions and improves flow conditions in the Project area that results in the increased flow velocities. The increased 100-yr flow velocities in Prairie Creek and near the bridge crossings should not increase erosion potential as the velocities are well below the existing 2-yr flood velocities, a more frequent flood, at these locations (Figure 8). Furthermore, the proposed Prairie Creek restoration project grading better redistributes flow in the Project area and decreases Prairie Creek velocities in the downstream reaches of the Project at the 2-yr flood flow (Figure 8). This indicates that the proposed Project grading will likely reduce overall erosion potential in Prairie Creek and at the bridge crossings.

REFERENCES

Lai, Y.G. 2008. SRH-2D version 2: Theory and User’s Manual, Sedimentation and River Hydraulics – Two-Dimensional River Flow Modeling. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, CO.

Northern Hydrology and Engineering (NHE) and Manhard Consulting (Manhard). 2013a. Hydrologic analysis for Redwood Creek, Humboldt County, California. Prepared for Humboldt County Public Works Department, final dated 29 Jan. 2013.

Northern Hydrology and Engineering (NHE) and Manhard Consulting (Manhard). 2013b. Hydraulic analysis for Redwood Creek, Humboldt County, California. Prepared for Humboldt County Public Works Department, dated 12 Apr. 2013.

Northern Hydrology & Engineering (NHE). 2014. Flood Analysis of the Orick Mill Site Property, Humboldt County, CA. Prepared for Save the Redwood League. Prepared by NHE, McKinleyville, CA. Technical Memorandum dated 5 Jun. 2014.

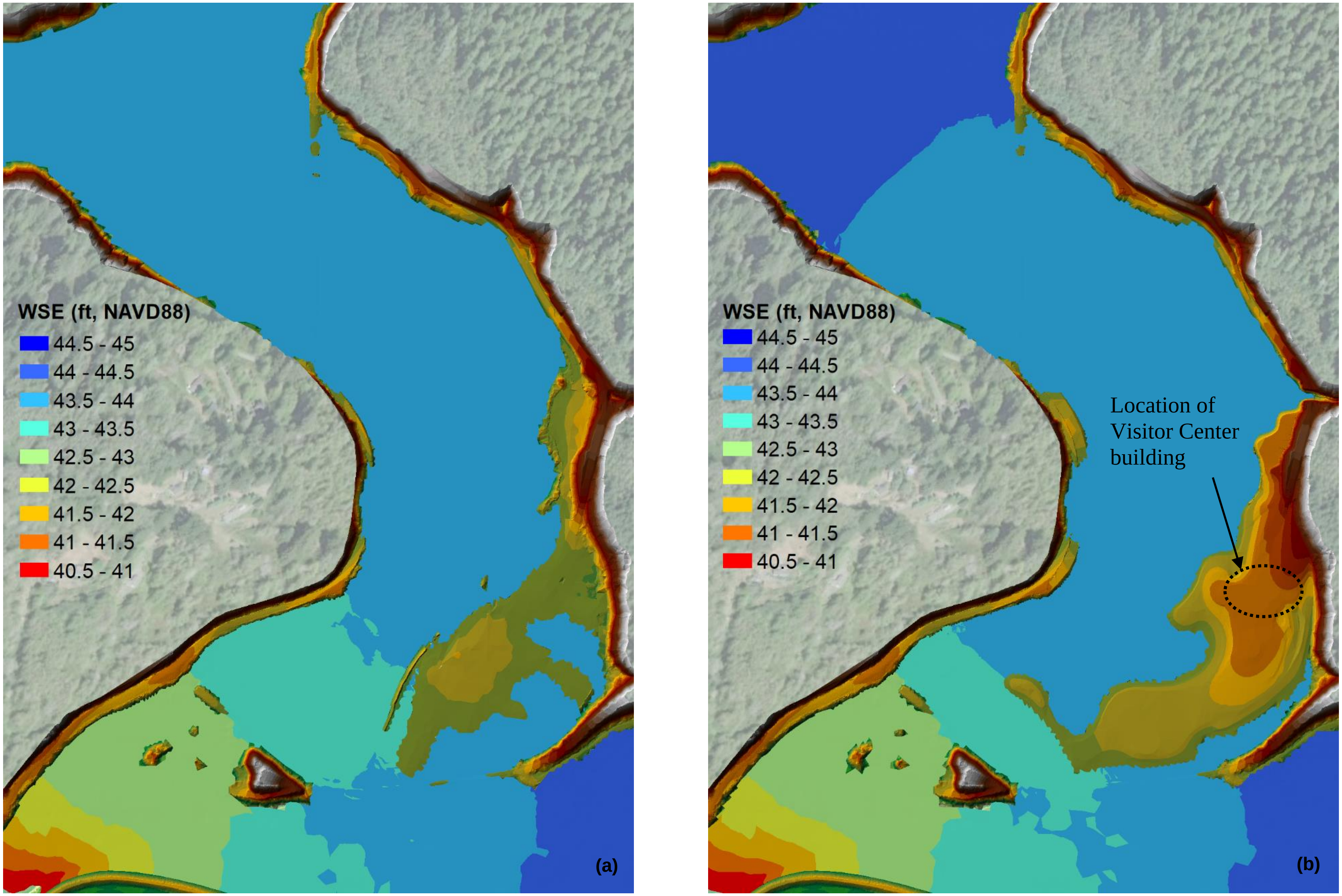

Figure 5. **Predicted 100-year water surface elevations for existing condition (a), and the Integrated Project preliminary design surface (b).**

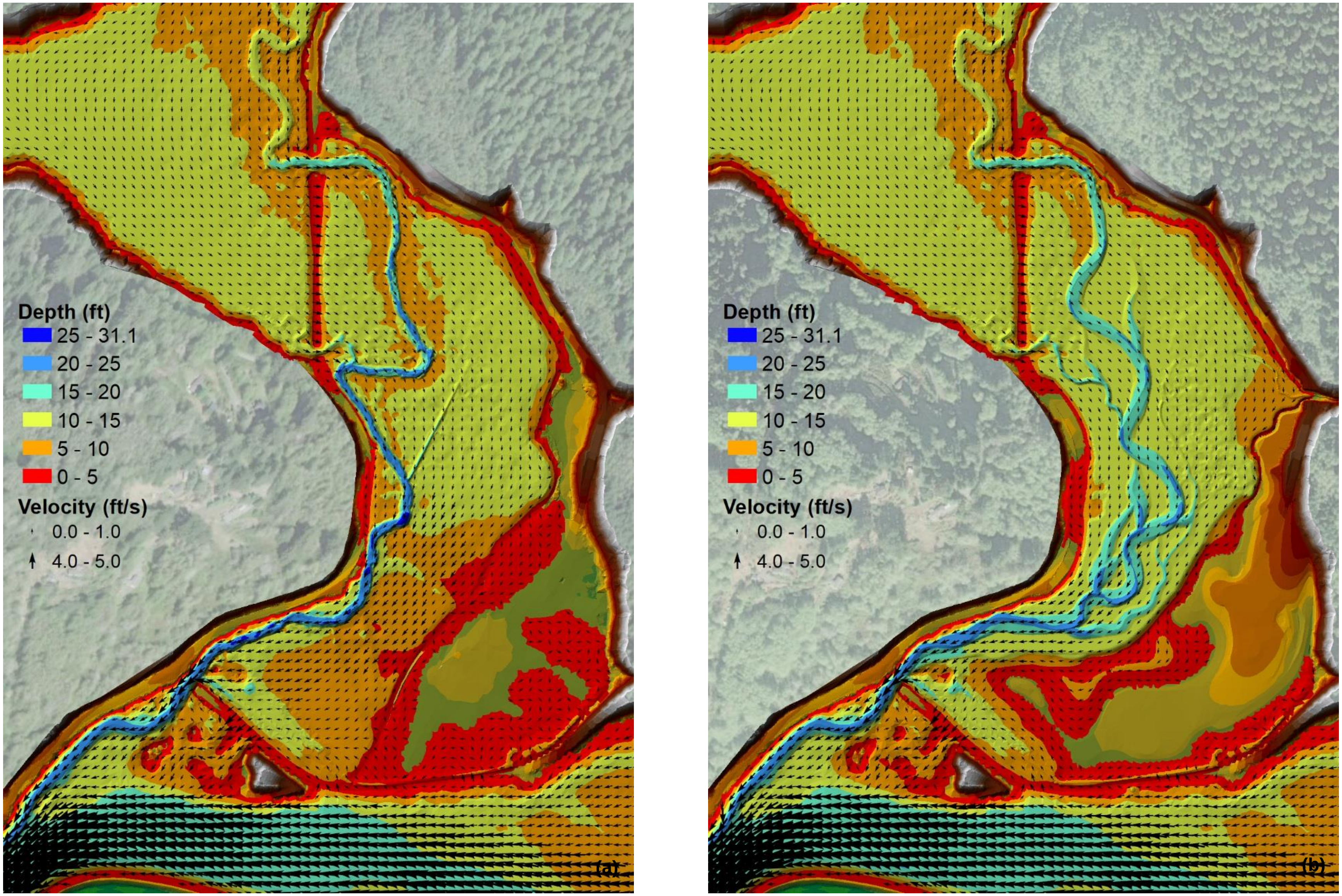

Figure 6. Predicted 100-year depth and velocity vectors for existing condition (a), and the Integrated Project preliminary design surface (b).

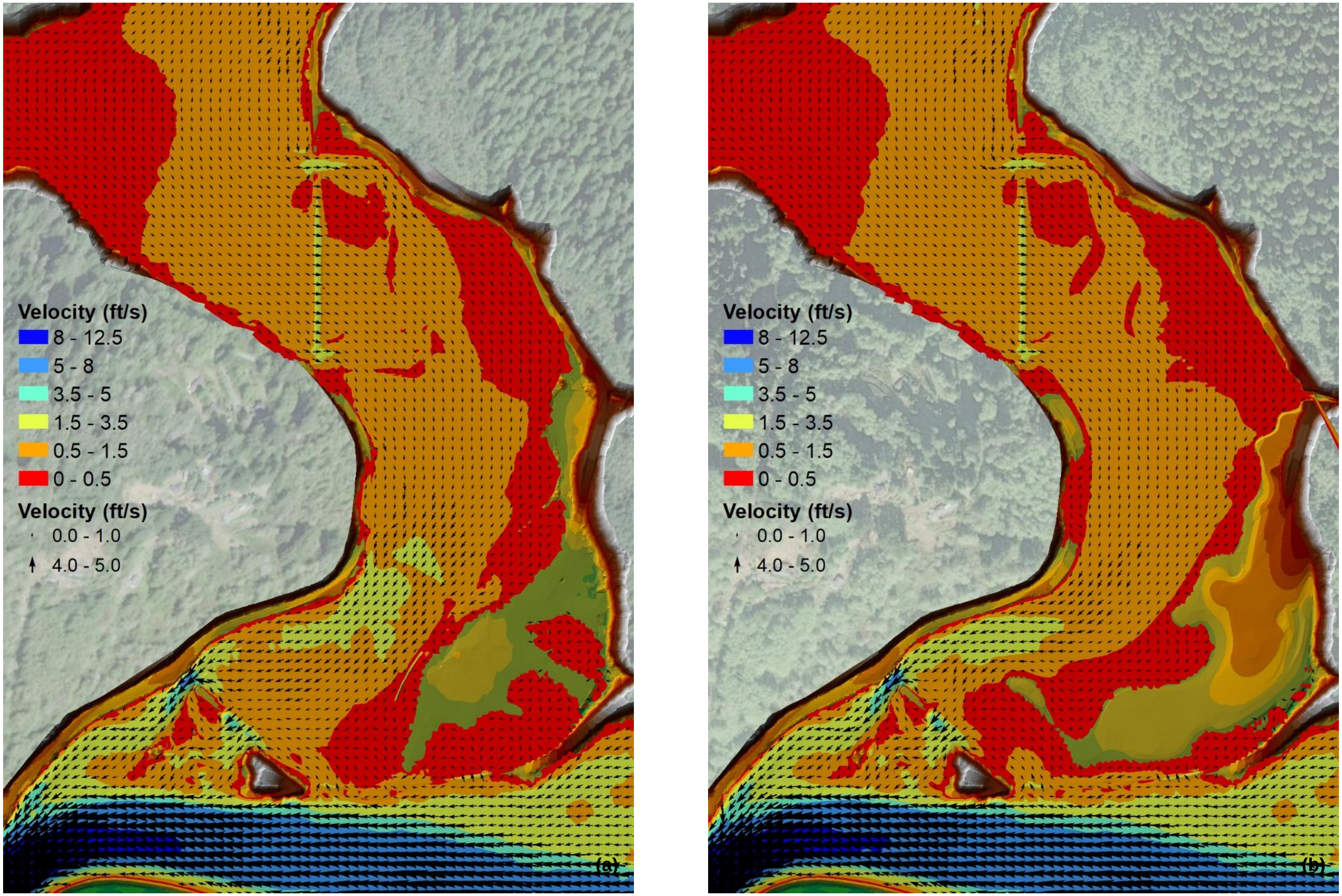

Figure 7. Predicted 100-year velocity magnitude and vectors for existing condition (a), and the Integrated Project preliminary design surface (b).

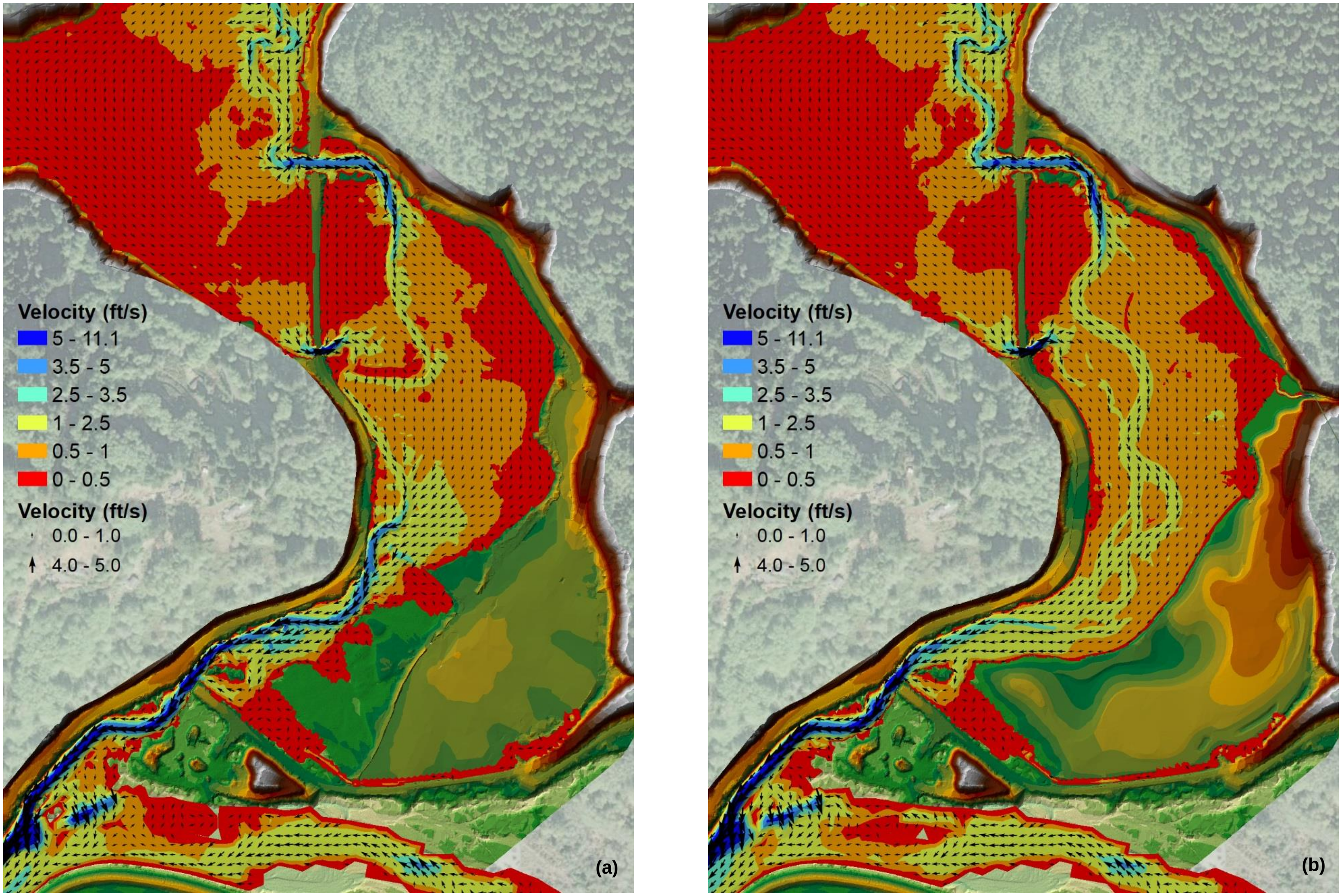

Figure 8. **Predicted 2-year velocity magnitude and vectors for existing condition (a), and the Integrated Project preliminary design surface (b).**

Appendix M – Civil Engineering Basis of Design Report 100% Schematic Design, Redwood Visitor Center, SHN 2018

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Civil Engineering Basis of Design Report
100% Schematic Design

Redwood Visitor Center
Orick, California

Prepared for:

Save the Redwoods League

December 2018
018015

Reference: 018015

Civil Engineering Basis of Design Report
100% Schematic Design

Redwood Visitor Center
Orick, California

Prepared for:
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December 2018

QA/QC:JXO

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Abbreviations and Acronyms

CY	cubic yards
ft^3	cubic feet
gal	gallon
gpd	gallons per day
gpm	gallons per minute
lb/d	pounds per day
mg/L	milligrams per liter
psi	pounds per square inch
ABAAS	Architectural Barriers Act Accessibility Standards
AHJ	authority having jurisdiction
APMP	advanced protection management plan
ASCE	American Society of Civil Engineers
AWWA	American Water Works Association
Basin Plan	Water Quality Control Plan for the North Coast Region
BOD	biochemical oxygen demand
BSE	base flood elevations
CCR	Code of California Regulations
CN	curve number
CRC	California Redwood Company
DMA	drainage management area
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FIRM	FEMA Flood Insurance Rate Map
HCDEH	Humboldt County Division of Environmental Health
JNRA	John Northmore Roberts & Associates
LAMP	local agency management program
LID	Low Impact Development
LIDAR	Light Detection and Ranging
NAVD88	North American Vertical Datum 1988
NFA	no further action
NFPA	National Fire Protection Association
NHE	Northern Hydrology and Engineering
nitrate-N	nitrate-nitrogen
NPS	National Park Service
NR	no reference
OCSD	Orick Community Services District
OWTS	onsite wastewater treatment system
P	rainfall (in)
Q	runoff (in)
RECs	recognized environmental conditions
RWQCB	North Coast Regional Water Quality Control Board
S	potential maximum retention after runoff begins (in)
SDE	Sherwood Design Engineers
SRA	State Responsibility Area
STRL	Save the Redwoods League
SWRCB	State Water Resources Control Board
TKN	total Kjeldahl nitrogen
TSS	total suspended solids
VBD	value-based design
VPA	variance prohibition areas
V_{runoff}	retention volume

Introduction

This report presents SHN's understanding of the civil engineering basis of design at the completion of the Schematic Design phase for the proposed new Redwood Visitor Center at the former Orick Mill site in Orick, California. The design for the Visitor Center project was coordinated with several other projects that are planned to occur adjacent to the Visitor Center site. These projects include:

- The Prairie Creek Restoration
- The Libby Creek Restoration
- The Upper Road Width Reduction
- The Canopy Walk
- The O'Ra Hiko Village Project

This report includes the following sections:

- Topography and Existing Conditions
- Earthworks and Geotechnical
- Grading and Drainage
- Vehicular Access
- Utilities–General
- Water Supply
- Wastewater Treatment
- Educational Opportunities
- Additional Data Required
- Summary of Modifications and Alternatives
- References

Civil engineering design is being conducted in general accordance with National Park Service (NPS) Standards (https://www.nps.gov/dscw/ds-civil-environmental.htm), and applicable local, state, and federal codes.

This report is intended to be read in conjunction with the 100% Schematic Design drawings.

This report also includes recommendations on how the water infrastructure could become part of the educational experience of the Visitor Center and concludes with a list of data required for the next phase of design.

Topography and Existing Conditions

Description of Existing Site

The Visitor Center site consists of asphalt paving and the remaining foundations of former mill buildings. The following are key areas and dimensions. The area of asphalt corresponds with the approximate boundaries of the former mill site.

Property Boundary	120 acres
Area of Asphalt	21 acres
Maximum Length of Asphalt	1,700 feet
Maximum Width of Asphalt	785 feet

The following existing elements will be demolished, removed, and/or reused:

- Asphalt paving (a proportion will be reused on site; see below under “Earthwork and Geotechnical”)
- Orick Mill foundations (demolition of remaining mill foundations to be coordinated with the restoration team)
- Miscellaneous site debris
- Existing miscellaneous utilities

Basis of Topography

Topographic mapping shown in the Existing Site Conditions drawing was based on the following:

- Topographic survey of the Orick Mill Site (LACO, 2012)
- Land Title Survey, (Kelly-O’Hern, 2013)
- Light Detection and Ranging (LIDAR) data for offsite topography (publicly available)

Additional survey needs are described at the end of this report.

Earthwork and Geotechnical

Existing Ground Conditions

Asphalt paving covers most of the site, and according to borings advanced by LACO Associates (LACO) during wet weather percolation testing (LACO, 2011), the site is underlain by 2 to 10 feet of river-run gravel fill. The bottom of the fill layer likely corresponds approximately to the natural ground before filling the site for construction of the mill; however, the natural ground may have been graded in some areas prior to placement of the fill.

Environmental Considerations

Previous biological surveys indicated that certain special species as well as wetlands are present at the site (LACO, 2012). Site improvements will be beyond the limits of the mapped wetlands. A biologist will be required to observe, protect, regulate, and mitigate environmental impacts.

An environmental assessment of the Orick Mill site was initiated in August 2009 following discontinuation of site operations. An initial Phase I environmental site assessment (ESA) was conducted by SHN in October 2009 for the California Redwood Company (CRC). In February 2010, SHN conducted an updated Phase I ESA for Save the Redwood League (STRL) and the NPS. During the site investigations, nine potential recognized environmental conditions (RECs) were identified that required further evaluation. In January 2011, a Phase 2 ESA was conducted, and a report of findings was submitted to the North Coast Regional Water Quality Control Board (RWQCB). On April 7, 2011, the RWQCB issued a no further action (NFA) letter to CRC, indicating that the investigation was complete and that the RWQCB required no further investigation, based upon the information submitted.

In June 2013, additional site evaluation was conducted in areas of concern that included excavation of approximately 65 cubic yards of petroleum-impacted soil. SHN submitted a report of findings to STRL in August 2013 indicating the areas excavated, and the material was characterized and disposed of properly. Verification soil sampling was conducted at each excavation area and showed that the contamination was removed prior to backfilling. Mitigation of the RECs identified in 2013 was completed to the satisfaction of STRL.

Although the RWQCB issued an NFA letter, it does not mean that the site is entirely free of soil contamination. Some foundations and asphalt surfacing remains, and once removed, there may be areas where soil contamination could be observed. If soil contamination is encountered during redevelopment, the soil may need to be excavated, stockpiled separately, and characterized for offsite disposal. A contingency plan for appropriate actions in a situation such as this during site development would help mitigate work stoppage impacts and cost overruns.

Grading and Drainage

Grading and Drainage Strategy

The adjacent Prairie Creek and Libby Creek restoration projects are expected to generate a significant amount of excess soils. These soils will be used as engineered fill to elevate the Visitor Center site by up to 6 feet. The Visitor Center buildings will be placed at a finish floor elevation of approximately 52.2 feet, which is approximately 5 feet above the 500-year flood elevation. Other site facilities (such as water treatment, water storage, wastewater treatment, and wastewater disposal facilities) will be installed a minimum of 1 foot above the 100-year flood elevation. The intention of the schematic level grading for this site is to balance the cut and fill earthwork, to the maximum extent possible, while still locating the proposed facilities at the necessary elevations. Pedestrian-accessible areas were designed to meet NPS Universal Design Standards, which include the Architectural Barriers Act Accessibility Standards (ABAAS).

The approach to drainage of the site was coordinated with the project architect (Siegel & Strain), the project landscape architect (John Northmore Roberts & Associates (JNRA)), and the engineering firm responsible for the adjacent Prairie Creek and Libby Creek restoration projects (Northern Hydrology and Engineering (NHE)) JNRA developed the overall grading concept for the site. In general, the Visitor Center will be located at a higher elevation than the rest of the site in order to maximize views from the Visitor Center. Drainage on the site will be directed to retention basins located on both the east and west sides of the site. The retention basins will be located beyond the limits of the Redwood Visitor Center site and will be incorporated into the design of the restoration areas.

Specific grading recommendations at the site should come from a Geotechnical Engineer. This should include recommendations for allowable cut slopes and fill slopes, keying and benching, site preparation, and compaction.

Preliminary soil investigations showed that the existing asphalt is located above a layer of river run fill material. Recommendations for grading of this material should be provided by the Geotechnical Engineer.

The soils from the restoration projects may be above optimum moisture content and may require extra effort during construction to dry the soils to optimum moisture content so that they can be adequately compacted as engineered fill. Alternatively, lime treatment or other soil conditioning techniques may be necessary to facilitate compaction.

Balance of Cut and Fill

Table 1 summarizes the proposed net cut/fill earthwork volumes for the Visitor Center site and the adjacent earthwork projects.

Table 1. Overall Cut and Fill Estimates
Redwood Visitor Center and Related Projects, Orick, California
(in cubic yards)

Project	Cut	Fill	Net
Visitor Center Engineered Fill	0	79,079	+79,079
Visitor Center Aggregate Base	0	1,190	+1,190
Visitor Center AC Grindings	13,117	4,074	-9043
Visitor Center Topsoil	0	23,802	+23,802
Prairie Creek Restoration*	not available	not available	not available
Libby Creek Restoration*	32,500	0	-32,500
Upper Road Width Reduction Engineered Fill*	5,275	10,388	+5,113
Upper Road Width Reduction AC Grindings*	753	1,034	+281
*Project components are not part of the Visitor Center scope of work but will be coordinated with the Visitor Center project.			

Further coordination between the Visitor Center project and the adjacent projects will be required in order to determine the overall cut/fill balancing options for these projects. Future coordination efforts should include: project scheduling, material suitability assessment, and permitting restrictions.

Since the Visitor Center site is entirely paved, all of the topsoil and growing medium for the landscaped areas of the proposed development will have to be imported. Further coordination with the restoration team is required to determine if these soils can be provided by the restoration projects.

Material Reuse

The Visitor Center site is paved. The asphalt pavement is expected to be approximately 4-6 inches thick, which equates to roughly 11,000 cubic yards (CY)–16,000 CY. The asphalt will be stripped and stockpiled for reuse as aggregate base below roadways and parking areas and could potentially be used below exterior slabs. The Structural Engineer and Geotechnical Engineer should provide recommendations on whether the asphalt may be reused as engineered fill material below the buildings. If additional onsite uses are approved, then the amount of asphalt to be off-hauled will be reduced.

Preservation of existing topsoil should be prioritized by stockpiling the topsoil, reusing where feasible, and coordinating with the Landscape Architect.

Flood Elevation

The project site is located in Federal Emergency Management Agency (FEMA) special Flood Hazard Zone A from Redwood Creek. Zone A areas are areas that receive flooding from the 100-year storm but for which base flood elevations (BFEs) have not been determined. The FEMA Flood Insurance Rate Map (FIRM) indicates that a majority of the existing project site is located outside of the flood zone. However, NHE prepared a technical memorandum describing the flooding at the project site, which concluded that a portion of the existing project site would be inundated by the 100-year flood (NHE, June 2014). A majority of the project site is outside of the 10-year floodplain for Redwood Creek.

Approximate flood elevations at the visitor center site, based on recent analysis by NHE are provided below:

100-year flood elevation	45.0 feet (North American Vertical Datum 1988 [NAVD88])
500-year flood elevation	47.0 feet (NAVD88)

Current Humboldt County regulations require that the elevation of any structure must be a minimum of 1 foot above the 100-year BFE. Additionally, utilities, including wastewater disposal, shall be designed to either eliminate infiltration of floor waters or avoid impairment to them or contamination of them during a flood. Finished floor elevations of the proposed Visitor Center buildings have been set at 52.2 feet. Site utilities (such as, the water treatment building, the domestic water storage tank, the ground surface at the wastewater treatment system, and the ground surface above the wastewater disposal field) have been set at a minimum of 46 feet.

Tsunami

According to NHE's June 2016 technical memorandum,

> *Based on the current California Humboldt County Tsunami Inundation Maps for Orick (Cal EMA et al., 2009), most of the Mill Site property, including the former mill site paved area, is outside the tsunami run-up and inundation area. Only a small portion of the south-west corner of the Project Area, near the Bald Hills Road Bridge, is inundated by tsunami. It should be noted that a similar length of Bald Hills Road between Highway 101 and access to the Mill Site property that is flooded by Prairie and Redwood Creeks, is also flooded by Tsunami inundation.*

Stormwater Hydrology and Conveyance

The site is bordered by two creeks, Prairie Creek to the west and Redwood Creek to the south. The confluence of the two creeks is located at the southwest boundary of the project site. The site drainage system will be designed to convey 10-year storm flows and provide overland release of the 100-year storm. This meets the standards outlined by the County of Humboldt Department of Public Works Roadway Design Standards Manual (1971).

Although the project is currently on privately owned land, it will ultimately be owned and operated by the National Park Service. As a federal agency, NPS must comply with Section 438 of the Energy Independence and Security Act of 2007. Section 438 of that legislation establishes strict stormwater runoff requirements for federal development and redevelopment projects.

The provision reads as follows:

> *Storm water runoff requirements for federal development projects. The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.*

In order to provide technical guidance on implementing the requirements established by Section 438, the U.S. Environmental Protection Agency (EPA) has published "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (EPA 841-B-09-001)." This guidance document provides two options for complying with Section 438:

1. Option 1: Retain the 95th percentile, 24-hour rainfall event.
2. Option 2: Conduct site-specific hydrologic analysis.

Under Option 2, the site designer must verify that the post-development runoff volume and peak flow discharges are equivalent to the pre-development conditions. The pre-development condition of the site is the combination of runoff, infiltration, and evapotranspiration rates and volumes that typically existed on the site before any development. Due to the challenges of trying to determine the pre-development conditions on a site that was initially developed as ranch land over 100 years ago and later developed into a lumber mill over 50 years ago, Option 1 was determined to be the most practical approach to ensuring compliance with Section 438.

Option 1 of Section 438 requires that runoff from the 95th percentile rainfall event be retained to the maximum extent practicable. The 95th percentile rainfall event is the event whose precipitation total is greater than or equal to 95 percent of 24-hour storm events on an annual basis. Because Section 438 does not provide specific guidance on how the runoff volume should be determined, SHN assumed that only impervious surfaces are to be considered when determining the runoff volume. This approach is consistent with local regulations. The project is located in Humboldt County, but outside of the county's Phase II MS4 Area, which prescribes stormwater mitigation requirements as outlined in the Humboldt Low Impact Development (LID) Stormwater Manual. For comparison, the Humboldt LID Stormwater Manual requires that projects retain runoff from impervious areas for the 85th percentile rainfall event (which is less conservative than the EPA regulations).

The proposed project minimizes the amount of impervious surface onsite and achieves a significant amount of reduction in the impervious surface from the existing condition. Therefore, when compared to the existing site conditions, the development of the Visitor Center project will decrease the amount of runoff from the site.

To comply with Section 438, the project is proposing to direct runoff from impervious surfaces to stormwater retention basins, which will be located in the restoration zone of the project. The stormwater retention basins will help to removes pollutants and infiltrate stormwater into the ground.

The stormwater retention basins will be designed by the restoration team and will be sized to retain the runoff from the 95th percentile rainfall event for all site impervious surfaces. To determine the amount of runoff, the TR-55 SCS Runoff Curve Number Method was used. The SCS runoff equations are:

$$Q = \frac{(P-0.2S)^2}{P+0.8S} \text{ and } S = \frac{1000}{CN} - 10$$

Where:

Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins (in)
CN = curve number

According to an analysis "What Should Be the 95th Percentile Rainfall Event Depths" (Shrestha, et. Al, 2013), the approximate rainfall depth for the project area is 1.3 inches (see Appendix 1). Therefore, P = 1.3 inches is used in the above equation. A curve number of CN = 98 is used because the runoff is from impervious surfaces only.

The resulting runoff depth, Q, is equal to 1.1 inches. The required retention volume, V_{runoff}, is then 1.1 inches multiplied by the impervious surface area.

The stormwater retention basins (to be designed by the restoration team) will be sized to retain the runoff generated by the drainage management areas (DMAs) that drain to each basin. The limits of each DMA are shown in Appendix 2.

Table 2 below summarizes the required retention volume associated with each DMA.

Table 2. DMA and Stormwater Retention Requirements
Redwood Visitor Center, Orick, California

DMA Name	Impervious Area (sf)	Required Retention Volume (cf)
1	108,114	9,911
2	64,323	5,897
3	15,315	1,404

Stormwater Hydrology Conclusion

The 100% Schematic Design proposes meet the requirements established in Section 438 by retaining the runoff generated by the impervious surfaces during the 95th percentile, 24-hour rainfall event. The stormwater runoff will be captured in stormwater retention basins, which should be designed to remove pollutants and infiltrate stormwater. The stormwater retention basins will be located within the limits of the Prairie Creek restoration project and will therefore be designed by the restoration team. Additionally, the proposed project will reduce the amount of impervious area from the existing condition by approximately 80%. Therefore, the overall amount of stormwater runoff leaving the site will be significantly less than the existing condition for all storm events.

Vehiclular Access

Site Access

Site access will be from Bald Hills Road, using an existing driveway that will be adjusted to comply with NPS and county width and visibility requirements. The main Visitor Center driveway is 20 feet wide, will facilitate two-way travel, and will include turnouts for buses. There are four parking lots (South–14 spaces; Mid–21 spaces, 10 RV spaces, 4 bus spaces; North–49 spaces and 4 accessible spaces; and North Accessible–6 accessible spaces).

Pedestrian access will include multiple pathways and trails and will meet ABAAS requirements outlined in NPS requirements.

Emergency Vehicle Access

Emergency vehicle access requirements for the Visitor Center site will be considered during the Design Development phase of the project. The design team will coordinate with the authority having jurisdiction (AHJ), and NPS to determine the emergency vehicle access requirements. Preliminary discussions with the AHJ and NPS suggest that having at least two emergency vehicle access routes to the site is preferable. However, it has not been determined if more than one access route is required.

There are currently three primary options for providing emergency vehicle access to the Visitor Center site:

1. The main entrance to the Visitor Center site on Bald Hills Road
2. The Upper Road, which provides connection between the Visitor Center Site and Berry Glen. Existing conditions of the Upper Road, turning radii, and access agreements through Berry Glen should be considered.
3. The Lower Road, which connects U.S. Highway 101 to the southern portion of the Upper Road (near the Visitor Center Site).

Emergency vehicles will be able to circulate through all driveways and parking lots. The driveway will create a loop at the Visitor Center and northern parking lot, which will provide for emergency vehicle turn around. Emergency vehicles and service vehicles will also be provided access to the north side of the Visitor Center. These vehicles may drive from the parking lot located directly south of the Visitor Center onto the pathway that surrounds the Visitor Center.

During the Design Development phase of the project, the geometry of the site roads will need to be checked by a vehicle swept path analysis, such as AutoTurn.

Offsite Circulation

Offsite vehicle circulation is not part of SHN's current project scope. LACO conducted a study of the Highway 101 intersection (LACO, 2012) for a previous project. GHD is currently working to determine the modifications to the intersection of Bald Hills Road and Highway 101 that will be required for this project.

Pavement Design

Pavement structural design recommendations will be issued by the Geotechnical Engineer and will be based on an estimate of the expected numbers and weights of vehicles. Current design assumptions are that paving will be 4 inches of asphalt over 12 inches of aggregate base, assuming an R-Value of 20. The pavement section in areas that will not be exposed to heavy vehicle loading (such as parking stalls) may be able to be reduced. A more detailed approach to pavement design will be considered during the Design Development phase of the project.

Utilities–General

Utilities to serve the site comprise drinking water, fire water, wastewater treatment, electricity, and communications. SHN is currently working with the design team and Save the Redwoods League to determine the most effective way of bringing electricity and communications services to the site. There is no gas main in the area, therefore any gas required will be propane delivered to the site.

Water Supply

Water Source and Water Quality

The existing water supply for the site is an onsite well that is not suitable as a water supply for the project due to a non-compliant sanitary seal. Pumping and drawdown testing of the existing well suggest that a new well placed in the same aquifer could meet the water quantity demands of the project. The NPS value-based design (VBD) process in November 2016 determined that a new onsite test well should be installed, verified to meet potable water and fire water demands, and developed to provide raw water for potable and fire water use. Water quality and production capacity testing of the new well will be performed to determine treatment requirements and satisfactory production. Historical data and recent testing of the existing well provided the following characteristics:

Groundwater surface	15 feet below ground surface
Well depth	118 feet below ground surface
Production capacity	50,000 gallons per day (gpd; average 35 gallons per minute [gpm])
Operating flow	20 gpm
Drawdown	Less than 1 foot

For Schematic Design considerations, we assume that a new well, constructed in accordance with State of California Well Standards, will produce adequate raw water, requiring disinfection (chlorination), and potentially filtration to achieve drinking water standards. No treatment is required for firewater. Water quality testing of the new well will be performed to determine the appropriate water treatment processes.

Demands

Potable water is required for drinking and sanitary uses. Fire water is required for building sprinkler systems and firefighting. Water surface level probes at the potable and fire water tanks will provide data to the level control logic so that water pumped from the well is directed to the appropriate storage facility. When water in the storage tanks reaches the defined high-water surface elevations the control logic will end the pump cycle.

Potable Water Demands

Potable water demands have been developed using existing Redwood Kuchel Visitor Center data (SDE, 2016), estimates of the number of future park users, and estimates of peak daily water use, peak month average daily water use, and average annual daily water use.

The project team has adopted the following:

• Peak daily water use	4,090 gpd
• Peak month, average daily water use	1,765 gpd
• Annual average daily water use	750 gpd
• Pressure range	50 to 75 pounds per square inch (psi)

For schematic design considerations, the required potable water storage volume is estimated to be between 5,000 gallons and 10,000 gallons.

Fire Water Demands

Firefighting water storage volumes must meet or exceed the requirements of National Fire Protection Association (NFPA) 1142–Standard on Water Supplies for Suburban and Rural Fire Fighting, and sprinkler systems within the structures must comply with NFPA 13–Standards for the Installation of Sprinkler Systems.

Table 3 presents the requirements for the firewater system.

Table 3. Fire Water System Requirements
Redwood Visitor Center, Orick, California

Variable	Requirement	Reference
Minimum Fire Flow	1,000 gpm[1]	NFPA[2] 1142, Table 4.6.1
Minimum Water Pressure	50 psi[3] (above sprinkler heads)	NFPA 13, 11.2.2.1
Volume of Structure (VS)	271,000 ft^{3}(4)	Siegel & Strain Architects (volume for both buildings combined)
Occupancy Hazard Class (OHC)	7	NFPA 1142, Chapter 5
Construction Class (CC)	1.5	NFPA 1142, Chapter 6
Volume of Water (WS_{min}) WS_{min} = (VS_{tot} x CC)/OHC	58,071 gal[5]	NFPA 1142, Equation 4.2.1 (no exposure hazard)

1. gpm: gallons per minute
2. NFPA: National Fire Protection Association
3. psi: pounds per square inch
4. ft^{3}: cubic feet
5. gal: gallon

In accordance with section 13.4.2 of NFPA 22, the well pump and well must be able to fill the fire water storage tanks in a maximum time of 8 hours. Based on the required fire water storage volume of 58,071 gallons, the well pump and well must have the capacity to produce at least 121 gallons per minute. In January 2011, LACO performed water well production testing on the existing well at the site. The water well production testing determined that the existing well had a capacity of at least 23 gpm. The existing well pump was the limiting factor in that evaluation, and it is likely that the well would be able to produce greater than 23 gpm with a larger well pump. However, the ultimate capacity of an onsite well has not been determined for the site.

Further testing and consideration will be necessary to determine if a single well and well pump will be able to provide 121 gpm. It may be necessary to install multiple wells onsite in order to achieve the required pumping rate for replenishing the fire water storage tanks.

Selection of Water Source and Storage Location

As a result of the NPS VBD process conducted in November 2016, the project team elected to supply drinking and firewater demands from a new well to be located on site. The VBD selection process is described in a separate NPS report.

In general, NPS practice is to tie into community water supply systems when they are available. Therefore, the VBD process also considered water supply from the Orick Community Services District (OCSD) from a pipeline that would need to be extended from town to the area of the site, and storage of the water at the site of a former firewater tank on the hill west of U.S. Highway 101 (LACO, June 2013). The OCSD is currently studying the feasibility of funding, through grants, the extension of the water supply line toward the site area. If the extension were to become feasible for the district, the option of using the OCSD supply for the project could be reconsidered. Until such time, the option will not be studied further by the A/E team.

Fire Water Storage and Fire Water Pumping

The required 58,071 gallons of fire water from the new onsite well will be stored in two tanks, either welded steel or bolted steel, designed and constructed in conformance with the appropriate American Water Works Association (AWWA) standard. NPS prefers to have two tanks provide the required fire water storage rather than having a single tank provide the fire water storage because having two tanks makes it easier to maintain and repair one tank at a time. However, if each tank has a capacity below the required fire water volume (58,071 gallons), temporary fire water storage tanks will have to be installed if either of the permanent tanks is taken offline for maintenance or repairs.

The fire water storage tanks will be located onsite, in a fenced-in area south of the middle parking lot. The base elevation of the tanks will below the finish floor elevation of the new Visitor Center building, so an emergency fuel-driven fire pump will be needed in order to provide the required fire water to the Visitor Center's sprinkler system and the onsite fire hydrants. The emergency fire pump will automatically activate to initiate pumping from the onsite fire water tanks when a pressure loss within the fire main piping indicates a demand for fire water flow.

The fire water pump will meet the requirements of NFPA 20 and will provide a minimum of 1,000 gpm at a pressure of 50 to 60 psi behind the sprinkler heads. The fire water main will be a buried 8-inch diameter AWWA C900 PVC pipe, independent of the potable water piping. The fire water main will always be pressurized, and if the pressure in the fire water main drops, the fuel-driven emergency fire water pump will automatically turn on and provide the necessary fire flow to the building sprinklers and hydrants. The emergency fire pump should also have a small jockey pump that will keep up with any minor leaks in the fire main to maintain adequate pressure in the fire system when it is not actively in use.

In the case of a fire, and if electrical power is available, the well pump will continue to deliver water to the onsite firewater storage tanks, providing additional water through the fire water pump for fire control. The allowable or preferred types of fuel-driven fire water pumps will be considered further during the Design Development phase of the project.

Valves and Controls

The potable and fire water systems are diagrammatically presented in Sheet C6.0 (Utility Plan), and Sheet C7.0 (Water System Schematic) of the 100% Schematic Design plans.

The onsite well will provide water to the storage facilities of both the potable water and fire water systems. A solenoid valve in the line between the well pump discharge and the potable water system is normally open. If the water level in the potable water tank is low, and if the water level in the fire water tanks is full, the solenoid valve will remain open, and the well pump will turn on to refill the potable water tank. However, the fire system is given priority over the domestic water system, so if the water level in the fire water tanks is low, the solenoid valve will close (regardless of the water level in the potable water tank), and the well pump will provide water to the fire tanks.

A double check-valve backflow prevention device will be needed in order to ensure that fire water does not enter the potable water system. Gate valves, combination air-vacuum release valves, blow-offs, and backflow prevention devices will be placed in appropriate locations in the fire water and potable water piping networks for proper system function, to allow pipe isolation for maintenance, and to prevent catastrophic pipe failure.

Wastewater Treatment

Wastewater Characterization

Wastewater from the Redwood Visitor Center will consist primarily of domestic waste from bathrooms, hand washing sinks, and some dish washing waste from a simple café with no kitchen. Design wastewater flows for the Visitor Center have previously been characterized in a technical memorandum dated December 15, 2016, by Sherwood Design Engineers (SDE, 2016):

- Peak Daily Flow: 4,090 gpd
- Average Daily Flow: 750 gpd
- Peak Month, Average Daily Flow: 1,765 gpd
- Minimum Month, Average Daily Flow: 18 gpd

Wastewater from the Visitor Center will be primarily domestic wastewater of relatively high strength compared with typical domestic wastewater due to the lack of showers and kitchens contained in typical residential wastewater streams. Typical raw waste strength ranges may include (Orenco, 2017):

- Biochemical Oxygen Demand (BOD): 300-500 milligrams per liter (mg/L)
- Total Suspended Solids (TSS): 80-250 mg/L
- Total Kjeldahl Nitrogen (TKN): 90-200 mg/L

Typical primary treated (septic tank only) waste strength ranges may include:

- BOD: 140-250 mg/L (Orenco, 2017)
- TSS: 40-140 mg/L (Orenco, 2017)
- TKN: 50-80 mg/L (Orenco, 2017)
- Nitrate-Nitrogen: 40 mg/L (RWQCB, 2011)

Waste Discharge Policies

Onsite wastewater treatment system (OWTS) requirements for the Visitor Center may be regulated by the RWQCB, or the Humboldt County Division of Environmental Health (HCDEH). In some cases, OWTS with design flow rates less than 10,000 gpd are regulated by a local agency management program (LAMP); which, in this case the local agency would be the HCDEH. The HCDEH has developed the *Humboldt County Onsite Wastewater Treatment System (OWTS) Regulations and Technical Manual* (Humboldt County Division of Environmental Health, 2017). However, "the regulation of onsite wastewater treatment systems on federal lands is beyond the jurisdiction of local agencies and must remain with the Regional Water Board" (RWQCB, 2011).

The Visitor Center site is currently being developed by the not-for-profit organization Save the Redwoods League. However, the Visitor Center will eventually be owned and operated by the National Park Service, a branch of the federal government. The RWQCB may elect to allow the HCDEH to oversee final approval of the Visitor Center OWTS in accordance with the LAMP. The RWQCB has indicated that the HCDEH will be the responsible agency for the Visitor Center OWTS, and that if the NPS assumes ownership of the system, the RWQCB will review the system design to be permitted in accordance with RWQCB regulations. Design and development of the Visitor Center OWTS should be coordinated primarily through the HCDEH, with the RWQCB being informed and consulted to ensure the system meets future approval if required. Therefore, regulatory and design requirements for both agencies are included below where applicable.

Wastewater treatment and disposal at the Visitor Center is regulated under the Water Quality Control Plan for the North Coast Region (Basin Plan). Due to the large number of OWTS in the state, the State Water Resources Control Board (SWRCB) has developed the *OWTS Policy: Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems* (June 19, 2012).

Water quality policies governing the Visitor Center OWTS may include (but not be limited) to the following:

- *Water Quality Control Plan for the North Coast Region* (also known as the Basin Plan; SWRCB, 2011)
- *OWTS Policy: Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems* (SWRCB, 2012)
- *State Water Resources Control Board Order WQ 2014-0153-DWQ General Waste Discharge Requirements for Small Domestic Wastewater Treatment Systems* (SWRCB, 2014)
- *State Water Resources Control Board Resolution No. 68-16: Statement of Policy with Respect to Maintaining High Quality Waters in California* (SWRCB, 1968)
- *Humboldt County Onsite Wastewater Treatment System (OWTS) Regulations and Technical Manual* (HCDEH, 2017)

Wastewater Treatment and Anti-Degradation Requirements

Wastewater treatment requirements are based on the need to protect the beneficial uses of the receiving water and nearby water bodies in accordance with the Basin Plan. The Visitor Center OWTS will discharge to an onsite leachfield that will ultimately come into contact with groundwater, therefore groundwater is assumed to be the receiving water.

The SWRCB OWTS Policy categorizes OWTS development into 5 Tiers (Tier 0 through Tier 4) associated with the potential risk for pollution created by that system; these tiers include:

Tier 0: Existing OWTS
Tier 1: Low Risk New or Replacement OWTS
Tier 2: Local Agency OWTS Management Program
Tier 3: Impaired Areas
Tier 4: OWTS Requiring Corrective Action

The Visitor Center will likely fall into Tier 1 because 1) the facility may be owned and operated by a federal entity, exempting it from coverage under the LAMP, and 2) neither of the nearby creeks, Redwood Creek and Prairie Creek, are listed as "Impaired Areas" with respect to nitrogen or pathogens.

The Visitor Center OWTS disposal leachfield will be located within approximately 300 feet of Redwood Creek and 1,000 feet of Prairie Creek. The SWRCB OWTS Policy (2012) provides additional evaluation requirements for potential pathogen and nitrogen pollution when systems are located with a geographic area defined as within 600 feet of an impaired water body. Impaired water bodies are listed in the Clean Water Act Section 303(d). Redwood Creek is 303(d) listed as an impaired water body for sediment and temperature, but not for nitrogen or pathogens, and Prairie Creek is not 303(d) listed. The SWRCB OWTS Policy and General Order include all water bodies that are 303(d) listed with respect to nitrogen and pathogens in a list of areas that require an advanced protection management plan (APMP) and fall under Tier 3.

In accordance with SWRCB OWTS Waste Discharge Requirements Order WQ 2014-0153-DWQ, wastewater systems with design flow rates less than 20,000 gpd are not required to meet nitrogen discharge effluent limits and *shall not be selected as a default to add water quality protection where the added expense of nitrogen control is not required* (SWRCB, 2014). Because the Visitor Center OWTS flow rates are not expected to exceed 4,090 gpd, additional nitrogen removal is not expected to be required by the RWQCB based on discharge flow rate alone, or due to proximity to an impaired water body.

The HCDEH OWTS regulations include a similar list of impaired water bodies called variance prohibition areas (VPA). Redwood Creek is not listed in the Humboldt County VPA such that additional design and permitting requirements for these areas may not apply to the Visitor Center OWTS.

The Basin Plan and the General Order require OWTS to meet the requirements of the state anti-degradation policy that requires discharges to prevent degradation of receiving waters (SWRCB, 1968). Numerous supporting documents have been provided since the anti-degradation policy was enacted in 1968 to help interpret and implement the objectives of the policy. However, compliance with anti-degradation policies typically includes technical analyses demonstrating that discharges will not degrade water quality in receiving waters with respect to beneficial uses.

Anti-degradation policies are also reflected in the HCDEH OWTS policies that require systems discharging greater than 1,500 gpd to conduct a cumulative effects analysis for nitrate contamination and groundwater mounding.

Wastewater discharged from the Visitor Center OWTS may contain nitrate-nitrogen (nitrate-N) that could degrade the use of groundwater as a drinking water supply. For this reason, a cumulative effects analysis of nitrate loading to groundwater was conducted in 2014 by NHE.

OWTS shall not cause groundwater nitrate-N concentrations to exceed 10 mg/L assuming a discharge concentration of 40 mg/L (RWQCB, 2011). The cumulative effects analysis indicated that discharge flow rates from the Visitor Center OWTS exceeding 3,800 gpd as a long-term average and containing nitrate-N concentrations of 40 mg/L or greater, could result in groundwater nitrate-N concentrations exceeding the 10 mg/L nitrate-N limit. Under the assumptions used in the analysis, the peak month average daily flow from the Visitor Center of 1,765 gpd would not be expected to cause nitrate contamination of groundwater, and therefore may not require additional nitrogen removal by the County DEH or RWQCB.

Therefore, the Visitor Center may be allowed to install a standard septic/leachfield system rather than an advanced treatment system, as was previously assumed. Elimination of the advanced treatment system (Orenco Advantex AX-100) could reduce costs. However, due to the proximity to Redwood Creek and Prairie Creek, advanced treatment may still be desired by the NPS to provide a higher standard of environmental protection.

The results of the 2014 NHE nitrate loading analysis should be re-calculated prior to final selection of a treatment system based on new information about groundwater flow in the vicinity of the dispersal field, revised flow rates from the 2016 technical memorandum by SDE, and refined dispersal area sizing. However, the 2014 analysis was conservative in its estimate, and therefore refinement of the model is not expected to significantly change the conclusions regarding potential groundwater contamination.

Due to the uncertainty of whether an advanced treatment system for nitrogen removal will be included in the final design, the following evaluation of the Visitor Center OWTS includes an advanced treatment system option.

Wastewater Treatment System Description

As mentioned above, further evaluation and coordination with regulators will be necessary in order to determine if the Visitor Center will require advanced wastewater treatment. Therefore, two alternative wastewater treatment systems are summarized below. The first alternative consists of a standard septic/leachfield treatment system, and the second alternative consists of an advanced treatment system.

Septic Tank and Leach Field Alternative

- Septic Tank
    - Purpose: Collects raw sewage from the buildings and provides primary treatment (removal of solids and some BOD reduction).
    - Capacity: 12,000 gallons (based on HCDEH requirements)
- Equalization Tank
    - Purpose: Provides tank volume to accommodate surges in flow during high-use periods. This allows for sizing of downstream treatment elements to match the peak month average flow days and does not need to be oversized to accommodate the peak day by retaining wastewater during the rare, ultra-high usage days.
    - Capacity: 8,000 gallons

- Discharge/Dosing Tank
    - Purpose: Collects treated effluent from the septic tank. Includes duplex pumps for redundancy with a single pump able to handle the peak flow conditions.
    - Capacity: 1,000 gallons (based on 600-gallon emergency storage required by HCDEH, and assumed 400-gallon dispersal field dose)
- Dispersal/Leachfield
    - Purpose: Distributes wastewater load evenly over broad area to promote infiltration and to reduce potential for groundwater and surface water contamination.
    - Size and Capacity: Average discharge flow rate of 1,765 gpd, eight dispersal lines, each 69 feet in length, with approximately 10-feet between adjacent trench centerlines (plus 100% reserve area).

Advanced Treatment Alternative

- Septic Tank
    - Purpose: Collects raw sewage from the buildings and provides primary treatment (removal of solids and some BOD reduction).
    - Capacity: 12,000 gallons (based on HCDEH requirements)
- Equalization Tank
    - Purpose: Provides tank volume to accommodate surges in flow during high use periods. This allows for sizing of downstream treatment elements to match the peak month average flow days and does not need to be oversized to accommodate the peak day by retaining wastewater during the rare ultra-high usage days.
    - Capacity: 8,000 gallons
- Recirculation Tank
    - Purpose: Recirculating pump tank to feed bio-filter unit and provides additional nitrogen removal for nitrified effluent from bio-filter unit.
    - Capacity: 1,500 gallons (based on Orenco requirements and peak month average daily design flow).
- One Orenco Advantex AX-100 Biological Filtration Unit
    - Purpose: Biological treatment for reduction of BOD and nitrification of ammonia.
    - Capacity: Organic loading rate: peak 8 pounds per day (lb/d), average 4 lb/d; hydraulic loading rate: peak 5,000 gpd, average 2,500 gpd.
- Discharge/Dosing Tank
    - Purpose: Collects treated effluent from the treatment unit. Includes duplex pumps for redundancy with a single pump able to handle the peak flow conditions.
    - Capacity: 1,000 gallons (based on 600-gallon emergency storage required by HCDEH and assumed 400-gallon dispersal field dose)

- Dispersal/Leachfield
  - Purpose: Distributes wastewater load evenly over broad area to promote infiltration and to reduce potential for groundwater and surface water contamination.
  - Size and Capacity: Average discharge flow rate of 1,765 gpd, eight dispersal lines, each 69 feet in length, with approximately 10-feet between adjacent trench centerlines (plus 100% reserve area).

Leachfield Sizing and Location

The size of a leachfield and the total length of the leach lines (or pressure distribution lines in the case of a non-standard system) is determined by the daily treated effluent quantity, the effective absorption area per linear foot of the pressurized dispersal trench, and the recommended soil application rate. The soil application rate is determined by the soil suitability and the percolation (or infiltration) rate that has been observed in field testing of the native soils.

LACO conducted extensive testing of soil conditions and described the results in “Wet Weather Testing and Wastewater Disposal System Feasibility Report of Findings” (LACO, 2011). Some observations and test results are described below for testing locations near the proposed site for the treated effluent dispersal field. Refer to Sheet C 8.0 of the 100% Schematic Design drawings of the leachfield.

The values used to calculate the total length of pressure distribution lines have been chosen based on the peak month average daily flow rate of 1,765 gpd, soil characteristics described by LACO, and the requirements of the RWQCB and HCDEH. The resulting configuration of the leachfield includes eight lines, each 69 feet in length, with approximately 10-feet between adjacent trench centerlines. Peak flow equalization is required in order to size the leachfield based on the peak month, average daily flow.

The leachfield has been positioned such that it meets the setback requirements defined by the RWQCB and HCDEH: 100 feet from the 10-year flood zone, 50-feet from any drainage ditch. In addition, the finish ground surface at the leachfield will be above the estimated 100-year flood elevation.

Wastewater Treatment Area Wildlife Protection

The bulk of the treatment system is below grade. Exceptions include the control panel and the top of the Orenco treatment pod. Although the control panel will be locked to protect the system from vandalism or inadvertent changes by visitors, the panel is mounted to a panel board above grade, which the elk may rub against. Over time, if enough force is applied to the panel, it may impact or damage the panel or the supporting panel board structure. If desired, the panel could be placed inside a utility closet for aesthetics and to protect it from wildlife.

Similarly, the top of the Orenco treatment pod is a few inches above grade and made of fiberglass. The unit can handle a fair amount of weight but if there is a very large elk that happens to walk or jump on the unit, the force of the hoof may exceed the capacity of the lid and cause damage to the unit putting a hole in the lid. This will not stop the system from operating correctly but can let in stormwater (which can potentially hydraulically overload the system) or allow for obnoxious odors to escape the system (and cause aesthetic issues with the nearby parking lot). A fence around the wastewater treatment area may be desired to prevent elk from causing damage.

The following additional data will be required for the next phase of design:

- Confirmation of RWQCB and HCDEH final requirements with LAMP approval
- Confirmation if the Orenco equipment or panel needs to be protected from elk and other wildlife

Educational Opportunities

We encourage opportunities to educate visitors about the water cycle and the supporting infrastructure. Opportunities include diagrams describing the wastewater treatment system and information on the aquifer, well construction, and the water supply system, including diagrams and maps. Information can also be provided on the protection of water quality through low impact development measures. The information could be tied back to protection of the watershed for the benefit of the redwood ecology.

Additional Data Required

Collection of the following data is recommended before commencing the next phase of the civil engineering design:

Topographic Survey

- Miscellaneous items at the existing site, such as inverts of existing culverts
- It is not clear from previous surveys if adequate control has been set at the site to facilitate construction; additional control may need to be set.

Geotechnical Investigation

- Geotechnical investigation at Orick Mill site should provide the following information:
    - Excavation and fill placement recommendations
    - Design parameters for building and tank foundations
    - Seismic design parameters
    - Pavement design recommendations
    - Reuse of AC grindings
- Geotechnical investigation at the Libby Creek Restoration site to determine parameters for arch culvert crossing
- Geotechnical investigation along the Upper Road to determine allowable cut and fill slopes
- Geotechnical investigation at the Canopy Walk site to determine parameters for the design of the Canopy Walk

Roadway Modifications

- U.S. Highway 101 and Bald Hills Road Intersection–Determine what, if any, modification(s) will need to be made at the intersection of Highway 101 and Bald Hills Road. GHD is currently working on this effort.

- Upper Road–Conduct an analysis of the roadway to determine if any modifications are necessary to provide emergency vehicle access or other access. Also consider California Coastal Trail requirements and goals.
- Emergency Vehicle Access–Coordinate with the AHJ and NPS to determine if secondary access is required for the site.
- Lower Road–If the Lower Road is kept for emergency vehicle access or maintenance access, it should be evaluated to verify that it will meet the needs of its intended use.

Utilities

- Determine how electrical and communications utilities will be brought to the site.

Install Test Well

- Drill a new well onsite and perform pump testing at proposed well location to confirm yield and water quality.
- As discussed in Water Supply section of this report, in order to comply with NFPA 22 (Section 13.4.2), the water well and well pump must be able to refill the fire water tanks in a maximum time of 8 hours. This equates to a minimum pumping rate of 121 gpm. Further testing and evaluation will be required to determine if a single well can meet this demand, or if multiple wells will have to be installed to meet this demand.

Adjacent Restoration Efforts

- Design details for the Libby Creek Restoration
- Design details for the Prairie Creek Restoration

Adjacent Project Coordination

- Canopy Walk–Determine layout and configuration of the proposed elevated walkway
- Demolition of Existing Mill Foundations–Determine the extent of foundation demolition and excavation that will be required in order to facilitate the development of the site and the adjacent restoration of Prairie Creek.
- O'Ra Hiko Village–The following items will need to be considered and coordinated:
    - Site grading and coordination with the Libby Creek restoration project
    - Site utilities–Verify the needs associated with water (fire water and domestic water), sewer (may need to be pumped), and electrical services
    - Emergency vehicle access

Summary of Modifications and Alternatives

SHN's 100% Schematic Design follows the previous schematic design efforts conducted by Sherwood Design Engineers (100% Schematic Design by Sherwood, dated April 2017), and by SHN (previous 100% Schematic Design by SHN, dated May 2018). SHN built upon the previous design efforts by SDE and made some modifications to their design in an effort to address data gaps and to attempt to reduce construction costs for the project. The modifications that have been made are summarized below.

Demolition

Modifications to the demolition plan include:

- Minimizing or eliminating the demolition of the existing mill foundations. The existing mill foundations are likely to be deep and are expected to be challenging and costly to remove. Also, due to the previous industrial activities onsite, extensive excavation and foundation demolition could result in encountering contaminated soils that will be costly to handle and dispose of properly.

Site Electrical Design

The previous 100% Schematic Design plans for the site civil improvements provided preliminary layout and sizing information for the electrical service for the Visitor Center. This information has been removed from the revised site civil 100% Schematic Design plans and will be provided on electrical plans prepared by O’Mahoney & Myer.

Grading and Drainage

Modifications that have been made to the grading and drainage design include:

- The finish floor elevation of the Visitor Center buildings has been raised in order to better balance the cut/fill requirements for the entire project. The restoration projects are expected to generate significant quantities of excess material that will be used to build up the Visitor Center site.
- The limits of the Visitor Center project have been modified, and now the stormwater retention basins are located within the limits of the Prairie Creek Restoration project.
- The storm drainage system has been reduced in scale based on the determination that not all drainage from impervious surfaces will need to drain to the existing drainage swale along eastern side of the site.
- The “lobe” has been removed from the Visitor Center project and is now included in the limits of the Prairie Creek Restoration project. In the previous design, this area consisted of a significant excavation.

Domestic Water and Fire Water

A number of modifications have been made to the water system. These include:

- Increase the size of the fire water storage tank to a minimum of 58,071 gallons, based on revised calculations using the most current version of NFPA 1142.
- The potable water treatment facilities and pressure booster pump have been moved to an aboveground location.
- A water treatment building has been added to the project. This building may be a pre-manufactured building by CXT or similar.
- The fire water tank will no longer be located at the site up Bald Hills Road and will now be located on the Visitor Center site. The fire water system modifications include:

- Installing two fire water tanks rather than one in order to better facilitate tank maintenance and repairs.
- Install an emergency fuel-driven fire pump skid that meets the requirements of NFPA 20 and will provide a minimum of 1,000 gpm at a pressure of 50 to 60 psi. The fire pump skid should include the following:
    - Jockey pump to keep up with minor leaks and maintain adequate pressure in the fire system
    - Battery-powered starter for pump
    - Diesel fuel storage tank
- Building to house fire pump skid.

Wastewater Treatment

Although further coordination and evaluation will be necessary before any determinations can be made, it appears as though it may be possible to eliminate the advanced treatment system (Orenco AX-100) from the project and simply rely on a standard septic tank/leachfield system for wastewater treatment.

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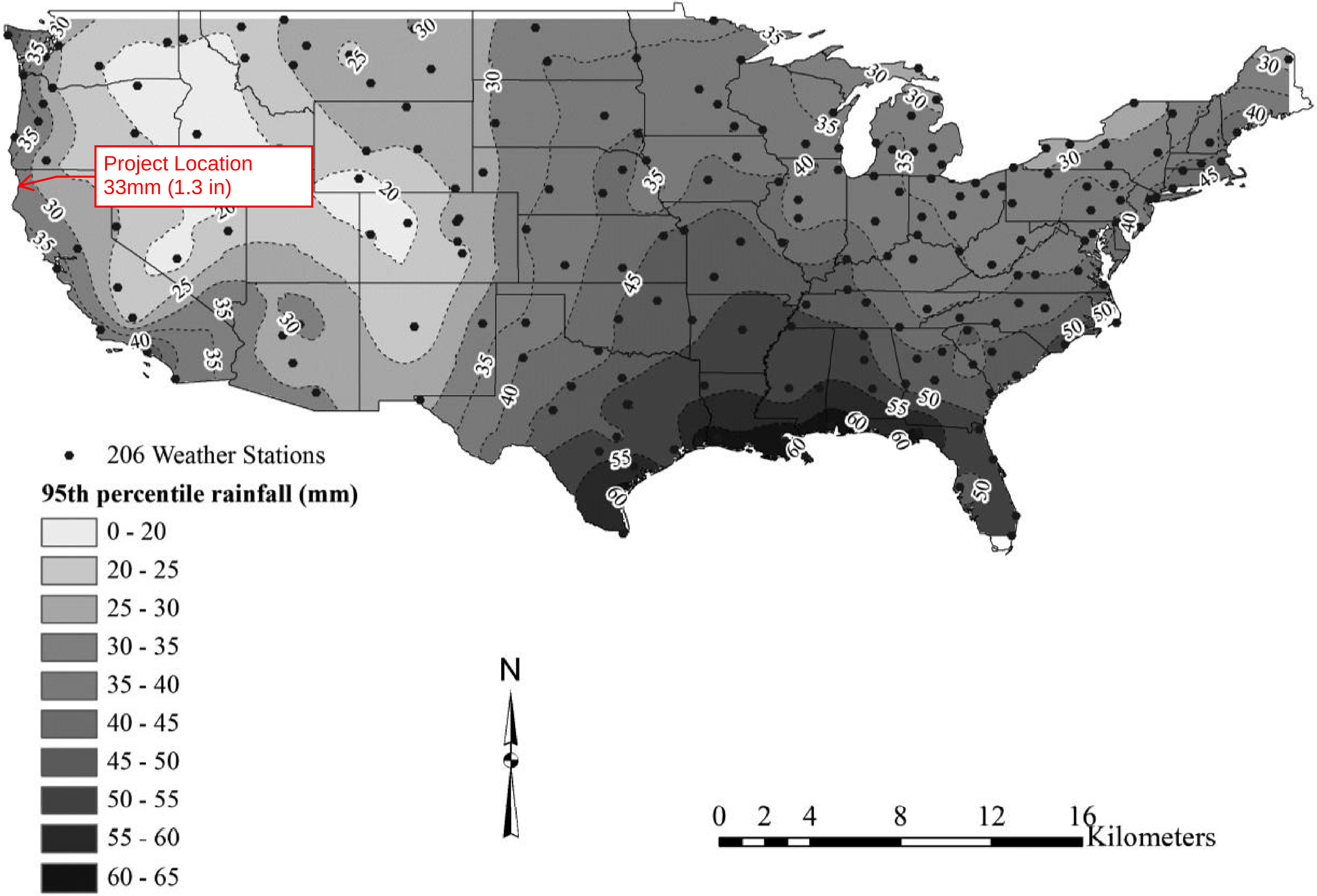
95th Percentile Rainfall

1



Project Location
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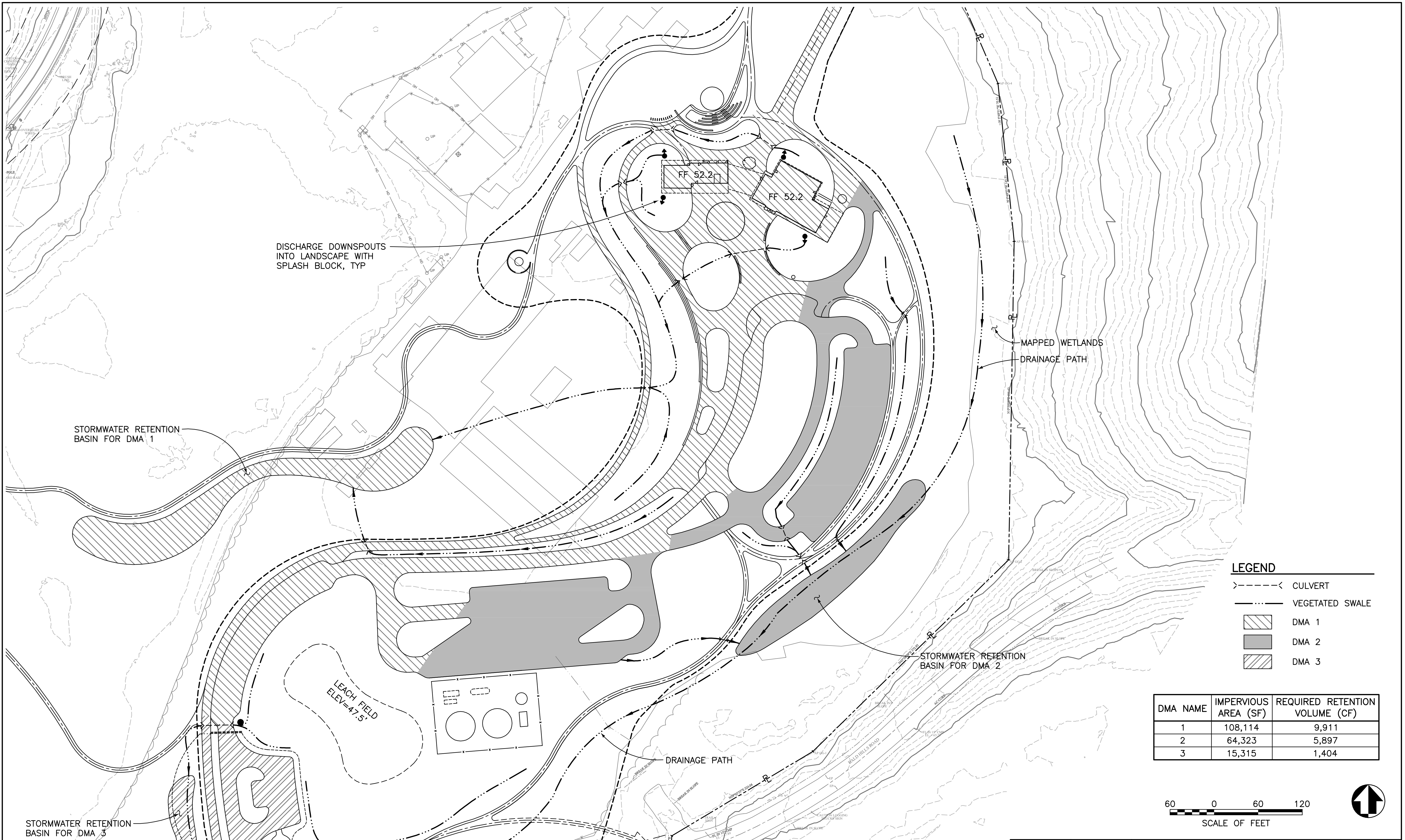
Stormwater Drainage Management Areas

2



LEGEND

- >- - - - -< CULVERT
- —·—·— VEGETATED SWALE
- ▨ DMA 1
- ■ DMA 2
- ▨ DMA 3

DMA NAME	IMPERVIOUS AREA (SF)	REQUIRED RETENTION VOLUME (CF)
1	108,114	9,911
2	64,323	5,897
3	15,315	1,404

DESIGNED:
J. O'BARR
CADD
C. NEWELL
TECH. REVIEW:

DATE:
12/18

SUB SHEET NO.
FIG

TITLE OF SHEET

VISITOR CENTER STORMWATER DRAINAGE MANAGEMENT AREAS

REDWOOD VISITOR CENTER

DRAWING NO.
167
144065

PMIS/PKG NO.
222776

SHEET
1 OF 1

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Eureka, CA | Arcata, CA | Redding, CA | Willits, CA | Coos Bay, OR | Klamath Falls, OR

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Appendix N – Topographic and Cross Sectional Views of Project Components, NHE 2019c

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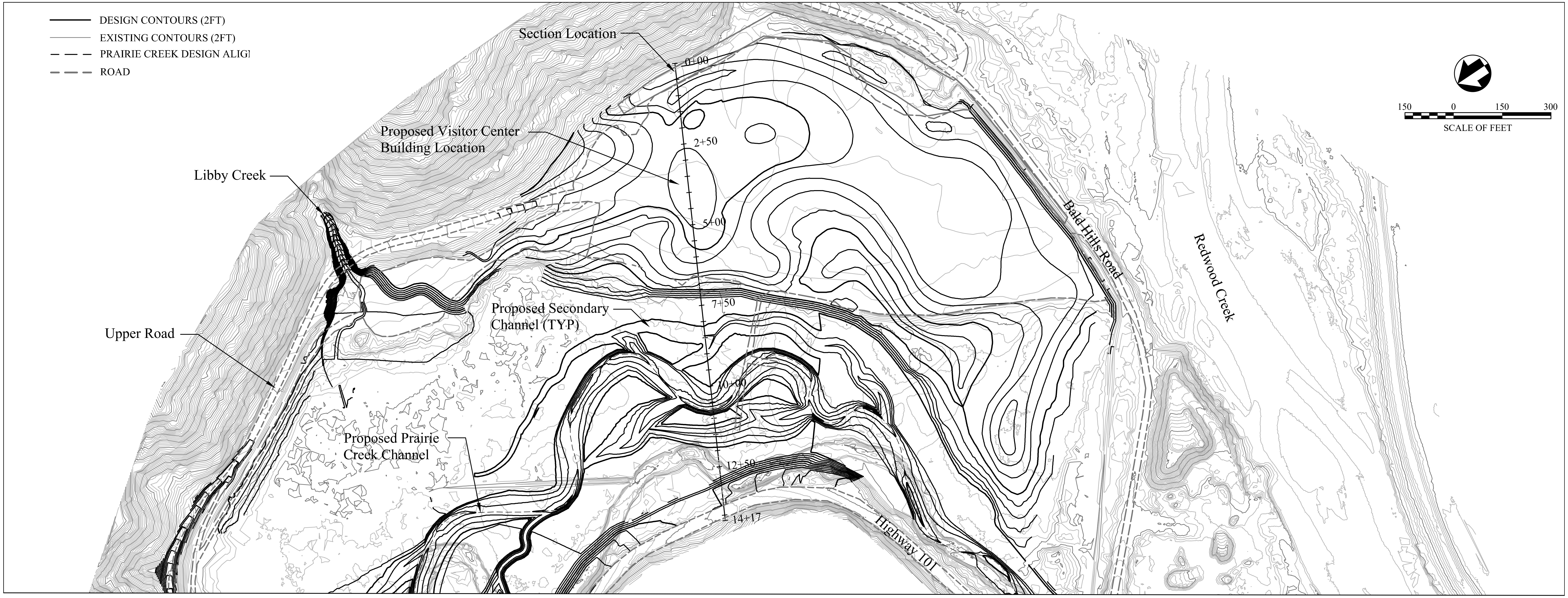
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EXISTING CONTOURS (2FT)
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10+00
12+50
14+17
Proposed Visitor Center Building Location
Libby Creek
Upper Road
Proposed Secondary Channel (TYP)
Proposed Prairie Creek Channel
Bald Hills Road
Redwood Creek
Highway 101
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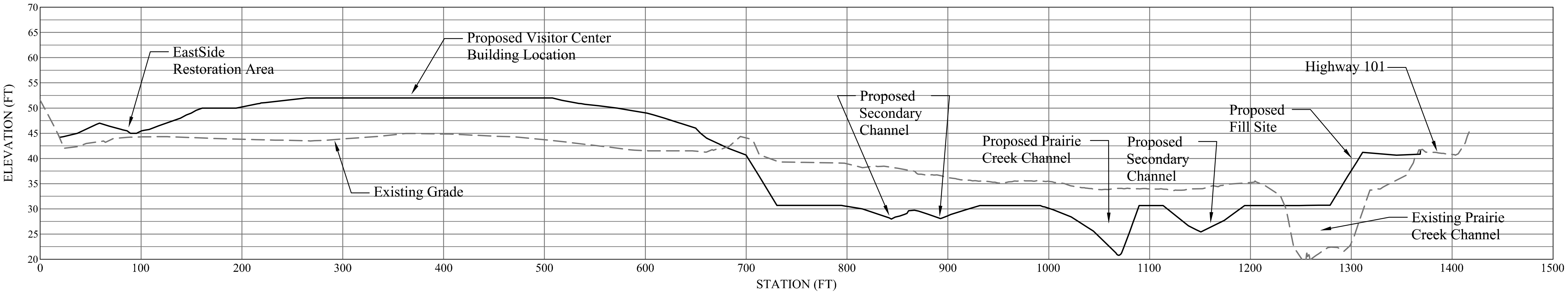
150
300
SCALE OF FEET


ELEVATION (FT)
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65
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55
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45
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0
100
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300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
STATION (FT)
EastSide Restoration Area
Proposed Visitor Center Building Location
Existing Grade
Proposed Secondary Channel
Proposed Prairie Creek Channel
Proposed Secondary Channel
Proposed Fill Site
Highway 101
Existing Prairie Creek Channel

Appendix O – Traffic Impact Study, GHD 2019h

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Save the Redwoods League

Proposed Redwood National and State Park Visitor Center and Restoration Project

Traffic Study Report

September 2019

SAVE THE REDWOODS LEAGUE
REDWOOD NATIONAL AND STATE PARK VISITOR CENTER AND RESTORATION PROJECT
TRAFFIC STUDY
ORICK, CALIFORNIA

GHD Project No. 11187543

Prepared for: Save the Redwoods League
111 Sutter Street, 11th Floor
San Francisco, CA 94104

Prepared by:

Matthew J. Wargula

Matt Wargula, PE, TE
Traffic Engineer

REGISTERED PROFESSIONAL ENGINEER
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No. TR2749
Exp. 3/31/2021
TRAFFIC
STATE OF CALIFORNIA

September 18, 2019
Date

Reviewed by:

Matthew G. Kennedy

Matt Kennedy, PE, TE
Traffic Engineer

REGISTERED PROFESSIONAL ENGINEER
MATTHEW GLEN KENNEDY
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Exp. 6/30/2021
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STATE OF CALIFORNIA

September 18, 2019
Date

GHD Inc.
2235 Mercury Way, Suite 150
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(707) 523-1010

September, 2019

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Appendix C – Existing Plus Project Intersection Level of Service Calculations and Queuing Analysis

Appendix D – Cumulative Conditions (2038) Intersection Level of Service Calculations and Queuing Analysis

Appendix E – Cumulative Conditions Plus Project Intersection Level of Service Calculations and Queuing Analysis

Appendix F – Signal Warrant Analysis

Appendix G – Harmelink Model Calculations

Appendix H – CalEEMod VMT Analysis Results

Appendix I – Previous Studies

Executive Summary

This report presents the results of a traffic impact analysis for the proposed *Redwood National and State Park Visitor Center and Restoration Project* (project), located approximately 1.25 miles north of the unincorporated community of Orick in Humboldt County, California. The study evaluated localized traffic conditions that could potentially be impacted by a the proposed project. The proposed project consists of the redevelopment of an approximately 101.5-acre site with a 5,847 square foot visitor center, recreation enhancements and habitat restoration to increase recreation and public educational opportunities for visitors to the Redwood National Park and State Parks (RNSP) and enhance ecological conditions of the creeks and floodplain to support wildlife. The project includes construction of a new visitor center and supporting infrastructure such as parking lots and circulation, on-site interpretive elements (including an outdoor classroom), creation of new local multi-use trails with regional trail connections and a new trail segment of the California Coastal Trail (CCT), a redwood tree canopy walkway, establishment of a traditional Ceremonial Brush Dance Site for local and visiting tribes to conduct ceremonies and other tribal events, and onsite stream and wetlands restoration for Prairie Creek and Libby Creek.

The project site includes a mile long reach of Prairie Creek, the former Orick Mill site and various onsite infrastructure such as onsite roads and parking areas. The former mill and an old bard have been removed from the site and the site is currently vacant but leased for grazing. The project area is bound to the west by Highway 101 (US 101), to the north by the community of Berry Glen, to the east by RNSP and the south by Bald Hills Road, a county road.

One intersection was evaluated in this study, because of the potential impact to this intersection from the proposed project, which is under the jurisdiction of the California Department of Transportation (Caltans): Bald Hills Road / US 101 (unsignalized)

This traffic study evaluates Existing, Existing Plus Project, Cumulative (2038) and Cumulative Plus Conditions at the study intersection. The cumulative 20-year is used for planning purposes based on typical general plan 20-year planning period and Caltrans District 1 standards for cumulative growth projects. Level of Service (LOS) calculations were performed for the study intersection for each scenario. The results of these calculations were used to assess the project's potential project impacts. A vehicle miles traveled (VMT) analysis was also performed for the project. The VMT analysis results were not used to assess potential project impacts because California Environmental Quality Act (CEQA) thresholds of significance for VMT have not yet been established by state and local agencies. In addition, a safety analysis was completed for the intersection.

GHD's traffic data subconsultant (Counts Unlimited) performed mid-week traffic counts in August, 2018. The Caltrans District 1 2014 growth assumptions for Humboldt County were used to estimate cumulative (2038) traffic volumes.

Trip Generation

The trip generation rates published in the Institute of Transportation Engineers (ITE) manuals entitled *Trip Generation*, 10th Edition, were used for this analysis. On the basis of these rates, it is estimated that at complete build-out and total occupation the project would generate 391 daily trips, including 67 trips during the peak hour during the average day. Using the specified inbound/outbound splits, the project would produce 35 inbound trips and 32 outbound trips during the peak hour.

Study Results

The analysis finds that the unsignalized intersection of Bald Hills Road and US 101 currently operates at an acceptable LOS and will continue to operate at an acceptable LOS with the addition of regional growth and project-related trips.

Drawing from the results of the traffic impact analysis, we conclude that:

1. Although the intersection would operate at acceptable service levels, the project may pose a risk to public safety at the intersection of Bald Hills Road and US 101. The proposed project would more than double the peak hour US 101 southbound left-turns and significantly increase the approach volumes to the intersection overall. The intersection currently has an above average collision rate for similar intersections state-wide (rural, tee intersections), with collisions that may be attributed to slowing and/or stopped traffic on southbound US waiting to make the left-turn onto Bald Hills Road. Based on the safety analysis included in this report and engineering judgement a southbound left-turn lane on US 101, combined with shoulder widening, and signage is recommended for the intersection of Bald Hills Road and US 101.

1. Introduction

GHD Inc. (GHD) has evaluated traffic conditions that could potentially be impacted by the proposed.

1.1 Project Description

The *Redwood National and State Park Visitor Center and Restoration* project (project) is located approximately 1.25 miles north of the unincorporated community of Orick in Humboldt County, California. The proposed project consists of the redevelopment of an approximately 101.5 acre site with a 5,847 square foot visitor center and associated infrastructure such as parking lots and internal circulation, recreation enhancements and habitat restoration to increase recreation and public educational opportunities for visitors to the Redwood National Park and State Park (RNSP). The project includes construction of a new visitor center and on-site interpretive elements (including outdoor classroom), creation of new local multi-use trails with regional trail connections and new trail segment of the California Coastal Trail (CCT), redwood tree canopy walkway, establishment of a traditional Ceremonial Brush Dance Site for local and visiting tribes to conduct ceremonies and other tribal events, and onsite stream and wetlands restoration for Prairie Creek and Libby Creek to enhance habitat conditions for salmonids and other species.

The project site includes the lower reach of Prairie Creek, the former Orick Mill site and various access roads. The project area is bound to the west by Highway 101 (US 101), to the north by the community of Berry Glen, to the east by RNSP and the south by Bald Hills Road. Figure 1 shows the project vicinity and location map.

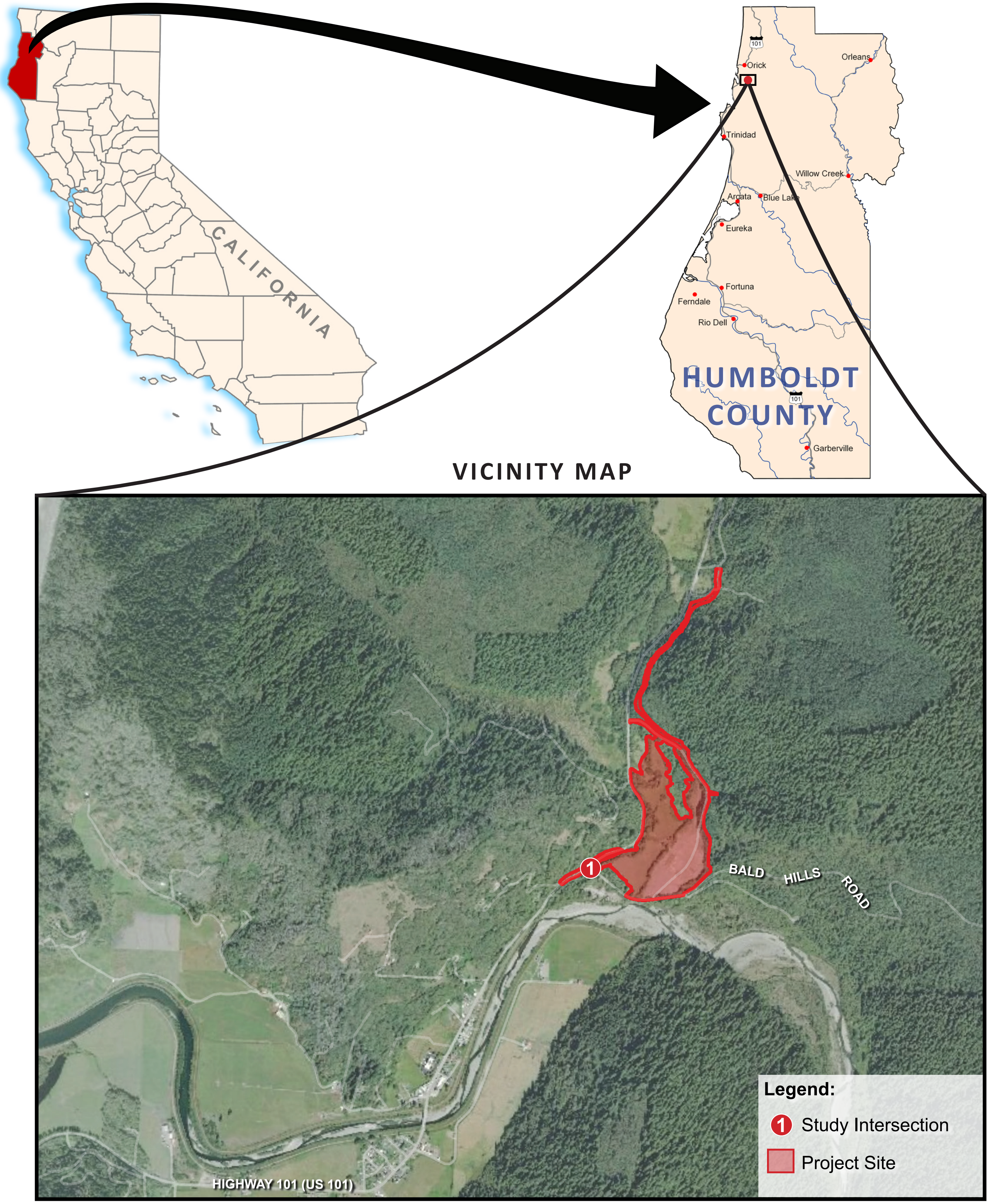
1.2 Scope of Study

This study was conducted with the intent of identifying the potential traffic impacts associated with the proposed project. The traffic impacts of the proposed project were evaluated using the standards and methodologies set forth by both the California Department of Transportation, District 1 (Caltrans). The study was performed and impacts evaluated in accordance with the standards and methodologies set forth in the *Guide for the Preparation of Traffic Impact Studies* (Caltrans, 2002). The traffic analysis is based on peak-hour levels of service for vehicle unsignalized intersections. The traffic analysis includes an evaluation of peak-hour signal warrants and queuing for unsignalized intersections. Significant impacts, as defined in the CEQA Guidelines, and thresholds of significance, as established by Caltrans, were used to determine level of significance of traffic impacts. A vehicle miles traveled (VMT) analysis was also performed for the project. A discussion of the methodology used and results for the VMT analysis is provided in Chapter 9.

1.2.1 Study Intersections

The following intersection under the jurisdiction of Caltrans was analyzed in this study:

1. Bald Hills Road and US 101 - Unsignalized



Save the Redwoods League
Redwood National and State Park
Visitor Center Project

Project Vicinity and Location Map

Project No. **11187543**
Revision No.
Date **06/13/2019**

FIGURE 1

\\ghdnet\ghd\US\Eureka\Projects\111\11187543 STRL RN-SP Visitor Center\04-Technical Work\Task 2. Environmental & Special Studies\Task 2.3 - Traffic Impact Study\Task 2.3.4 - Traffic Study Report\Figures\InDesign\Vicinity + Location Map.indd
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The study includes an analysis of one (1) unsignalized intersection. Traffic conditions at this study intersection were analyzed for the weekday peak hour of traffic, which was found to be during the middle of the day, between 11:00 AM and 1:00 PM. It is during this period that the most congested traffic conditions occur on an average day.

1.2.2 Study Scenarios

Five scenarios were evaluated as part of this project:

Scenario 1: Existing Condition (2018). Existing conditions are represented by existing peak hour traffic volumes at the study intersection, and were obtained from recent traffic counts (August 2018) collected by GHD's subconsultant.

Scenario 2: Existing Plus Project Condition are represented by adding project traffic to the existing peak hour traffic volumes at the study intersection through estimating project generated trips and distributing them through the roadway network.

Scenario 4: Cumulative Condition (2038). Cumulative conditions are represented by cumulative growth traffic volumes on the existing roadway network at the 20-year planning horizon. Cumulative traffic volumes were estimated by applying a growth factor to existing traffic volumes.

Scenario 5: Cumulative Plus Project Condition (2038). Cumulative + Project conditions are represented by cumulative growth traffic volumes, with the project traffic, on the existing roadway network. Cumulative traffic volumes with the project were estimated by adding traffic generated by the project to the cumulative traffic volumes. Cumulative + Project conditions were evaluated relative to cumulative conditions to determine potential project traffic impacts.

Each of the scenarios were evaluated in conformance with the CEQA Guidelines.

2. Methodology

This chapter describes the methods used in performing the traffic impact analysis for each study scenario described in Chapter 1. It includes a discussion of the data requirements, analysis methodologies, and level of service standards.

2.1 Data Requirements

The data requirements for the traffic impact analysis include:

- Existing intersection turning movement traffic volume counts
- Existing Intersection geometry and lane configuration

GHD's traffic data collection subconsultant, Counts Unlimited, Inc., collected existing intersection turning movement traffic volumes at all study area locations on Wednesday, August 29 and Thursday, August 30, 2018 while schools were in session, inclusive of bicycles and pedestrians, as directed by Caltrans. Caltrans confirmed that traffic counts should be taken during summer period with higher visitation and while school is in session. In addition, vehicle classification counts were also collected. Vehicle classifications were identified in accordance with the Federal Highway Administration (FHWA) Vehicle Classification 13-Category Scheme, inclusive of bicycles. Site visits were also made to confirm intersection geometry and roadway widths at all intersection approaches.

All intersection vehicle turning movement volume counts are included in Appendix A.

2.2 Analysis Methodology and Level of Service Standards

Traffic operating conditions for the study intersections were analyzed using level of service methodology from the *Highway Capacity Manual 6th Edition* (Transportation Research Board, 2016), referred to hereafter as the *HCM6th*. The various analysis methods and criteria are described in the following sections.

2.2.1 Measures of Effectiveness

Caltrans maintains jurisdiction over the operation of US 101 and the study intersection. The County of Humboldt maintains jurisdiction over the operation of the minor streets adjacent to US 101, including Bald Hills Road. Caltrans use measures of effectiveness (MOEs) to describe the techniques best suited for analyzing State highway facilities. MOEs are calculated performance measures that reflect the operating conditions of a facility, given a set of roadway, traffic, and control conditions. Table 1 summarizes the MOEs by facility type used in this study.

Table 1. Measures of Effectiveness by Facility Type

Type of Facility	Measure of Effectiveness (MOE)
Unsignalized Intersections	Average Control Delay per Vehicle (sec/veh)
Source: Caltrans (2002).	

2.2.2 Thresholds of Significance

Thresholds of significance in traffic analyses are principally used to determine whether a project would have a significant impact on study intersections. A threshold of significance is a quantitative or qualitative standard, or a set of criteria from which the significance of a given impact may be determined. In the context of traffic, level of service (LOS) based standards are typically used to establish thresholds of significance.

Potential traffic impacts are evaluated based on the threshold of significance established by Caltrans. Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities. If a State highway facility is operating at less than the appropriate target LOS, the existing MOE should be maintained (Caltrans, 2002).

A significant traffic impact is identified if the project's increase in traffic results in a degradation of an acceptable LOS to an unacceptable LOS, or if the project contributes traffic to an intersection movement or approach that operates unacceptably without the project either currently or in the future. If the project is determined to have a significant impact, mitigation measures are identified to improve the operation of the transportation facility to an acceptable condition.

2.2.3 Level of Service Methodology

Traffic operating conditions for the study intersections were analyzed using intersection delay-based methodologies from the *HCM6th – Volume 3 Interrupted Flow* (Transportation Research Board, 2016). This source contains methodologies for various types of intersection control, including signalized intersections, two-way stop-controlled (TWSC) intersections and roundabouts.

The analysis level in this study is recognized as planning and preliminary engineering. The "analysis level" describes the level of detail used when the methodology is applied. The "planning and preliminary engineering level" of analysis requires only the most fundamental types of information. Default values are then used as substitutes for other input data.

The methodologies utilized in this study are for the automobile mode, although other modes are discussed.

Synchro 10 (Synchro) with SimTraffic software was used for the traffic analysis in this study. Guidelines established by Caltrans District 1 (Caltrans, 2008) were utilized in the analysis, where applicable.

2.2.4 Unsignalized Intersections

The unsignalized study intersection is a two-way stop-controlled (TWSC). The TWSC intersection methodology for motor vehicles is determined by the computed or control delay and assigned a LOS. For motor vehicles, LOS is determined for each minor-street movement (or shared movement) as well as major-street left turns.

The input data required for the evaluation of TWSC intersections includes the number and configuration of lanes on each approach; percent heavy vehicles for each movement; demand flow rate for each entering vehicular movement and each pedestrian crossing movement during the peak hour; peak hour factor; existence of a two-way left-turn lane (TWLTL) or raised or striped median storage (or both); approach grades; existence of flared approaches on the minor street; and existence of upstream traffic signals. Computed control delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology to describe each minor-street movement and major-street left-turn movement. The ranges of delay associated with the TWSC levels of service are indicated in Table 2.

Table 2. Unsignalized Intersection Level of Service

Level of Service	Description	Control Delay (Seconds Per Vehicle)
A	Little or no delay	< 10
B	Short traffic delays	>10 to 15
C	Average traffic delays	>15 to 25
D	Long traffic delays	>25 to 35
E	Very long traffic delays	>35 to 50
F	Extreme traffic delays with intersection capacity exceeded (for an all-way stop), or with approach/turn movement capacity exceeded (for a side street stop controlled intersection)	> 50.0
Source: Highway Capacity Manual 6th Edition (Transportation Research Board, 2016).		

2.2.5 Vehicle Miles Traveled

Senate Bill (SB) 743 creates a process to change the way that transportation impacts are analyzed under CEQA. Specifically, SB 743 requires the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative MOE to control delay and associated LOS for evaluating transportation impacts. OPR recommends that vehicle miles traveled (VMT) become the primary metric or MOE of transportation impact across the State of California.

A more detailed discussion of VMT, the methodology used in this study and the results of the VMT analysis for the proposed project are included in Chapter 8.

2.3 Vehicle Queuing

Vehicle queuing analysis was completed for the intersection. This analysis is important because if there is not enough queuing space between intersections, in left-turn or right-turn pockets, the overflow of vehicles can obstruct the operations of the roadway.

The Synchro 10 with SimTraffic software program was used to determine the 50th and 95th percentile queue lengths, represented by the average of five (5) model runs of an hour in length. The 50th percentile is the average queue length. The 95th percentile of queue length (in vehicles) is the queue length that has only a 5-percent probability of being exceeded during the analysis time period. It is a useful parameter for determining the appropriate length of turn pockets, but it is not typical of what an average driver would experience. The queue analysis will determine the 50th and 95th percentile movement queue lengths based on *HCM6th* methodology.

2.4 Peak Hour Signal Warrant 3 Methodology

Traffic Signal Warrant 3 (Peak Hour) is defined in the 2014 edition of the *California Manual on Uniform Traffic Control Devices* (MUTCD), Revision 4, which is based on the Federal Highway Administration's 2009 Edition for use in California (Caltrans, 2019). The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street (Caltrans, 2019).

Warrant 3 has two Parts, A and B, either of which must be met to consider the potential need for a signal based on the peak hour condition.

Part A contains three conditions, which are:

1. The total delay experience by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds 4 vehicle-hours for one-lane approach, or 5 vehicle-hours for a two-lane approach; AND
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vehicles per hour (vph) for one moving lane of traffic or 150 vph for two moving lanes; AND
3. The total entering volume serviced during the hour equals or exceeds 800 vph for the intersection with 4 or more approaches or 650 vph for intersections with 3 approaches.

Part B of the Traffic Signal Warrant 3 contains figures wherein the plotted point representing vph on the major street (total of both approaches) and the corresponding vph on the higher-volume minor street approach (one direction only) for 1 hour is above the applicable curve on the applicable figure. The results of the Signal Warrant 3 analysis for each study scenario are included in Appendix G.

The satisfaction of a traffic signal warrant or warrants is not considered an impact based on Caltrans significance criteria, and does not in itself require the installation of a traffic signal. Applicable to this study, it has been determined through engineering judgment that, in order for the installation of a traffic signal to be considered, the scenario must have an intersection LOS which is not acceptable with respect to the applicable significance thresholds <u>and</u> meet the requirements of either part of Traffic Signal Warrant 3.

3. Existing Condition

This chapter describes the Existing Condition at the study intersection during the peak hour based on the peak 15-minute traffic conditions. Also included is a discussion of intersection safety and transportation facilities in the project area, including the roadway network, transit services, and bicycle and pedestrian facilities.

3.1 Existing Condition Roadway Network

The roadways analysed in this study are located in a rural area, with the closest community (Orick) located approximately 1.25 miles south of the project site. The Humboldt County General Plan (adopted October 23, 2017) recognizes that roadway capacity is generally less of an issue for rural areas due to the lower population densities, but capacity and functionality must be maintained.

U.S. 101 is a two-lane highway within the project vicinity. It generally runs in a north/south direction. There is a minimum 12-foot lane with 1-foot minimum paved shoulder in each direction and the speed limit is 55 mph. Existing terrain is characterized as rolling, with changes in grade and horizontal curvature in the roadway alignment north and south of Bald Hills Road.

Bald Hills Road provides local access to the project site. Bald Hills Road runs between US 101 and Tulley Creek Road, providing linkage to several small communities along the route, with eventual connection to State Route 169 via Tulley Creek Road. Within the project area, Bald Hills Road is a two-lane collector, with one 12-foot lane in each direction and varies from no shoulder to a few feet of soft shoulder. Bald Hills Road Bridge, near the intersection with US 101, provides a narrow two-lane crossing over Prairie Creek. The posted speed limit within the project vicinity is 35 mph. There are no pedestrian or bicycle facilities on Bald Hills Road near the project area.

3.2 Existing Condition Transit Service

Redwood Coast Transit operates bus Route 20 – Smith River/Crescent City/Arcata, providing daily fixed route transit service between Smith River in Del Norte County and Arcata in Humboldt County along US 101, with stops at all major communities along the route, including the Prairie Creek Redwoods State Park and Redwood National Park’s Orick Southern Service Center. In Arcata, daily connections with Amtrak, Greyhound, Redwood Transit System and Arcata and Mad River Transit provide transit connections to Eureka and other regional and interregional locations throughout the north State, including Santa Rosa and San Francisco.

3.3 Existing Condition Bicycle and Pedestrian Facilities

Bicycle facilities are classified into four categories:

- Class I (Multi-Use Trails) – A Class I facility is a multi-use trail for the exclusive use of bicycles and pedestrians, separate from the auto traveled way.
- Class II (Bike Lanes) – A Class II facility is an on-street bicycle lane, with painted markings and signs designating the lane’s bicycle-only use. The bicycle lane is separated from vehicle and pedestrian traffic, but the route may be interrupted by vehicle turning movements at intersections.
- Class III (Bike Routes) – A Class III bicycle facility is a route for bicyclists in which the available traveled way is shared with vehicles. The facility is designated by signs or other markings and is usually provided when a Class I or Class II facility cannot be provided.

- Class IV (Separated Bikeways) – A Class IV bikeway is a bikeway for the exclusive use of bicycles and includes a separation required between the separated bikeway and the through vehicular traffic. The separation may include, but is not limited to, grade separation, flexible posts, inflexible posts, inflexible barriers, or on-street parking.

Bicycle facilities on US 101 consist of Class III bike routes – the Pacific Coast Bike Route. There are no marked bicycle facilities within Bald Hills Road. Pedestrian facilities in the study area consist primarily of existing State Park and National Park trails, including the California Coastal Trail. In general, sidewalks are not present within the study area.

3.4 Existing Condition Intersection Lane Configuration

The existing lane configurations at the study intersection was obtained by observations in the field. The existing intersection lane geometry and traffic controls are shown on Figure 2.

3.5 Existing Condition Site Access and Circulation

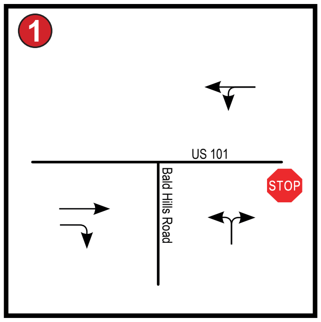
The project site is currently gated and not accessible to the public. The gated access to the existing site is located on Bald Hills Road, approximately 1,400 feet from the intersection of Bald Hills Road and US 101.

3.6 Existing Condition Traffic Volumes

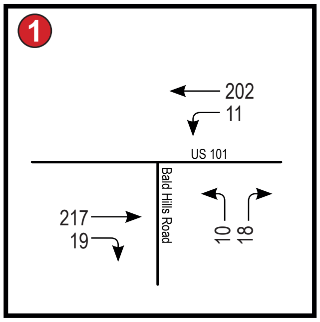
GHD's traffic data collection subconsultant, Counts Unlimited, Inc., collected 24-hour classification intersection turning movement traffic volumes at the study location on Wednesday, August 29 and Thursday, August 30, 2018 while schools were in session. Vehicle classifications are in accordance with the Federal Highway Administration (FHWA) Vehicle Classification 13-Category Scheme, inclusive of bicycles.

The peak 1-hour intersection volumes at the study intersections are shown on Figure 2. In general, the midday peak hour represents worst-case peak hour traffic conditions during a typical weekday at this location, based on collected traffic count data. The traffic count data are included in Appendix A of this report.

Bald Hills Road /
Highway 101 (US 101)



Bald Hills Road /
Highway 101 (US 101)



Legend:

① Study Intersection

STOP Stop Sign

xxx Weekday Peak Hour Volume (Midday Peak)

N

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Existing Intersection Lane Geometry & Traffic Controls & Existing Turning Movement Traffic Volumes

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FIGURE 2

\\ghdnet\ghd\US\Eureka\Projects\111\11187543 STRL RN-SP Visitor Center\04-Technical Work\Task 2. Environmental & Special Studies\Task 2.3 - Traffic Impact Study\Task 2.3.4 - Traffic Study Report\Figures\InDesign\Existing_Geo_TC_Conditions TM TV.indd
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3.7 Existing Condition Intersection Level of Service

The results of the level of service analysis under Existing Condition are summarized in Table 3. The results show that, measured against the Caltrans level of service standards, the study intersection currently operates at an acceptable LOS “B” or better during the peak hour.

Detailed calculation sheets for the existing level of service for the study intersections are provided in Appendix B of this report.

Table 3. Existing Intersection Level of Service

Study Intersection	Existing Condition	
	Midday Peak Period	
Approach	Delay	LOS
1. Bald Hills Rd. / US 101	13.5	B
Westbound (Bald Hills Rd.) Left	13.5	B
Westbound (Bald Hills Rd.) Right	10.1	B
Southbound (US 101) Left	8.1	A

Notes: Delay is calculated in average seconds per vehicle in queue
LOS = Level of Service
Bold = LOS exceeds threshold of significance

3.8 Existing Condition Intersection Queue Analysis

Existing traffic volumes were applied to the study intersection and the peak hour demand 50th and 95th percentile queue lengths were reviewed against the existing lane storage capacity, or available area for vehicles to queue, at the intersection. The results indicate that under existing typical conditions, queues are not excessive and storage capacity is adequate. Table 4 shows the results of the Existing Condition peak hour intersection queue analysis.

Table 4. Existing Condition Peak Hour Intersection Queue Analysis

Movement	Lanes / Available Storage	Existing Condition
		Queue Length – 50th/95th Percentile (feet)
		Peak Hour
SB LT	1 / Unlimited ft	3/21
WB L	1 / Unlimited ft	9/29
WB R	1 / 25 ft	17/41

Notes: Queue shown is maximum after two cycles
Bold = results where available storage is exceeded by more than one standard vehicle, 25 ft.

3.9 Analysis of Intersection Safety

3.9.1 Previous Studies and Documentation for Bald Hills Road / US 101 Intersection

In 2012. Green Diamond Resource Company retained LACO to complete a traffic impact study , titled *Traffic Impact Study Redwood National Park Lodge* (LACO, 2012). At that time, the Green

Diamond contemplated a different project than currently contemplated by Save the Redwoods League. The 2012 project proposed 247 camping and recreational vehicle sites with associated restroom and parking facilities, a guest lodge, an employee dormitory, a general store, a restaurant and a recreation building. The trip generation of the 2012 project was much greater than the current project.

Caltrans commented on the Draft Traffic Impact Study (LACO, 2012) in a letter dated July 5, 2012 to the Humboldt County Community Development Services. Caltrans provided the following major comments related on the study:

- Potential safety impacts relating to the lack of left-turn channelization (or roadway lane configuration necessary to safely move traffic on or off the highway) for the southbound left-turn from US 101 to Bald Hills Road and the need for a left-turn warrant analysis using an industry approved approach such as the Harmelink model (the Harmelink model is an empirical derivation of volume warrants and design charts for left-turn storage lanes at unsignalized intersections on four-lane and two-lane highways as developed by M.D. Harmelink in the 1960's).
- Traffic volumes provided by Caltrans Traffic Data Branch are two-way volumes, but the study used this data as one-way volumes for both southbound and northbound.

In 2017, Save the Redwoods League retained LACO to complete a traffic safety analysis at the intersection of Bald Hills Road and US 101. The effort was summarized in a Technical Memorandum, *Traffic Safety Analysis for Save the Redwoods League* (LACO, 2017). In summary, the *2017 Traffic Safety Analysis* found that the intersection:

- Has inadequate intersection corner sight distance from the left-turn and right-turn onto US 101 from Bald Hills Road;
- Cannot safety accommodate US 101 southbound left-turn onto Bald Hills Road; and
- Cannot safety accommodate pedestrian and bicyclist users.

The *Traffic Safety Analysis* evaluated whether a southbound left-turn lane was warranted utilizing the National Cooperative Highway Research Program (NCHRP) *Report 745 Left-Turn Accommodations at Unsignalized Intersections* (NCHRP, 2013) methodology for rural, two-lane highways and determined that a southbound left-turn lane was warranted based on existing traffic volumes at the intersection.

Short and long-term infrastructure recommendations were included, along with recommendations for long-term maintenance. Table 5 shows the recommendations made by LACO. The previously completed studies are included in Appendix I.

Table 5. Short and Long Term Infrastructure Recommendations (LACO)

Topic	Findings	Recommendation(s)		
		Short-term	Regular	Long-term
Sight Distance	Left-turn and right-turn from Bald Hills Road does not have adequate sight distance	Trim/cut existing vegetation and trees to provide better sight distance.	Trim vegetation and trees regularly	Shoulder widening

Topic	Findings	Recommendation(s)		
		Short-term	Regular	Long-term
Left-turn Channelization	Intersection cannot accommodate the Highway 101 southbound left-turn traffic safely	Additional warning signs, lower advised speed in the intersection	N/A	Adding left-turn lane for the southbound Highway 101 onto Bald Hills Road
Right-turn Channelization	The existing right-turn lane on northbound Highway 101 onto Bald Hills Road meets the recommended standards	No action required	N/A	No action required
Pedestrian and Bicyclist Safety	The existing intersection cannot accommodate pedestrian and bicyclist uses safely	Additional warning signs for pedestrians and cyclists	N/A	Shoulder widening, adding appropriate road markings and signage

Notes: Source: Traffic Safety Analysis for Save the Redwoods League (LACO, 2017)

3.9.2 Existing Collision Analysis

GHD collected State-wide Integrated Traffic Records System (SWITRS) data for the last three available complete years on record ending on December 31, 2017.

From this data, GHD performed a collision analysis for the 3-year time period between 01/01/2015 and 12/31/2017. The segment (intersection area) reviewed was US 101 in Humboldt County, centered on MP 122.25 at the intersection with Bald Hills Road.

There were six reported collisions within this intersection with breakdown as follows:

Severity:

- 2 injury
- 4 property damage only

Primary Collision Factor:

- 3 improper turning
- 1 unsafe speed
- 1 following too closely
- 1 driving under the influence of alcohol or drugs

Type of Collision:

- 2 rear-end
- 4 hit object

All collisions involved another motor vehicle or fixed object. There were no reported collisions involving pedestrians or bicyclists.

The Average Daily Traffic (ADT) of the intersection is 5,027 vehicles per day based on entering volume traffic data collected in August 2018. This corresponds to an intersection crash rate of 1.09 collisions per million entering vehicles (MEV). The actual intersection collision rate is higher than the statewide average for similar intersections, which is 0.16 collisions per MEV. Average rates are per *2014 Collision Data on California State Highways* (Caltrans, 2017a) for years 2012, 2013 and 2014. Collision rates are for rural (outside City) intersections with stop and yield signs. Reported as crashes per One Million Entering Vehicle (MEV).

3.9.3 Existing Southbound Left-Turn Lane Warrants

As stated in Section 3.9.1, NCHRP Report 745 methodology was reviewed for potential warrant of left-turn channelization (either left-turn lane or bypass lane). Based on traffic volumes provided in the previous studies, it was determined that the warrant was met for a southbound left-turn lane. Utilizing recent traffic counts from the analysis for Existing Condition, this warrant would continue to be met during most daytime hours (between the hours of 7:00 AM to 6:00 PM).

As explained above, Caltrans commented on the 2012 project about a possible need for left-turn channelization at the intersection of Bald Hills Road and US 101 and asked that left-turn lane warrants be checked utilizing the Harmelink model. Caltrans District 1 has adopted the unmodified AASHTO Left Turn Warrants by Harmelink (1967) as the standard methodology for analysis; however, GHD completed this analysis utilizing the Harmelink as modified by Kikuchi and Chakroborty (K&C) in 1991 with recently collected intersection turning movement counts. Based on the Harmelink model modified by K&C, a left-turn lane would not be warranted. A similar result would be expected from the unmodified Harmelink (1967) (i.e. left-turn lane would not be warranted). See Appendix G for Harmelink model calculations for Existing Condition, as well as all other scenarios.

3.10 Existing Condition Peak Hour Signal Warrant 3

A review of peak-hour Signal Warrant 3 was completed for the unsignalized study intersection to determine whether the Warrant is met and signalization should be investigated further on the basis of peak-hour delay and volume. The review of Warrant 3 indicates that existing traffic delays and volumes at the study intersection are not great enough to warrant consideration of a traffic signal. The traffic signal warrant summary for the Existing Condition are included in Appendix G.

4. Project Trip Generation, Distribution and Assignment

This chapter discusses the methods and analysis conducted in selecting trip generation rates and assigning project trips to the existing roadway network. The amount of traffic generated by the proposed project and the distribution of that traffic was estimated using the three-step process of trip generation, trip distribution and trip assignment. Trip generation generated during the weekday a.m. and p.m. peak hours was estimated using standard Institute of Transportation Engineers (ITE) *Trip Generation Manual 10th Edition* (ITE, 2017) rates for the project's land use type. This standard reference is used by jurisdictions throughout the country, and is based on actual trip generation studies performed at numerous locations in areas of various populations.

4.1 Project Description

The proposed project consists of the redevelopment of an approximately 101.5 acre site with a 5,847 square foot visitor center, recreation enhancements and habitat restoration to increase recreation and public educational opportunities for visitors to the Redwood National Park and State Parks (RNSP) and enhance ecological conditions of the creeks and floodplain to support wildlife. The project includes construction of a visitor center and supporting infrastructure such as parking lots and circulation, on-site interpretive elements (including an outdoor classroom), creation of new local multi-use local trails with regional trail connections and new trail segment of the California Coastal Trail (CCT), a redwood tree canopy walkway, establishment of a traditional Ceremonial Brush Dance Site for local and visiting tribes to conduct ceremonies and other tribal events, and onsite stream and wetlands restoration for Prairie Creek and Libby Creek.

4.2 Trip Generation

For the analysis of potential project-related traffic impacts, trip generation rates were selected for the project based on ITE trip generation rates and estimated based on available information. Several potential trip generation rates were reviewed for the proposed project. The *Guidelines for Estimating Trip Generation* from ITE *Trip Generation Manual 10th Edition* (ITE, 2017) were utilized in selecting the appropriate trip generation rates. *Trip Generation Manual* land use classifications are based on specific sites and data collected over years of study for the purpose of estimating trip generation for specific land uses.

The ITE trip generation rates (and ITE land use code) selected for evaluation, including the split between entering/exiting trips are:

- Public Park (411) – Public parks are owned and operated by a municipal, county, state or federal agency. The parks surveyed vary widely as to location, type, and number of facilities, including boating or swimming facilities, beaches, hiking trails, ball fields, soccer fields, campsites, and picnic facilities. Seasonal use of the individual sites differs widely as a result of the varying facilities and local conditions, such as weather. For example, some of the sites are used primarily for boating or swimming; others are used for softball games.
    - Peak Hour Entering: 40%
    - Peak Hour Exiting: 60%

- Recreational Community Center (495) – A recreational community center is a stand-alone public facility similar to and including YMCAs. These facilities often include classes and clubs for adults and children; outdoor athletic fields/courts, and a restaurant or snack bar. Public access is typically allowed but a fee may be charged.
    - Peak Hour Entering: 46%
    - Peak Hour Exiting: 54%

These land uses were selected based on the potential range of trips for the types of uses proposed as best represented by available trip generation rates and as described in the project description from the Notice of Preparation for the environmental document for this project, and the conservativeness of the individual land use trip generation rates. Public Park (411) was selected to best represent uses such as the CCT, outdoor classroom, amphitheater, trails and park uses. Recreational Community Center (495) was selected as the best fit among available ITE rates to represent the visitor center building.

Based on information provided by the Save the Redwoods League, the Ceremonial Brush Dance Site is anticipated to host approximately four (4) events per year, with each event lasting around four days, or a total of sixteen days per year. It is estimated that 100 people will participate in each event. The trip generation was estimated based on the foregoing information and an assumed vehicle occupancy rate of 1.7 persons/vehicle. It was conservatively estimated that 25-percent of the daily trips would occur during the weekday peak hour. The entering and exiting splits were estimated based on the Public Park (411) land use.

On the basis of these rates and calculated trips, it is estimated that the proposed project would generate 391 daily trips and 67 peak hour trips. Using the specified inbound/outbound splits, the project would produce 32 inbound trips and 35 outbound trips during the weekday peak hour, which is anticipated during the middle part of the day between 11:00 AM and 1:00 PM. The project trip generation estimates are shown in Table 6.

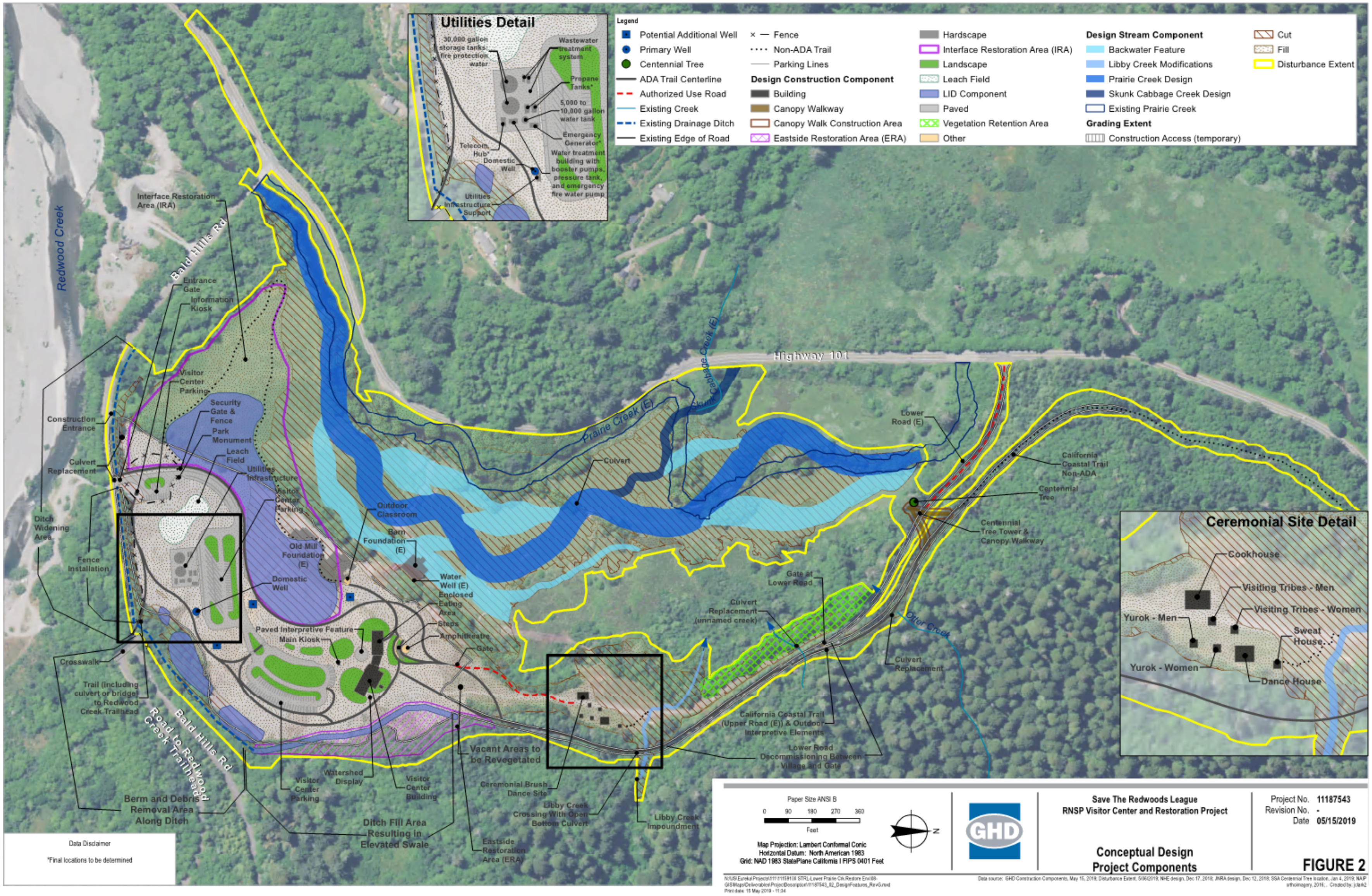


Figure 3. Project Site Plan

Table 6. Project Trip Generation Estimates

Description	Land Use (ITE Code)	Net Size	Units	Daily Rate	Daily Trips	AM Peak Hour					
						Peak Hour Rate	Splits		Trips		
							Entering	Exiting	Entering	Exiting	Total
Visitor Center	Recreational Community Center (495)	5,847	1,000 SF GFA	37.38	219	5.37	46%	54%	15	17	32
CCT, Outdoor Classroom, Amphitheater, trails, etc.	Public Park (411)	40	ACRE	2.85	114	0.48	40%	60%	8	12	20
Ceremonial Brush Dance Site	N/A	1.0	100 PERSONS	58.82	59	14.71	59%	41%	9	6	15
Total Trip Generation					**391**				**32**	**35**	**67**

4.3 Trip Distribution

Project trip distribution was estimated based on existing travel patterns in the study area, as observed during traffic counts. The trip distribution patterns for the project trips are shown in Figure 4.

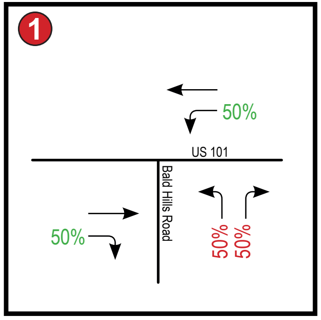
4.4 Trip Assignment

The peak-hour trips generated by the proposed project were assigned to the roadway network in accordance with the trip distribution pattern discussed above. Figure 4 shows the project trip assignment.

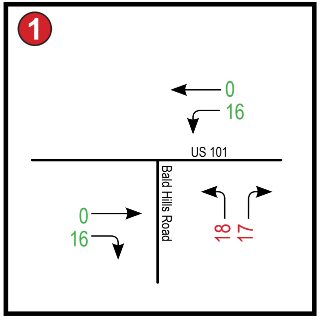
4.5 Project Transit, Pedestrian, and Bicycle Facilities

Some of the project trips could be made by mass transit or public transportation. However, for the purpose of this analysis, it is assumed that all project trips are made by motor vehicle.

Project Trip Distribution
Bald Hills Road /
Highway 101 (US 101)



Project Trip Assignment
Bald Hills Road /
Highway 101 (US 101)



Legend:

①	Study Intersection
XX	Peak Hour Volume (Weekday Midday Peak)
XX	Peak Hour Volume (Weekday Midday Peak)
XX%	Entering Traffic Percentage
(XX%)	Exiting Traffic Percentage

N

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Project Trip Distribution & Project Trip Assignment

FIGURE 4

\\ghdnet\ghd\US\Eureka\Projects\111\11187543 STRL RN-SP Visitor Center\04-Technical Work\Task 2. Environmental & Special Studies\Task 2.3 - Traffic Impact Study\Task 2.3.4 - Traffic Study Report\Figures\InDesign\Pro_Trip_Dist_Assign.indd
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5. Existing Plus Project Condition

This chapter evaluated the Project's potentially significant transportation impacts from Existing Plus Project Conditions. The Existing Plus Project Condition is represented by existing traffic conditions with the addition of traffic generated by the project. It is assumed in this analysis that the roadway network and intersection configurations under Existing Plus Project Condition would be the same as those described under existing conditions.

5.1 Existing Plus Project Condition Traffic Volumes

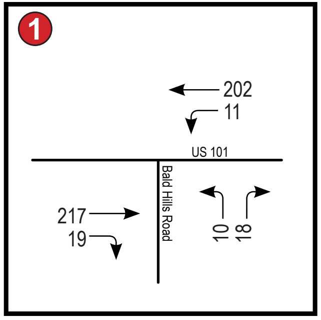
Project trips, as shown on Figure 4, were added to existing traffic volumes, as shown on Figure 5, to obtain Existing Plus Project traffic volumes. The Existing Plus Project traffic volumes are shown on Figure 5.

5.2 Existing Plus Project Condition Intersection Level of Service Analysis

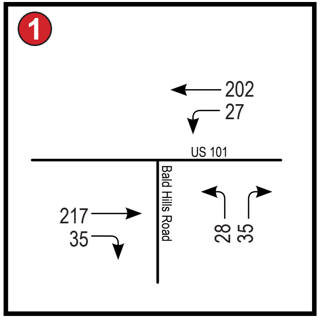
The results of the intersection level of service analysis for the Existing Plus Project Condition are summarized in Table 7. The results show that, measured against the Caltrans LOS thresholds of significance, the study intersection would operate at an acceptable LOS "B" or better during the peak hour.

The level of service calculation sheets for the Existing Plus Project Condition are included in Appendix C.

Existing Conditions
Bald Hills Road /
Highway 101 (US 101)



Existing Plus Project Conditions
Bald Hills Road /
Highway 101 (US 101)



Legend:

① Study Intersection

XXX Weekday Peak Hour Volumes (Midday Peak)

Save the Redwoods League
Redwood National and State Park
Visitor Center Project

Existing Conditions & Existing Existing Plus Project Conditions Turning Movement Traffic Volumes

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FIGURE 5

\\ghdnet\ghd\US\Eureka\Projects\111\11187543 STRL RN-SP Visitor Center\04-Technical Work\Task 2. Environmental & Special Studies\Task 2.3 - Traffic Impact Study\Task 2.3.4 - Traffic Study Report\Figures\InDesign\Ex_Cond_Ex_+ProTMTV.indd
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Table 7. Existing Plus Project Condition Intersection Level of Service

Study Intersection ***Approach***	**Existing + Project Condition**	
	Midday Peak Period	
	Delay	**LOS**
1. Bald Hills Rd. / US 101	14.8	B
Westbound (Bald Hills Rd.) Left	14.8	B
Westbound (Bald Hills Rd.) Right	10.3	B
Southbound (US 101) Left	8.1	A

Notes: Delay is calculated in average seconds per vehicle in queue
LOS = Level of Service
Bold = LOS exceeds threshold of significance

5.3 Existing Plus Project Condition Intersection Queue Analysis

Existing Plus Project traffic volumes were applied to the study intersections and the peak hour demand 50th and 95th percentile queue lengths were reviewed against the existing lane storage capacity at the intersection. The results indicate that, under typical conditions, queues would not be excessive and storage capacity would be adequate. Table 8 shows Existing Plus Project Condition Peak Hour Intersection Queue Analysis.

Table 8. Existing Plus Project Condition Peak Hour Intersection Queue Analysis

Movement	**Lanes / Available Storage**	**Existing Condition**
		Queue Length – 50th/95th Percentile (feet)
		Peak Hour
SB LT	1 / Unlimited ft	8/36
WB L	1 / Unlimited ft	21/49
WB R	1 / 25 ft	24/49

Notes: Queue shown is maximum after two cycles
Bold = results where available storage is exceeded by more than one standard vehicle, 25 ft.

5.4 Existing Plus Project Condition Peak Hour Signal Warrant 3

A review of peak-hour Signal Warrant 3 was completed for the study intersection to determine whether the Warrant would be met and whether signalization should be investigated based on peak-hour delay and traffic volumes for the Existing Plus Project Condition. The review of Warrant 3 indicates that Existing Plus Project Condition traffic delays and volumes at the study intersection are not great enough to warrant the installation of a traffic signal. Traffic signal warrant summaries for the Existing Plus Project Condition are included in Appendix C.

6. Cumulative Condition (2038)

This chapter evaluates the Project’s potential to result in significant impacts for the Cumulative (2038) Condition at, study intersections during the peak hour. This scenario is representative of traffic conditions at the end of the 20-year planning horizon in the year 2038. The Cumulative Condition includes future increases in traffic due to regional growth.

6.1 Cumulative Condition Assumptions

Cumulative traffic volumes were estimated based on applying an established growth factor to existing traffic turning movement counts. A 20-year growth factor of 1.05 was obtained from the Caltrans *2014 Growth Factors* (Caltrans, 2014b) developed from California Air Resources Board (ARB) traffic growth projections and historic traffic growth data. Caltrans requires the use of these growth factors when analyzing traffic conditions on the State transportation facilities in District 1 that are shown on the map. The *2014 Growth Factors* (Caltrans, 2014b) are included in Appendix A.

The Cumulative Condition scenario does not include any planned changes to the study roadway network.

6.2 Cumulative Condition Traffic Volumes

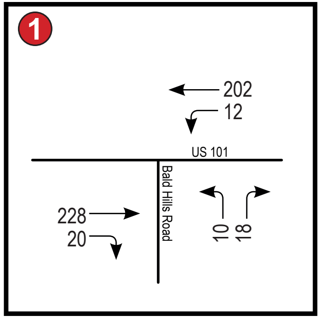
The Cumulative Condition traffic volumes are shown on Figure 6. These traffic volumes are represented by the projected cumulative growth traffic volumes in the year 2038 applied to the existing roadway network and geometry.

6.3 Cumulative Condition Intersection Level of Service Analysis

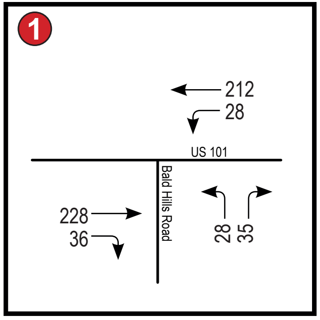
The results of the intersection level of service analysis for the Cumulative Condition are summarized in Table 9. The results show that, measured against the Caltrans LOS thresholds of significance, the study intersection operates at an acceptable LOS “B” or better during the peak hour.

The LOS calculation sheets for the Cumulative Condition are included in Appendix E.

Cumulative (2038) Conditions
Bald Hills Road /
Highway 101 (US 101)



Cumulative Plus Project Conditions
Bald Hills Road /
Highway 101 (US 101)



Legend:

①	Study Intersection
XXX	Weekday Peak Hour Volumes (Midday Peak)

N

Save the Redwoods League
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Cumulative (2038) Conditions & Cumulative Plus Project Conditions Turning Movement Traffic Volumes

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FIGURE 6

Table 9. Cumulative Condition Intersection Level of Service

Study Intersection *Approach*	Cumulative Condition	
	Midday Peak Period	
	Delay	LOS
1. Bald Hills Rd. / US 101	13.9	B
Westbound (Bald Hills Rd.) Left	13.9	B
Westbound (Bald Hills Rd.) Right	10.2	B
Southbound (US 101) Left	8.1	A

Notes: Delay is calculated in average seconds per vehicle in queue
LOS = Level of Service
Bold = LOS exceeds threshold of significance

6.4 Cumulative Condition Intersection Queue Analysis

Cumulative traffic volumes were applied to the study intersections and the peak hour demand 50th and 95th percentile queue lengths utilizing were reviewed against the available lane storage capacity at the intersections. The results indicate that, under typical conditions, queues are not excessive and storage capacity is adequate. Table 10 shows Cumulative Condition Peak Hour Intersection Queue Analysis.

Table 10. Cumulative Condition Peak Hour Intersection Queue Analysis

Movement	Lanes / Available Storage	Cumulative Condition
		Queue Length – 50th/95th Percentile (feet)
		Peak Hour
SB LT	1 / Unlimited ft	6/29
WB L	1 / Unlimited ft	9/31
WB R	1 / 25 ft	17/40

Notes: Queue shown is maximum after two cycles
Bold = results where available storage is exceeded by more than one standard vehicle, 25 ft.

6.5 Cumulative Condition Traffic Signal Warrant Analysis

A review of peak-hour Signal Warrant 3 was completed for all unsignalized study intersections to determine whether the Warrant would be met and whether signalization should be investigated further on the basis of peak-hour delay and volume for the Cumulative Condition. The review of Warrant 3 indicates that the Cumulative Condition traffic delays and volumes at the study intersection are not great enough to warrant the installation of a traffic signal. Traffic signal warrants for the Cumulative Condition are included in Appendix F.

7. Cumulative Plus Project Condition (2038)

This chapter evaluates the Project's potential in significance impacts under Cumulative Plus Project (2038) conditions, for the study intersections during peak hour. This scenario is representative of traffic conditions at the end of the 20-year planning horizon in the year 2038.

7.1 Roadway Network Under Cumulative Plus Project Condition

It is assumed in this analysis that the roadway network and intersection configurations under Cumulative (2038) Plus Project Conditions would be the same as those described under the Cumulative Condition, i.e. there would be no planned changes to the study roadway network.

7.2 Cumulative Plus Project Conditions Traffic Volumes

Project trips, as shown on Figure 4, were added to cumulative (2038) traffic volumes, as shown on Figure 6, to obtain Cumulative Plus Project traffic volumes. The Cumulative Plus Project traffic volumes are shown on Figure 6.

7.3 Cumulative Plus Project Condition Intersection Level of Service Analysis

The results of the intersection level of service analysis for the Cumulative Plus Project Condition are summarized in Table 11. The results show that, measured against the Caltrans LOS thresholds of significance, the study intersection operates at an acceptable LOS "C" or better during the peak hour.

The LOS calculation sheets for the Cumulative Plus Project Condition are included in Appendix E.

Table 11. Cumulative Plus Project Condition Intersection Level of Service

Study Intersection	Cumulative + Project Condition	
	Midday Peak Period	
Approach	Delay	LOS
1. Bald Hills Rd. / US 101	15.3	C
Westbound (Bald Hills Rd.) Left	15.3	C
Westbound (Bald Hills Rd.) Right	10.4	B
Southbound (US 101) Left	8.2	A

Notes: Delay is calculated in average seconds per vehicle in queue
LOS = Level of Service
Bold = LOS exceeds threshold of significance

7.4 Cumulative Plus Project Condition Intersection Queue Analysis

Cumulative Plus Project traffic volumes were applied to the study intersections and the peak hour demand 50th and 95th percentile queue lengths utilizing were reviewed against the available lane storage capacity at the study intersection. The results indicate that under typical conditions, queues are not excessive and storage capacity is adequate. Table 12 shows Cumulative Plus Project Condition Peak Hour Intersection Queue Analysis.

Table 12. Cumulative Plus Project Condition Peak Hour Intersection Queue Analysis

Movement	Lanes / Available Storage	Cumulative Plus Project Condition
		Queue Length – 50th/95th Percentile (feet)
		Peak Hour
SB LT	1 / Unlimited ft	10/39
WB L	1 / Unlimited ft	22/49
WB R	1 / 25 ft	24/49

Notes: Queue shown is maximum after two cycles
Bold = results where available storage is exceeded by more than one standard vehicle, 25 ft.

7.5 Cumulative Plus Project Conditions Peak Hour Signal Warrant 3

A review of peak-hour Signal Warrant 3 was completed for all unsignalized study intersections to determine whether the Warrant would be met and whether signalization should be investigated further on the basis of peak-hour delay and volume for the Cumulative Plus Project Condition. The review of the peak hour traffic signal warrant indicates that Cumulative Plus Project Condition traffic delays and volumes at the study intersection is not great enough to warrant the installation of a traffic signal. Traffic signal warrants for the Cumulative Plus Project Condition are included in Appendix E.

8. VMT Analysis

This chapter describes the methodology and results of the vehicle miles traveled (VMT) analysis performed for the project. Senate Bill (SB) 743 creates a process to change the way transportation impacts are analyzed under CEQA. Specifically, SB 743 requires the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative measure of effectiveness (MOE) to control delay and associated LOS for evaluating transportation impacts. The alternative criteria must promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses. Measurements of transportation impacts may include VMT, VMT per capita, automobile trip generation rates, or automobile trips generated. The OPR maintains the recommendation that VMT become the primary metric or MOE of transportation impact across the state of California.

Detailed recommendations on thresholds of significance for VMT are currently being developed by the OPR in coordination with other state and local agencies. This VMT analysis is provided for informational purposes only. The results presented in this chapter should not be used to evaluate potential project impacts.

8.1 Model Selection

The California Emissions Estimator Model (CalEEMod) was used for this VMT analysis. CalEEMod is referred to as a "sketch model" which uses statistical characterizations of land use projects and transportation networks to estimate project VMT. CalEEMod was developed in cooperation with the South Coast Air Quality Management District (SCAQMD) and other air districts throughout the state. CalEEMod is designed as a uniform platform for government agencies, land use planners, and environmental professionals to quantify VMT and potential criteria pollutant and greenhouse gas emissions associated with construction and operation from a variety of land uses. CalEEMod version 2016.3.2 was used to estimate VMT from this project's operation.

Sources of methodologies and default vehicle activity data in CalEEMod include California Air Resources Board (ARB) vehicle emission model EMFAC. In addition, some local air districts provided customized values for their default data and existing regulation methodologies for use for projects located in their jurisdictions. When no customized information was provided and no regional differences were defined for local air districts, then state-wide default values were utilized.

8.2 Project Characteristics

The project's operational activity assumptions and parameters are summarized below.

"Humboldt County" and "Rural" settings were selected in the CalEEMod model.

The land use types and sizes described in Chapter 4 of this study were used to identify the approximate corresponding CalEEMod land uses used in the VMT analysis. These land uses and weekday trip generation rates are summarized in Table 13. It is important to note that the CalEEMod Land Use Subtype names are not the proposed project land uses. They are the closest CalEEMod Land Use Subtypes available that approximately correspond to the proposed project land uses.

Table 13. CalEEMod model project land uses and trip generation rates

General Land Use	CalEEMod Land Use Subtype	Quantity	Unit Type	Trip Generation Rate (trips/unit/day)
Recreational	Health Club (estimate for Visitor Center building)	5.847	ksf	37.38
Recreational	City Park	40	Acre	2.85
Recreational	User Defined	1	User Defined	58.82

Notes:
ksf = thousand square feet
Source: GHD 2018, CalEEMod 2016.

8.3 Methodology

CalEEMod contains assumptions for trip length based on the type of trip (trip type), distribution of trip types, and trip purpose. Each of these components is used in the VMT calculations. The trip types, trip lengths, distribution and trip purpose distribution are detailed in the CalEEMod output, which is included in Appendix H.

8.3.1 Trip Types and Distribution

Non-residential land use trip types used in the analysis consist of the following categories, each with its own trip length:

- Commercial–customer (C-C),
- Commercial-work (C-W), and
- Commercial-nonwork (C-NW) such as delivery trips.

The model includes a trip type distribution for each land use type. For example, CalEEMod assumes that 33 percent of city park land use trips are C-W trips, 48 percent are C-C trips, and 19 percent are C-NW trips. For the Ceremonial Brush Dance Site, it was assumed that 100 percent of the trips would be C-C.

8.3.2 Trip Length and Purpose

The trip length per trip type assumptions are for primary trip purposes, and serve as the 'starting point' for the VMT calculations. The model default trip lengths for primary trips are 14.70 miles for C-W, 6.6 miles for C-C, and 6.6 miles for C-NW. The trip lengths were modified to reflect the location and regional draw of project. Trip lengths were modified to 14.70 miles for C-W, 171 miles for C-C, and 20 miles for C-NW.

The model then modifies the trip lengths according to trip purpose. Trip purposes are:

- Primary: Primary trips are assumed to be dedicated to travel to the land use from the originating source or from the land use to the ultimate destination.

- Diverted: Diverted trips are trips that may occur as a result of travel to multiple land uses, such as would occur for running errands or other trip linking activity. Diverted trips are assumed to be 25 percent of the primary trip length.
- Pass-by trips: Pass-by trips are those that occur as minor jaunts off another trip, such as pulling into a gas station while on the way to work. Pass-by trips are assumed to be 0.1 mile in length and are a result of no diversion from the primary route.

Due to the location and nature of the project, it was assumed that 100 percent of trips would be primary for all land uses.

8.4 VMT Results

The VMT calculation results are provided in Table 14. The detailed CalEEMod output is included in Appendix H.

Table 14. Operational Vehicle Miles Traveled

Land Use	Unit Quantity	Trip Generation		Days/ Year	Vehicle Miles Traveled	
		Trips/Day/ Unit	Daily		Daily	Annual
Health Club (estimate for Visitor Center building)	5.847 ksf	37.38	218.56	365	25,260.78	9,220,184
City Park	40 acres	2.85	114.00	365	10,315.00	3,764,974
User Defined	1 User Defined	58.82	58.82	16	10,030.66	160,491
					Total Annual VMT	**13,145,649**

Notes:

ksf = thousand square feet
Source: GHD 2019, CalEEMod 2016.

The Ceremonial Brush Dance Site is considered the "User Defined" land use and will have events up to 16 days a year.

9. Summary and Conclusions

The potential impacts of the proposed project were evaluated using the *HCM6th* methodologies and the thresholds of significance set forth by Caltrans. A VMT analysis was also performed for the project, the results of which are presented in Chapter 8. The study analyzed one intersection in the vicinity of the proposed project for peak hours of traffic. The results of the level of service analysis for all study scenarios are summarized in Table 15.

9.1 Recommended Project Improvements

Caltrans maintains an intersection level of service threshold of significance at the transition between LOS “C” and LOS “D” (Caltrans, 2002). A significant intersection impact is satisfactorily mitigated when measures are implemented that would restore intersection level of service to LOS “C” conditions or better based on Caltrans intersection level of service standards (Caltrans, 2002). The study intersection maintains acceptable level of service under all scenarios evaluated and does not meet traffic signal warrant for peak hour traffic.

Based on intersection safety analysis completed at Bald Hills Road and US 101, including existing intersection corner sight distance, left-turn lane warrants and collision history, traffic from the project would contribute to an increase in hazards. The project will approximately double the existing peak hour approach volume on Bald Hills Road, while adding approximately 40 percent more US101 southbound left-turns to the intersection. Intersection safety should be improved by increasing intersection corner sight distance for the minor leg approaches (Bald Hills Road), adding left-turn channelization for US 101 southbound left-turn and increasing shoulder width on US 101 and adding appropriate road markings and signage for pedestrians and bicyclists. These improvements are warranted with- and without the contribution of the proposed project trips to the intersection.

Intersection safety considerations are a cumulatively significant impact. Any increment of added traffic volume to the intersection is significant. Project contributions are needed for the improvements and will be determined in coordination with project partners and Caltrans.

9.2 Conclusions

Drawing from the results of the traffic impact analysis, we conclude that:

1. Although the intersection is expected to operate at acceptable levels, there are significant concerns with intersection safety. The proposed project is expected to more than double the peak hour US 101 southbound left-turns and significantly increase the approach volumes to the intersection overall. The intersection has an above average collision rate for similar intersections State-wide, with collisions that may be attributed to slowing and/or stopped traffic on southbound US 101 waiting to make the left-turn. Based on the safety analysis and engineering judgement a US 101 southbound left-turn lane, combined with shoulder widening, road markings and signage, is recommended for the intersection of Bald Hills Road and US 101.

Table 15. Summary of Study Scenario Level of Service Calculations

Study Intersection	Existing Conditions		Existing + Project Conditions		Cumulative Conditions		Cumulative + Project Conditions	
	Midday Peak Period		Midday Peak Period		Midday Peak Period		Midday Peak Period	
Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Bald Hills Rd. / US 101	13.5	B	14.8	B	13.9	B	15.3	C
Westbound (Bald Hills Rd.) Left	13.5	B	14.8	B	13.9	B	15.3	C
Westbound (Bald Hills Rd.) Right	10.1	B	10.3	B	10.2	B	10.4	B
Southbound (US 101) Left	8.1	A	8.1	A	8.1	A	8.2	A

Notes: Delay is calculated in average seconds per vehicle in queue
LOS = Level of Service
*Signalized intersection
Bold = LOS exceeds threshold of significance

10. References

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Appendices

Appendix A – Traffic Counts and Growth Factors

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	2	2	0	0	0	1	0	1	3
12:15 AM	0	4	4	0	0	0	2	0	2	6
12:30 AM	0	2	2	0	0	0	1	0	1	3
12:45 AM	0	5	5	0	0	0	6	0	6	11
Total	0	13	13	0	0	0	10	0	10	23
01:00 AM	0	2	2	0	0	0	2	0	2	4
01:15 AM	0	3	3	0	0	0	3	0	3	6
01:30 AM	0	2	2	1	0	1	2	0	2	5
01:45 AM	1	3	4	0	0	0	1	1	2	6
Total	1	10	11	1	0	1	8	1	9	21
02:00 AM	0	2	2	0	0	0	2	1	3	5
02:15 AM	0	5	5	1	1	2	5	0	5	12
02:30 AM	0	1	1	0	0	0	2	0	2	3
02:45 AM	0	0	0	0	0	0	2	0	2	2
Total	0	8	8	1	1	2	11	1	12	22
03:00 AM	1	2	3	0	0	0	2	0	2	5
03:15 AM	0	2	2	0	0	0	3	0	3	5
03:30 AM	0	1	1	1	0	1	3	1	4	6
03:45 AM	0	3	3	1	0	1	3	0	3	7
Total	1	8	9	2	0	2	11	1	12	23
04:00 AM	0	1	1	0	1	1	5	1	6	8
04:15 AM	0	2	2	0	1	1	7	1	8	11
04:30 AM	0	3	3	0	1	1	6	1	7	11
04:45 AM	1	3	4	0	0	0	3	1	4	8
Total	1	9	10	0	3	3	21	4	25	38
05:00 AM	1	6	7	0	1	1	6	1	7	15
05:15 AM	0	7	7	0	0	0	14	1	15	22
05:30 AM	0	6	6	1	0	1	18	2	20	27
05:45 AM	0	10	10	1	0	1	10	5	15	26
Total	1	29	30	2	1	3	48	9	57	90
06:00 AM	1	9	10	1	0	1	14	1	15	26
06:15 AM	1	6	7	0	0	0	18	1	19	26
06:30 AM	0	10	10	0	1	1	16	1	17	28
06:45 AM	1	19	20	1	0	1	16	3	19	40
Total	3	44	47	2	1	3	64	6	70	120
07:00 AM	1	24	25	0	1	1	21	1	22	48
07:15 AM	1	14	15	1	0	1	23	0	23	39
07:30 AM	0	17	17	0	2	2	21	1	22	41
07:45 AM	5	19	24	2	3	5	21	1	22	51
Total	7	74	81	3	6	9	86	3	89	179
08:00 AM	0	19	19	0	2	2	32	4	36	57
08:15 AM	2	30	32	2	2	4	25	2	27	63
08:30 AM	2	36	38	3	0	3	27	3	30	71
08:45 AM	1	33	34	0	1	1	30	2	32	67
Total	5	118	123	5	5	10	114	11	125	258
09:00 AM	5	30	35	1	1	2	40	1	41	78
09:15 AM	0	25	25	1	1	2	34	5	39	66
09:30 AM	1	52	53	2	2	4	34	5	39	96
09:45 AM	5	34	39	3	2	5	33	7	40	84
Total	11	141	152	7	6	13	141	18	159	324

Counts Unlimited
PO Box 1178
Corona, CA 92878
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City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	5	37	42	4	4	8	25	2	27	77
10:15 AM	3	30	33	2	2	4	56	7	63	100
10:30 AM	2	38	40	2	2	4	33	7	40	84
10:45 AM	3	51	54	2	2	4	46	11	57	115
Total	13	156	169	10	10	20	160	27	187	376
11:00 AM	2	38	40	3	2	5	31	5	36	81
11:15 AM	6	49	55	3	6	9	50	6	56	120
11:30 AM	3	39	42	4	1	5	47	12	59	106
11:45 AM	8	35	43	1	6	7	30	4	34	84
Total	19	161	180	11	15	26	158	27	185	391
12:00 PM	4	55	59	3	3	6	44	4	48	113
12:15 PM	6	41	47	6	6	12	62	3	65	124
12:30 PM	3	43	46	3	5	8	46	10	56	110
12:45 PM	6	45	51	5	10	15	39	3	42	108
Total	19	184	203	17	24	41	191	20	211	455
01:00 PM	1	40	41	0	4	4	36	1	37	82
01:15 PM	5	48	53	8	8	16	29	1	30	99
01:30 PM	10	56	66	4	6	10	54	3	57	133
01:45 PM	1	47	48	3	3	6	25	4	29	83
Total	17	191	208	15	21	36	144	9	153	397
02:00 PM	4	37	41	3	2	5	51	5	56	102
02:15 PM	4	46	50	7	4	11	24	1	25	86
02:30 PM	5	33	38	4	5	9	32	3	35	82
02:45 PM	8	53	61	9	8	17	27	4	31	109
Total	21	169	190	23	19	42	134	13	147	379
03:00 PM	3	35	38	5	6	11	50	2	52	101
03:15 PM	3	55	58	10	4	14	22	0	22	94
03:30 PM	3	39	42	5	5	10	46	3	49	101
03:45 PM	2	56	58	6	3	9	59	6	65	132
Total	11	185	196	26	18	44	177	11	188	428
04:00 PM	3	46	49	6	4	10	51	3	54	113
04:15 PM	0	42	42	1	1	2	43	2	45	89
04:30 PM	1	43	44	10	4	14	38	1	39	97
04:45 PM	1	53	54	4	1	5	25	3	28	87
Total	5	184	189	21	10	31	157	9	166	386
05:00 PM	0	39	39	2	2	4	40	5	45	88
05:15 PM	0	38	38	1	8	9	35	2	37	84
05:30 PM	2	47	49	4	1	5	39	2	41	95
05:45 PM	1	46	47	2	2	4	22	0	22	73
Total	3	170	173	9	13	22	136	9	145	340
06:00 PM	1	37	38	3	2	5	27	1	28	71
06:15 PM	1	29	30	2	2	4	20	2	22	56
06:30 PM	0	34	34	4	2	6	31	0	31	71
06:45 PM	0	37	37	0	3	3	27	3	30	70
Total	2	137	139	9	9	18	105	6	111	268
07:00 PM	0	19	19	2	4	6	23	3	26	51
07:15 PM	1	16	17	0	0	0	18	0	18	35
07:30 PM	0	22	22	1	0	1	16	2	18	41
07:45 PM	1	16	17	1	0	1	9	1	10	28
Total	2	73	75	4	4	8	66	6	72	155

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
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Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	1	18	19	2	0	2	13	1	14	35
08:15 PM	1	14	15	1	0	1	16	0	16	32
08:30 PM	0	18	18	2	0	2	9	0	9	29
08:45 PM	0	15	15	1	0	1	11	0	11	27
Total	2	65	67	6	0	6	49	1	50	123
09:00 PM	1	8	9	0	0	0	9	0	9	18
09:15 PM	0	12	12	0	0	0	6	1	7	19
09:30 PM	1	4	5	1	0	1	8	1	9	15
09:45 PM	0	10	10	1	0	1	9	0	9	20
Total	2	34	36	2	0	2	32	2	34	72
10:00 PM	0	7	7	0	0	0	4	1	5	12
10:15 PM	0	3	3	0	1	1	7	1	8	12
10:30 PM	0	6	6	2	0	2	8	0	8	16
10:45 PM	0	6	6	0	1	1	3	0	3	10
Total	0	22	22	2	2	4	22	2	24	50
11:00 PM	0	10	10	0	0	0	5	0	5	15
11:15 PM	0	3	3	1	0	1	4	0	4	8
11:30 PM	0	3	3	0	0	0	3	0	3	6
11:45 PM	0	2	2	1	0	1	3	0	3	6
Total	0	18	18	2	0	2	15	0	15	35
Grand Total	146	2203	2349	180	168	348	2060	196	2256	4953
Apprch %	6.2	93.8		51.7	48.3		91.3	8.7		
Total %	2.9	44.5	47.4	3.6	3.4	7	41.6	4	45.5	
Passenger Vehicles	135	1931	2066	159	148	307	1805	169	1974	4347
% Passenger Vehicles	92.5	87.7	88	88.3	88.1	88.2	87.6	86.2	87.5	87.8
Large 2 Axle Vehicles	5	109	114	3	8	11	106	7	113	238
% Large 2 Axle Vehicles	3.4	4.9	4.9	1.7	4.8	3.2	5.1	3.6	5	4.8
3 Axle Vehicles	6	15	21	1	12	13	46	13	59	93
% 3 Axle Vehicles	4.1	0.7	0.9	0.6	7.1	3.7	2.2	6.6	2.6	1.9
4+ Axle Trucks	0	148	148	17	0	17	103	7	110	275
% 4+ Axle Trucks	0	6.7	6.3	9.4	0	4.9	5	3.6	4.9	5.6

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 11:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	4	**55**	**59**	3	3	6	44	4	48	113
12:15 PM	**6**	41	47	**6**	6	12	**62**	3	**65**	**124**
12:30 PM	3	43	46	3	5	8	46	**10**	56	110
12:45 PM	6	45	51	5	**10**	**15**	39	3	42	108
Total Volume	19	184	203	17	24	41	191	20	211	455
% App. Total	9.4	90.6		41.5	58.5		90.5	9.5		
PHF	.792	.836	.860	.708	.600	.683	.770	.500	.812	.917

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
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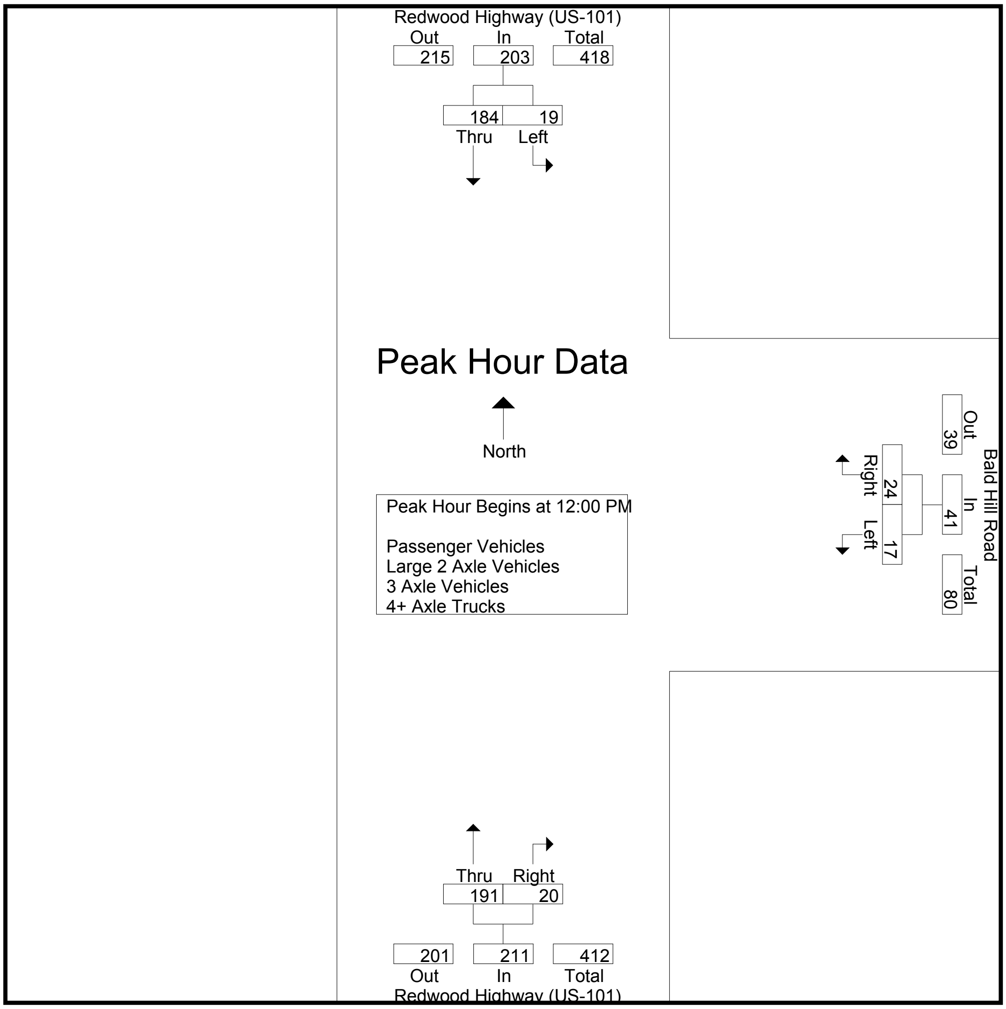

Peak Hour Analysis From 12:00 AM to 11:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:45 PM			02:45 PM			03:30 PM		
+0 mins.	6	45	51	9	**8**	**17**	46	3	49
+15 mins.	1	40	41	5	6	11	**59**	**6**	**65**
+30 mins.	5	48	53	**10**	4	14	51	3	54
+45 mins.	**10**	**56**	**66**	5	5	10	43	2	45
Total Volume	22	189	211	29	23	52	199	14	213
% App. Total	10.4	89.6		55.8	44.2		93.4	6.6	
PHF	.550	.844	.799	.725	.719	.765	.843	.583	.819

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
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Groups Printed- Passenger Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	2	2	0	0	0	1	0	1	3
12:15 AM	0	3	3	0	0	0	2	0	2	5
12:30 AM	0	2	2	0	0	0	1	0	1	3
12:45 AM	0	5	5	0	0	0	6	0	6	11
Total	0	12	12	0	0	0	10	0	10	22
01:00 AM	0	2	2	0	0	0	2	0	2	4
01:15 AM	0	2	2	0	0	0	3	0	3	5
01:30 AM	0	2	2	1	0	1	1	0	1	4
01:45 AM	0	1	1	0	0	0	1	0	1	2
Total	0	7	7	1	0	1	7	0	7	15
02:00 AM	0	2	2	0	0	0	0	1	1	3
02:15 AM	0	4	4	1	1	2	5	0	5	11
02:30 AM	0	1	1	0	0	0	1	0	1	2
02:45 AM	0	0	0	0	0	0	1	0	1	1
Total	0	7	7	1	1	2	7	1	8	17
03:00 AM	0	1	1	0	0	0	1	0	1	2
03:15 AM	0	1	1	0	0	0	0	0	0	1
03:30 AM	0	1	1	1	0	1	1	1	2	4
03:45 AM	0	1	1	1	0	1	0	0	0	2
Total	0	4	4	2	0	2	2	1	3	9
04:00 AM	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	2	2	0	0	0	3	1	4	6
04:30 AM	0	1	1	0	1	1	1	1	2	4
04:45 AM	1	2	3	0	0	0	2	1	3	6
Total	1	5	6	0	1	1	6	3	9	16
05:00 AM	1	4	5	0	1	1	1	1	2	8
05:15 AM	0	4	4	0	0	0	11	1	12	16
05:30 AM	0	2	2	0	0	0	18	1	19	21
05:45 AM	0	9	9	0	0	0	10	3	13	22
Total	1	19	20	0	1	1	40	6	46	67
06:00 AM	0	5	5	1	0	1	12	1	13	19
06:15 AM	1	3	4	0	0	0	14	0	14	18
06:30 AM	0	7	7	0	1	1	15	1	16	24
06:45 AM	1	15	16	1	0	1	13	0	13	30
Total	2	30	32	2	1	3	54	2	56	91
07:00 AM	1	19	20	0	1	1	17	0	17	38
07:15 AM	1	14	15	1	0	1	18	0	18	34
07:30 AM	0	17	17	0	1	1	17	0	17	35
07:45 AM	3	14	17	2	2	4	19	0	19	40
Total	5	64	69	3	4	7	71	0	71	147
08:00 AM	0	18	18	0	1	1	25	4	29	48
08:15 AM	2	30	32	2	1	3	22	2	24	59
08:30 AM	2	33	35	2	0	2	23	3	26	63
08:45 AM	1	28	29	0	1	1	26	2	28	58
Total	5	109	114	4	3	7	96	11	107	228
09:00 AM	4	25	29	0	0	0	35	1	36	65
09:15 AM	0	20	20	1	1	2	33	5	38	60
09:30 AM	1	45	46	2	1	3	27	5	32	81
09:45 AM	5	31	36	3	2	5	31	7	38	79
Total	10	121	131	6	4	10	126	18	144	285

Counts Unlimited
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City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
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Groups Printed- Passenger Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	5	31	36	2	4	6	23	2	25	67
10:15 AM	3	26	29	1	2	3	48	7	55	87
10:30 AM	2	33	35	2	2	4	33	7	40	79
10:45 AM	3	41	44	2	1	3	42	10	52	99
Total	13	131	144	7	9	16	146	26	172	332
11:00 AM	1	35	36	3	2	5	27	5	32	73
11:15 AM	5	44	49	3	6	9	44	6	50	108
11:30 AM	3	36	39	4	1	5	45	11	56	100
11:45 AM	6	31	37	1	6	7	26	3	29	73
Total	15	146	161	11	15	26	142	25	167	354
12:00 PM	4	51	55	2	3	5	40	4	44	104
12:15 PM	6	37	43	6	6	12	49	2	51	106
12:30 PM	3	37	40	3	5	8	42	8	50	98
12:45 PM	6	37	43	5	9	14	35	3	38	95
Total	19	162	181	16	23	39	166	17	183	403
01:00 PM	1	34	35	0	4	4	33	1	34	73
01:15 PM	4	40	44	7	6	13	27	1	28	85
01:30 PM	10	50	60	4	4	8	43	3	46	114
01:45 PM	1	40	41	2	3	5	22	3	25	71
Total	16	164	180	13	17	30	125	8	133	343
02:00 PM	4	35	39	3	2	5	42	5	47	91
02:15 PM	4	41	45	5	4	9	20	1	21	75
02:30 PM	5	25	30	4	5	9	30	2	32	71
02:45 PM	8	46	54	9	7	16	22	3	25	95
Total	21	147	168	21	18	39	114	11	125	332
03:00 PM	3	29	32	4	6	10	41	2	43	85
03:15 PM	3	52	55	8	4	12	18	0	18	85
03:30 PM	3	35	38	4	5	9	41	2	43	90
03:45 PM	2	52	54	6	2	8	53	6	59	121
Total	11	168	179	22	17	39	153	10	163	381
04:00 PM	3	38	41	6	4	10	45	2	47	98
04:15 PM	0	35	35	1	1	2	36	1	37	74
04:30 PM	1	38	39	9	4	13	35	1	36	88
04:45 PM	1	48	49	4	1	5	24	2	26	80
Total	5	159	164	20	10	30	140	6	146	340
05:00 PM	0	33	33	1	1	2	39	5	44	79
05:15 PM	0	34	34	1	6	7	33	1	34	75
05:30 PM	2	42	44	4	1	5	37	2	39	88
05:45 PM	1	44	45	2	2	4	18	0	18	67
Total	3	153	156	8	10	18	127	8	135	309
06:00 PM	1	34	35	3	2	5	27	1	28	68
06:15 PM	1	29	30	2	2	4	17	2	19	53
06:30 PM	0	34	34	3	2	5	31	0	31	70
06:45 PM	0	37	37	0	2	2	26	3	29	68
Total	2	134	136	8	8	16	101	6	107	259
07:00 PM	0	17	17	1	4	5	23	3	26	48
07:15 PM	1	14	15	0	0	0	16	0	16	31
07:30 PM	0	20	20	1	0	1	15	1	16	37
07:45 PM	1	16	17	1	0	1	8	1	9	27
Total	2	67	69	3	4	7	62	5	67	143

City of Humboldt
N/S: Redwood Highway (US-101)
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Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
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Groups Printed- Passenger Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	1	15	16	1	0	1	12	1	13	30
08:15 PM	1	13	14	1	0	1	16	0	16	31
08:30 PM	0	16	16	2	0	2	8	0	8	26
08:45 PM	0	15	15	1	0	1	11	0	11	27
Total	2	59	61	5	0	5	47	1	48	114
09:00 PM	1	7	8	0	0	0	7	0	7	15
09:15 PM	0	9	9	0	0	0	6	1	7	16
09:30 PM	1	4	5	1	0	1	8	1	9	15
09:45 PM	0	7	7	1	0	1	9	0	9	17
Total	2	27	29	2	0	2	30	2	32	63
10:00 PM	0	6	6	0	0	0	3	1	4	10
10:15 PM	0	3	3	0	1	1	6	1	7	11
10:30 PM	0	5	5	2	0	2	8	0	8	15
10:45 PM	0	6	6	0	1	1	3	0	3	10
Total	0	20	20	2	2	4	20	2	22	46
11:00 PM	0	9	9	0	0	0	4	0	4	13
11:15 PM	0	3	3	1	0	1	4	0	4	8
11:30 PM	0	2	2	0	0	0	2	0	2	4
11:45 PM	0	2	2	1	0	1	3	0	3	6
Total	0	16	16	2	0	2	13	0	13	31
Grand Total	135	1931	2066	159	148	307	1805	169	1974	4347
Apprch %	6.5	93.5		51.8	48.2		91.4	8.6		
Total %	3.1	44.4	47.5	3.7	3.4	7.1	41.5	3.9	45.4	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	4	**51**	**55**	2	3	5	40	4	44	104
12:15 PM	**6**	37	43	**6**	6	12	**49**	2	**51**	**106**
12:30 PM	3	37	40	3	5	8	42	**8**	50	98
12:45 PM	6	37	43	5	**9**	**14**	35	3	38	95
Total Volume	19	162	181	16	23	39	166	17	183	403
% App. Total	10.5	89.5		41	59		90.7	9.3		
PHF	.792	.794	.823	.667	.639	.696	.847	.531	.897	.950

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
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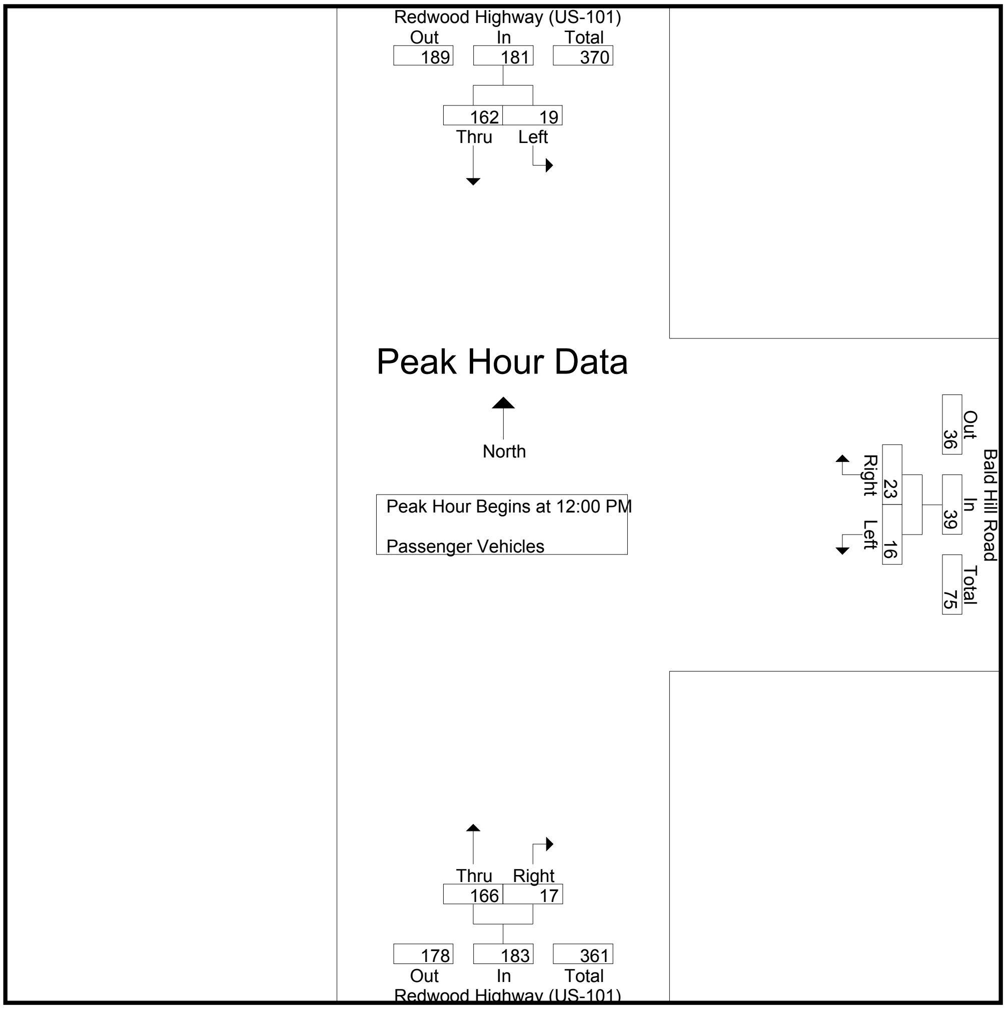

Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM			12:00 PM			12:00 PM		
+0 mins.	4	**51**	**55**	2	3	5	40	4	44
+15 mins.	**6**	37	43	**6**	6	12	**49**	2	**51**
+30 mins.	3	37	40	3	5	8	42	**8**	50
+45 mins.	6	37	43	5	**9**	**14**	35	3	38
Total Volume	19	162	181	16	23	39	166	17	183
% App. Total	10.5	89.5		41	59		90.7	9.3	
PHF	.792	.794	.823	.667	.639	.696	.847	.531	.897

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
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Groups Printed- Large 2 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	1	1	0	0	0	0	0	0	1
12:30 AM	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	0	0	0	1
01:00 AM	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0
01:45 AM	1	0	1	0	0	0	0	1	1	2
Total	1	0	1	0	0	0	0	1	1	2
02:00 AM	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	1	0	1	1
02:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	1	1
03:00 AM	1	0	1	0	0	0	0	0	0	1
03:15 AM	0	0	0	0	0	0	2	0	2	2
03:30 AM	0	0	0	0	0	0	1	0	1	1
03:45 AM	0	0	0	0	0	0	2	0	2	2
Total	1	0	1	0	0	0	5	0	5	6
04:00 AM	0	0	0	0	0	0	1	0	1	1
04:15 AM	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	1	1	0	0	0	0	0	0	1
04:45 AM	0	1	1	0	0	0	0	0	0	1
Total	0	2	2	0	0	0	1	0	1	3
05:00 AM	0	1	1	0	0	0	0	0	0	1
05:15 AM	0	1	1	0	0	0	1	0	1	2
05:30 AM	0	1	1	0	0	0	0	1	1	2
05:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	3	3	0	0	0	1	1	2	5
06:00 AM	1	2	3	0	0	0	0	0	0	3
06:15 AM	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	2	0	2	2
Total	1	2	3	0	0	0	2	0	2	5
07:00 AM	0	1	1	0	0	0	1	0	1	2
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	1	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	2	0	2	3
08:00 AM	0	0	0	0	0	0	1	0	1	1
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	2	2	0	0	0	2	0	2	4
08:45 AM	0	0	0	0	0	0	1	0	1	1
Total	0	2	2	0	0	0	4	0	4	6
09:00 AM	1	1	2	0	0	0	3	0	3	5
09:15 AM	0	1	1	0	0	0	0	0	0	1
09:30 AM	0	3	3	0	0	0	3	0	3	6
09:45 AM	0	0	0	0	0	0	2	0	2	2
Total	1	5	6	0	0	0	8	0	8	14

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- Large 2 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	0	4	4	0	0	0	2	0	2	6
10:15 AM	0	2	2	0	0	0	4	0	4	6
10:30 AM	0	2	2	0	0	0	0	0	0	2
10:45 AM	0	5	5	0	0	0	2	0	2	7
Total	0	13	13	0	0	0	8	0	8	21
11:00 AM	0	2	2	0	0	0	1	0	1	3
11:15 AM	0	1	1	0	0	0	0	0	0	1
11:30 AM	0	0	0	0	0	0	1	0	1	1
11:45 AM	0	2	2	0	0	0	1	0	1	3
Total	0	5	5	0	0	0	3	0	3	8
12:00 PM	0	2	2	1	0	1	1	0	1	4
12:15 PM	0	2	2	0	0	0	6	0	6	8
12:30 PM	0	6	6	0	0	0	1	2	3	9
12:45 PM	0	6	6	0	1	1	1	0	1	8
Total	0	16	16	1	1	2	9	2	11	29
01:00 PM	0	2	2	0	0	0	0	0	0	2
01:15 PM	1	3	4	0	0	0	1	0	1	5
01:30 PM	0	3	3	0	1	1	7	0	7	11
01:45 PM	0	3	3	0	0	0	3	0	3	6
Total	1	11	12	0	1	1	11	0	11	24
02:00 PM	0	1	1	0	0	0	2	0	2	3
02:15 PM	0	3	3	0	0	0	2	0	2	5
02:30 PM	0	3	3	0	0	0	1	0	1	4
02:45 PM	0	3	3	0	1	1	3	1	4	8
Total	0	10	10	0	1	1	8	1	9	20
03:00 PM	0	4	4	0	0	0	6	0	6	10
03:15 PM	0	0	0	0	0	0	4	0	4	4
03:30 PM	0	1	1	0	0	0	4	0	4	5
03:45 PM	0	4	4	0	1	1	5	0	5	10
Total	0	9	9	0	1	1	19	0	19	29
04:00 PM	0	6	6	0	0	0	6	0	6	12
04:15 PM	0	2	2	0	0	0	6	1	7	9
04:30 PM	0	3	3	0	0	0	1	0	1	4
04:45 PM	0	1	1	0	0	0	0	1	1	2
Total	0	12	12	0	0	0	13	2	15	27
05:00 PM	0	5	5	0	1	1	1	0	1	7
05:15 PM	0	2	2	0	2	2	2	0	2	6
05:30 PM	0	4	4	0	0	0	2	0	2	6
05:45 PM	0	2	2	0	0	0	3	0	3	5
Total	0	13	13	0	3	3	8	0	8	24
06:00 PM	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	1	1	0	0	0	1
Total	0	0	0	0	1	1	0	0	0	1
07:00 PM	0	0	0	1	0	1	0	0	0	1
07:15 PM	0	0	0	0	0	0	1	0	1	1
07:30 PM	0	0	0	0	0	0	1	0	1	1
07:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	2	0	2	3

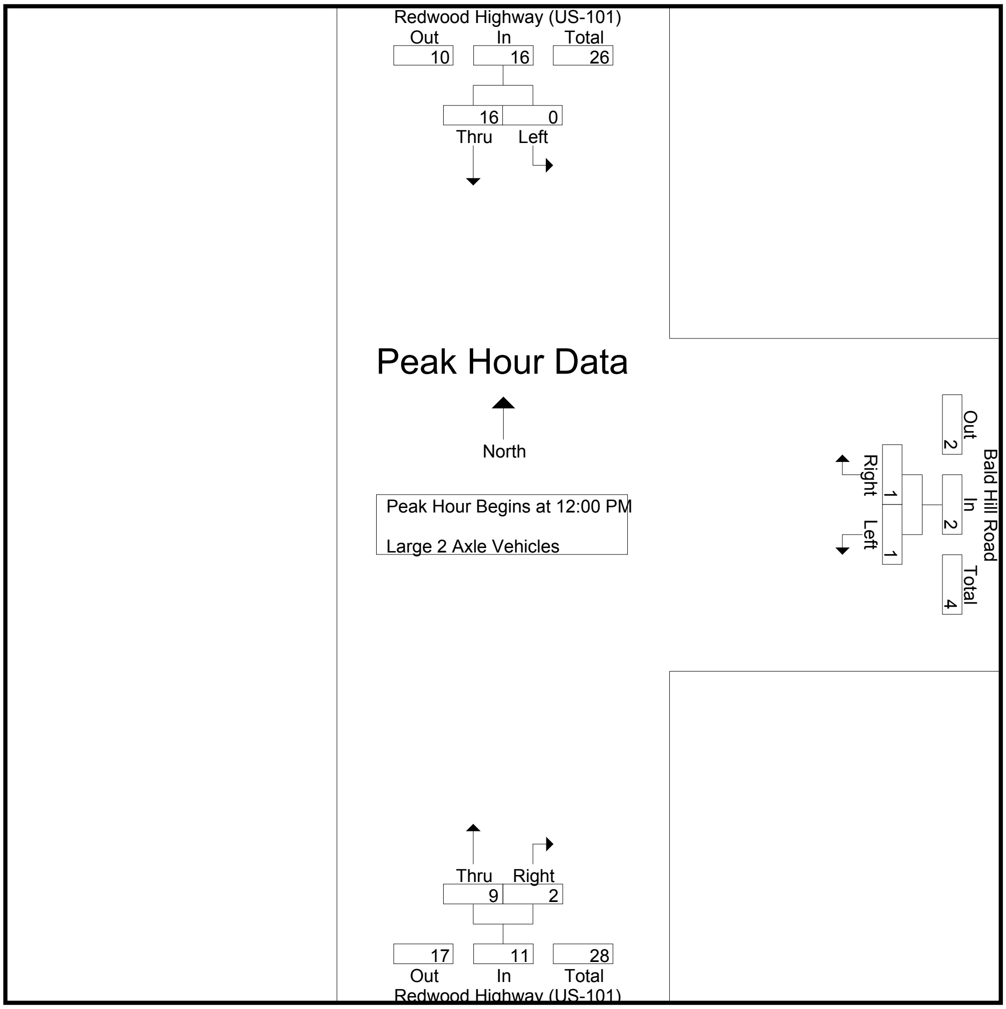
City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018

Groups Printed- Large 2 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	0	0	1	0	1	0	0	0	1
08:15 PM	0	1	1	0	0	0	0	0	0	1
08:30 PM	0	1	1	0	0	0	0	0	0	1
08:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	2	2	1	0	1	0	0	0	3
09:00 PM	0	0	0	0	0	0	1	0	1	1
09:15 PM	0	1	1	0	0	0	0	0	0	1
09:30 PM	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	1	1	0	0	0	0	0	0	1
Total	0	2	2	0	0	0	1	0	1	3
10:00 PM	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Grand Total	5	109	114	3	8	11	106	7	113	238
Apprch %	4.4	95.6		27.3	72.7		93.8	6.2		
Total %	2.1	45.8	47.9	1.3	3.4	4.6	44.5	2.9	47.5	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	0	2	2	**1**	0	**1**	1	0	1	4
12:15 PM	0	2	2	0	0	0	**6**	0	**6**	8
12:30 PM	0	**6**	**6**	0	0	0	1	**2**	3	**9**
12:45 PM	0	6	6	0	**1**	1	1	0	1	8
Total Volume	0	16	16	1	1	2	9	2	11	29
% App. Total	0	100		50	50		81.8	18.2		
PHF	.000	.667	.667	.250	.250	.500	.375	.250	.458	.806



Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM			12:00 PM			12:00 PM		
+0 mins.	0	2	2	**1**	0	**1**	1	0	1
+15 mins.	0	2	2	0	0	0	**6**	0	**6**
+30 mins.	0	**6**	**6**	0	0	0	1	**2**	3
+45 mins.	0	6	6	0	**1**	1	1	0	1
Total Volume	0	16	16	1	1	2	9	2	11
% App. Total	0	100		50	50		81.8	18.2	
PHF	.000	.667	.667	.250	.250	.500	.375	.250	.458

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- 3 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	1	1	2	1	3	4
04:15 AM	0	0	0	0	1	1	4	0	4	5
04:30 AM	0	0	0	0	0	0	3	0	3	3
04:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	2	9	1	10	12
05:00 AM	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	1	0	1	1
05:30 AM	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	0	0	0	0	0	0	2	2	2
Total	0	0	0	0	0	0	1	2	3	3
06:00 AM	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	2	1	3	3
06:30 AM	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	2	2	2
Total	0	0	0	0	0	0	2	3	5	5
07:00 AM	0	0	0	0	0	0	0	1	1	1
07:15 AM	0	0	0	0	0	0	2	0	2	2
07:30 AM	0	0	0	0	1	1	1	1	2	3
07:45 AM	2	1	3	0	1	1	1	1	2	6
Total	2	1	3	0	2	2	4	3	7	12
08:00 AM	0	0	0	0	1	1	3	0	3	4
08:15 AM	0	0	0	0	1	1	2	0	2	3
08:30 AM	0	0	0	0	0	0	1	0	1	1
08:45 AM	0	0	0	0	0	0	3	0	3	3
Total	0	0	0	0	2	2	9	0	9	11
09:00 AM	0	0	0	0	1	1	1	0	1	2
09:15 AM	0	0	0	0	0	0	1	0	1	1
09:30 AM	0	0	0	0	1	1	1	0	1	2
09:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	2	3	0	3	5

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- 3 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	0	1	1	0	0	0	0	0	0	1
10:15 AM	0	0	0	0	0	0	1	0	1	1
10:30 AM	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	1	1	1	1	2	3
Total	0	1	1	0	1	1	2	1	3	5
11:00 AM	1	0	1	0	0	0	0	0	0	1
11:15 AM	1	0	1	0	0	0	0	0	0	1
11:30 AM	0	0	0	0	0	0	0	0	0	0
11:45 AM	2	0	2	0	0	0	0	1	1	3
Total	4	0	4	0	0	0	0	1	1	5
12:00 PM	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	1	0	1	1
12:30 PM	0	0	0	0	0	0	3	0	3	3
12:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	5	0	5	5
01:00 PM	0	2	2	0	0	0	2	0	2	4
01:15 PM	0	2	2	0	2	2	0	0	0	4
01:30 PM	0	1	1	0	1	1	1	0	1	3
01:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	5	5	0	3	3	3	0	3	11
02:00 PM	0	1	1	0	0	0	5	0	5	6
02:15 PM	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	3	3	0	0	0	0	0	0	3
Total	0	4	4	0	0	0	5	0	5	9
03:00 PM	0	0	0	0	0	0	1	0	1	1
03:15 PM	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	1	1
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	1	1	0	0	0	0	0	0	1
04:30 PM	0	1	1	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	2	2	0	0	0	0	0	0	2
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	1	1	0	0	0	0	1	1	2
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	1	1	0	0	0	1	1	2	3
06:00 PM	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	1	0	1	1
06:30 PM	0	0	0	1	0	1	0	0	0	1
06:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	1	0	1	2
07:00 PM	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	0	0	0	0	0	0	1	1	1
07:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	1	1

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
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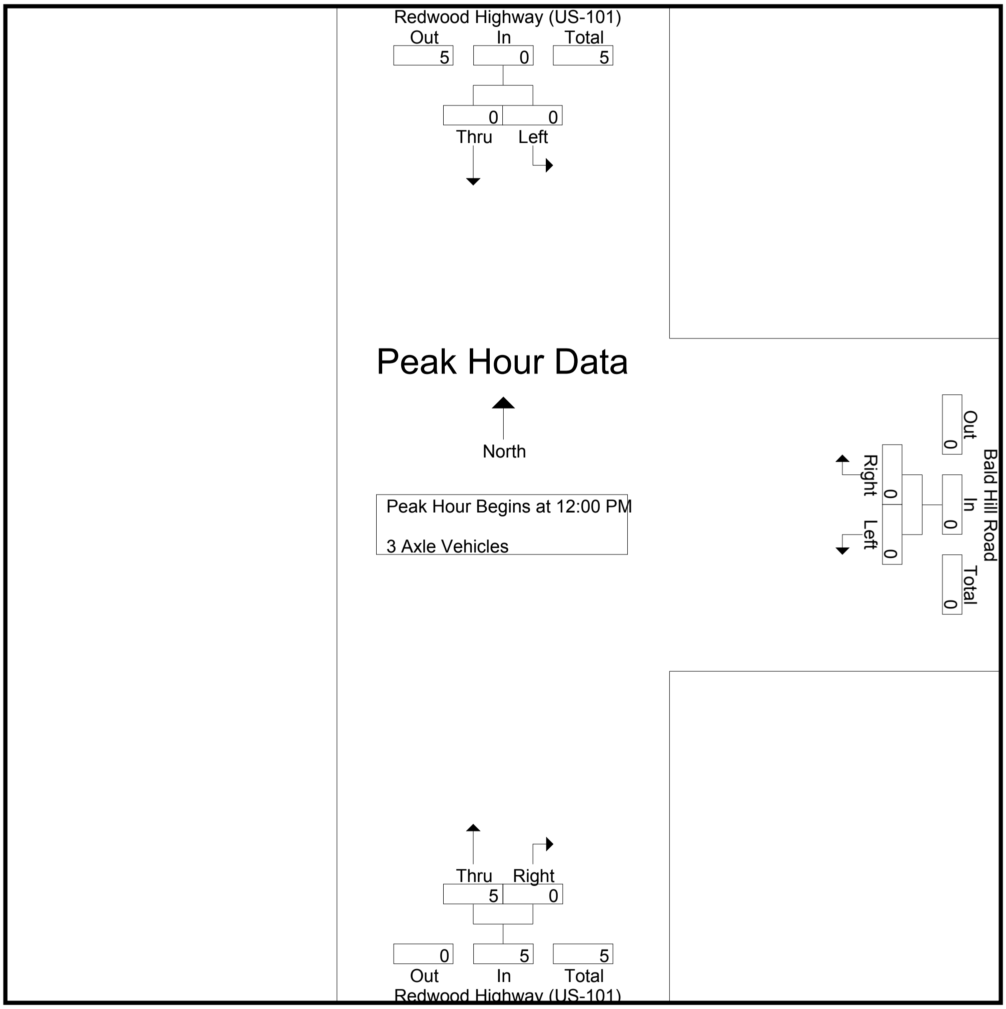
Groups Printed- 3 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
09:00 PM	0	0	0	0	0	0	0	0	0	0
09:15 PM	0	0	0	0	0	0	0	0	0	0
09:30 PM	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	1	1	0	0	0	0	0	0	1
11:15 PM	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	0	0	0	1
Grand Total	6	15	21	1	12	13	46	13	59	93
Apprch %	28.6	71.4		7.7	92.3		78	22		
Total %	6.5	16.1	22.6	1.1	12.9	14	49.5	14	63.4	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	1	0	1	1
12:30 PM	0	0	0	0	0	0	**3**	0	**3**	**3**
12:45 PM	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	0	5	0	5	5
% App. Total	0	0		0	0		100	0		
PHF	.000	.000	.000	.000	.000	.000	.417	.000	.417	.417

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 4



Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM			12:00 PM			12:00 PM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	1	0	1
+30 mins.	0	0	0	0	0	0	**3**	0	**3**
+45 mins.	0	0	0	0	0	0	1	0	1
Total Volume	0	0	0	0	0	0	5	0	5
% App. Total	0	0		0	0		100	0	
PHF	.000	.000	.000	.000	.000	.000	.417	.000	.417

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	1	1	0	0	0	0	0	0	1
01:30 AM	0	0	0	0	0	0	1	0	1	1
01:45 AM	0	2	2	0	0	0	0	0	0	2
Total	0	3	3	0	0	0	1	0	1	4
02:00 AM	0	0	0	0	0	0	2	0	2	2
02:15 AM	0	1	1	0	0	0	0	0	0	1
02:30 AM	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	1	0	1	1
Total	0	1	1	0	0	0	3	0	3	4
03:00 AM	0	1	1	0	0	0	1	0	1	2
03:15 AM	0	1	1	0	0	0	1	0	1	2
03:30 AM	0	0	0	0	0	0	1	0	1	1
03:45 AM	0	2	2	0	0	0	1	0	1	3
Total	0	4	4	0	0	0	4	0	4	8
04:00 AM	0	1	1	0	0	0	2	0	2	3
04:15 AM	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	1	1	0	0	0	2	0	2	3
04:45 AM	0	0	0	0	0	0	1	0	1	1
Total	0	2	2	0	0	0	5	0	5	7
05:00 AM	0	1	1	0	0	0	5	0	5	6
05:15 AM	0	2	2	0	0	0	1	0	1	3
05:30 AM	0	3	3	1	0	1	0	0	0	4
05:45 AM	0	1	1	1	0	1	0	0	0	2
Total	0	7	7	2	0	2	6	0	6	15
06:00 AM	0	2	2	0	0	0	2	0	2	4
06:15 AM	0	3	3	0	0	0	2	0	2	5
06:30 AM	0	3	3	0	0	0	1	0	1	4
06:45 AM	0	4	4	0	0	0	1	1	2	6
Total	0	12	12	0	0	0	6	1	7	19
07:00 AM	0	4	4	0	0	0	3	0	3	7
07:15 AM	0	0	0	0	0	0	3	0	3	3
07:30 AM	0	0	0	0	0	0	2	0	2	2
07:45 AM	0	4	4	0	0	0	1	0	1	5
Total	0	8	8	0	0	0	9	0	9	17
08:00 AM	0	1	1	0	0	0	3	0	3	4
08:15 AM	0	0	0	0	0	0	1	0	1	1
08:30 AM	0	1	1	1	0	1	1	0	1	3
08:45 AM	0	5	5	0	0	0	0	0	0	5
Total	0	7	7	1	0	1	5	0	5	13
09:00 AM	0	4	4	1	0	1	1	0	1	6
09:15 AM	0	4	4	0	0	0	0	0	0	4
09:30 AM	0	4	4	0	0	0	3	0	3	7
09:45 AM	0	3	3	0	0	0	0	0	0	3
Total	0	15	15	1	0	1	4	0	4	20

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	0	1	1	2	0	2	0	0	0	3
10:15 AM	0	2	2	1	0	1	3	0	3	6
10:30 AM	0	3	3	0	0	0	0	0	0	3
10:45 AM	0	5	5	0	0	0	1	0	1	6
Total	0	11	11	3	0	3	4	0	4	18
11:00 AM	0	1	1	0	0	0	3	0	3	4
11:15 AM	0	4	4	0	0	0	6	0	6	10
11:30 AM	0	3	3	0	0	0	1	1	2	5
11:45 AM	0	2	2	0	0	0	3	0	3	5
Total	0	10	10	0	0	0	13	1	14	24
12:00 PM	0	2	2	0	0	0	3	0	3	5
12:15 PM	0	2	2	0	0	0	6	1	7	9
12:30 PM	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	2	2	0	0	0	2	0	2	4
Total	0	6	6	0	0	0	11	1	12	18
01:00 PM	0	2	2	0	0	0	1	0	1	3
01:15 PM	0	3	3	1	0	1	1	0	1	5
01:30 PM	0	2	2	0	0	0	3	0	3	5
01:45 PM	0	4	4	1	0	1	0	1	1	6
Total	0	11	11	2	0	2	5	1	6	19
02:00 PM	0	0	0	0	0	0	2	0	2	2
02:15 PM	0	2	2	2	0	2	2	0	2	6
02:30 PM	0	5	5	0	0	0	1	1	2	7
02:45 PM	0	1	1	0	0	0	2	0	2	3
Total	0	8	8	2	0	2	7	1	8	18
03:00 PM	0	2	2	1	0	1	2	0	2	5
03:15 PM	0	3	3	2	0	2	0	0	0	5
03:30 PM	0	3	3	1	0	1	1	1	2	6
03:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	8	8	4	0	4	4	1	5	17
04:00 PM	0	2	2	0	0	0	0	1	1	3
04:15 PM	0	4	4	0	0	0	1	0	1	5
04:30 PM	0	1	1	1	0	1	2	0	2	4
04:45 PM	0	4	4	0	0	0	1	0	1	5
Total	0	11	11	1	0	1	4	1	5	17
05:00 PM	0	1	1	1	0	1	0	0	0	2
05:15 PM	0	1	1	0	0	0	0	0	0	1
05:30 PM	0	1	1	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	3	3	1	0	1	0	0	0	4
06:00 PM	0	3	3	0	0	0	0	0	0	3
06:15 PM	0	0	0	0	0	0	2	0	2	2
06:30 PM	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	3	3	0	0	0	3	0	3	6
07:00 PM	0	2	2	0	0	0	0	0	0	2
07:15 PM	0	2	2	0	0	0	1	0	1	3
07:30 PM	0	2	2	0	0	0	0	0	0	2
07:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	6	6	0	0	0	2	0	2	8

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 3

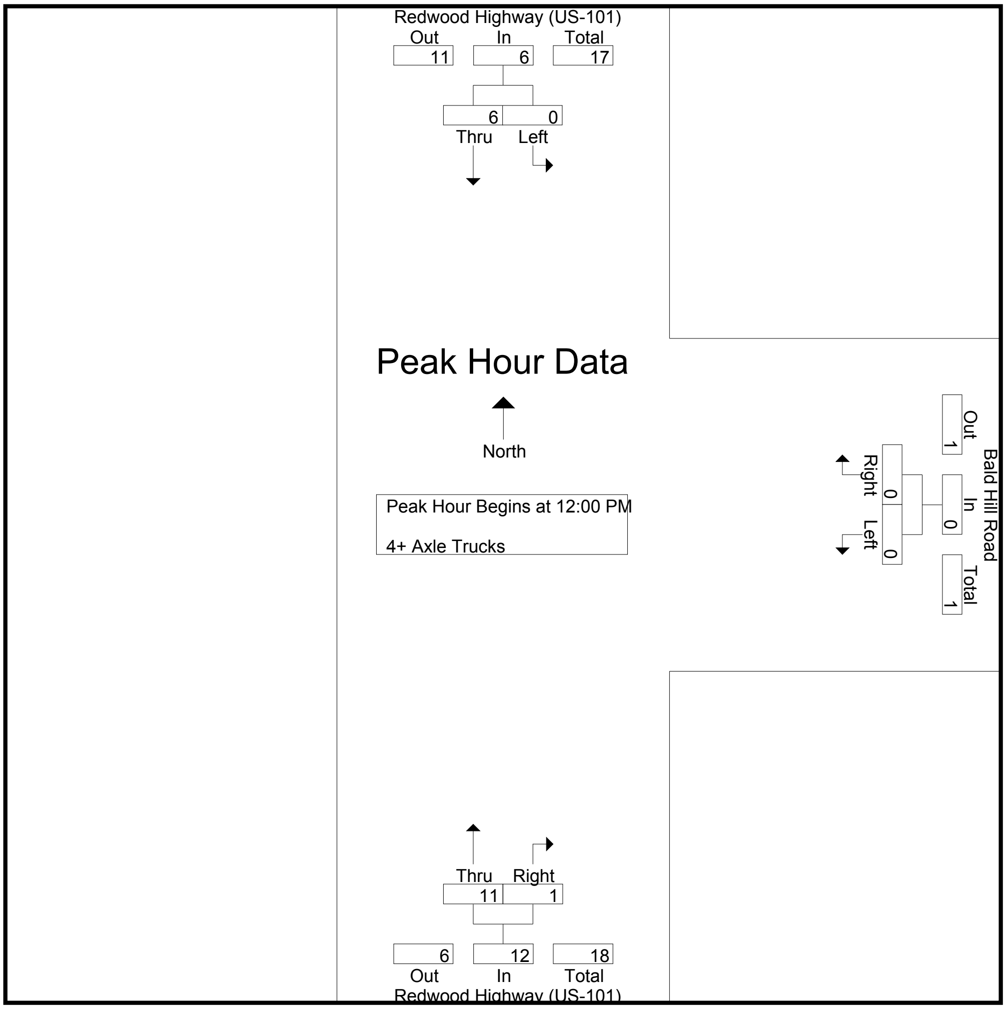
Groups Printed- 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	3	3	0	0	0	1	0	1	4
08:15 PM	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	1	1	0	0	0	1	0	1	2
08:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	4	4	0	0	0	2	0	2	6
09:00 PM	0	1	1	0	0	0	1	0	1	2
09:15 PM	0	2	2	0	0	0	0	0	0	2
09:30 PM	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	2	2	0	0	0	0	0	0	2
Total	0	5	5	0	0	0	1	0	1	6
10:00 PM	0	1	1	0	0	0	1	0	1	2
10:15 PM	0	0	0	0	0	0	1	0	1	1
10:30 PM	0	1	1	0	0	0	0	0	0	1
10:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	2	2	0	0	0	2	0	2	4
11:00 PM	0	0	0	0	0	0	1	0	1	1
11:15 PM	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	1	1	0	0	0	1	0	1	2
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	2	0	2	3
Grand Total	0	148	148	17	0	17	103	7	110	275
Apprch %	0	100		100	0		93.6	6.4		
Total %	0	53.8	53.8	6.2	0	6.2	37.5	2.5	40	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	0	**2**	**2**	0	0	0	3	0	3	5
12:15 PM	0	2	2	0	0	0	**6**	**1**	**7**	**9**
12:30 PM	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	2	2	0	0	0	2	0	2	4
Total Volume	0	6	6	0	0	0	11	1	12	18
% App. Total	0	100		0	0		91.7	8.3		
PHF	.000	.750	.750	.000	.000	.000	.458	.250	.429	.500

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-29-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 4



Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM			12:00 PM			12:00 PM		
+0 mins.	0	**2**	**2**	0	0	0	3	0	3
+15 mins.	0	2	2	0	0	0	**6**	**1**	**7**
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	2	2	0	0	0	2	0	2
Total Volume	0	6	6	0	0	0	11	1	12
% App. Total	0	100		0	0		91.7	8.3	
PHF	.000	.750	.750	.000	.000	.000	.458	.250	.429

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	3	3	0	0	0	7	0	7	10
12:15 AM	0	2	2	0	0	0	2	1	3	5
12:30 AM	0	1	1	1	0	1	6	0	6	8
12:45 AM	0	3	3	0	0	0	5	0	5	8
Total	0	9	9	1	0	1	20	1	21	31
01:00 AM	0	2	2	0	0	0	2	0	2	4
01:15 AM	0	2	2	0	0	0	2	0	2	4
01:30 AM	0	2	2	0	0	0	2	0	2	4
01:45 AM	1	1	2	0	0	0	1	1	2	4
Total	1	7	8	0	0	0	7	1	8	16
02:00 AM	0	1	1	0	0	0	2	0	2	3
02:15 AM	0	2	2	0	0	0	2	0	2	4
02:30 AM	0	0	0	0	0	0	1	0	1	1
02:45 AM	0	1	1	0	0	0	2	0	2	3
Total	0	4	4	0	0	0	7	0	7	11
03:00 AM	1	1	2	1	0	1	4	1	5	8
03:15 AM	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	1	1	0	0	0	2	1	3	4
03:45 AM	0	0	0	0	0	0	2	0	2	2
Total	1	2	3	1	0	1	8	2	10	14
04:00 AM	0	3	3	0	0	0	4	1	5	8
04:15 AM	0	3	3	0	1	1	1	1	2	6
04:30 AM	1	1	2	0	1	1	4	2	6	9
04:45 AM	1	6	7	0	0	0	4	0	4	11
Total	2	13	15	0	2	2	13	4	17	34
05:00 AM	1	4	5	0	0	0	5	0	5	10
05:15 AM	0	4	4	0	1	1	13	1	14	19
05:30 AM	0	7	7	0	0	0	20	2	22	29
05:45 AM	0	7	7	1	0	1	10	5	15	23
Total	1	22	23	1	1	2	48	8	56	81
06:00 AM	1	9	10	1	0	1	14	1	15	26
06:15 AM	0	9	9	0	0	0	29	0	29	38
06:30 AM	0	13	13	2	0	2	15	2	17	32
06:45 AM	2	18	20	1	0	1	18	3	21	42
Total	3	49	52	4	0	4	76	6	82	138
07:00 AM	0	22	22	0	0	0	10	0	10	32
07:15 AM	1	18	19	0	1	1	17	1	18	38
07:30 AM	3	15	18	1	5	6	20	3	23	47
07:45 AM	1	15	16	0	1	1	32	1	33	50
Total	5	70	75	1	7	8	79	5	84	167
08:00 AM	0	26	26	1	0	1	32	0	32	59
08:15 AM	4	32	36	1	4	5	24	5	29	70
08:30 AM	3	36	39	1	0	1	28	1	29	69
08:45 AM	1	25	26	3	0	3	35	5	40	69
Total	8	119	127	6	4	10	119	11	130	267
09:00 AM	1	31	32	2	1	3	46	2	48	83
09:15 AM	3	20	23	3	3	6	33	3	36	65
09:30 AM	3	40	43	2	1	3	26	1	27	73
09:45 AM	4	36	40	3	3	6	43	4	47	93
Total	11	127	138	10	8	18	148	10	158	314

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	2	39	41	1	2	3	53	5	58	102
10:15 AM	2	42	44	3	3	6	34	2	36	86
10:30 AM	5	45	50	1	1	2	51	4	55	107
10:45 AM	0	40	40	1	1	2	41	3	44	86
Total	9	166	175	6	7	13	179	14	193	381
11:00 AM	2	47	49	1	3	4	23	10	33	86
11:15 AM	3	37	40	1	0	1	45	4	49	90
11:30 AM	2	40	42	4	5	9	85	6	91	142
11:45 AM	2	45	47	3	6	9	35	5	40	96
Total	9	169	178	9	14	23	188	25	213	414
12:00 PM	2	46	48	1	1	2	47	5	52	102
12:15 PM	5	71	76	2	6	8	50	3	53	137
12:30 PM	4	50	54	5	4	9	30	3	33	96
12:45 PM	4	42	46	8	12	20	49	1	50	116
Total	15	209	224	16	23	39	176	12	188	451
01:00 PM	2	44	46	4	2	6	23	5	28	80
01:15 PM	3	34	37	3	5	8	40	0	40	85
01:30 PM	1	42	43	2	5	7	29	2	31	81
01:45 PM	2	38	40	1	6	7	39	5	44	91
Total	8	158	166	10	18	28	131	12	143	337
02:00 PM	5	45	50	5	3	8	44	1	45	103
02:15 PM	1	43	44	5	0	5	39	4	43	92
02:30 PM	5	48	53	2	3	5	30	2	32	90
02:45 PM	0	49	49	5	3	8	55	8	63	120
Total	11	185	196	17	9	26	168	15	183	405
03:00 PM	2	42	44	3	5	8	19	4	23	75
03:15 PM	2	51	53	8	1	9	45	2	47	109
03:30 PM	1	43	44	4	4	8	30	4	34	86
03:45 PM	1	53	54	5	6	11	65	3	68	133
Total	6	189	195	20	16	36	159	13	172	403
04:00 PM	0	49	49	1	5	6	49	3	52	107
04:15 PM	1	50	51	5	5	10	37	2	39	100
04:30 PM	2	60	62	9	1	10	42	3	45	117
04:45 PM	1	55	56	5	4	9	46	3	49	114
Total	4	214	218	20	15	35	174	11	185	438
05:00 PM	4	50	54	4	3	7	42	4	46	107
05:15 PM	3	48	51	4	0	4	36	4	40	95
05:30 PM	5	53	58	1	2	3	43	3	46	107
05:45 PM	1	32	33	5	1	6	32	1	33	72
Total	13	183	196	14	6	20	153	12	165	381
06:00 PM	1	42	43	4	2	6	38	1	39	88
06:15 PM	0	33	33	2	2	4	44	2	46	83
06:30 PM	1	34	35	1	0	1	29	1	30	66
06:45 PM	2	29	31	2	2	4	27	2	29	64
Total	4	138	142	9	6	15	138	6	144	301
07:00 PM	2	37	39	3	3	6	34	2	36	81
07:15 PM	1	18	19	2	1	3	25	1	26	48
07:30 PM	0	20	20	2	0	2	25	2	27	49
07:45 PM	1	21	22	1	1	2	23	1	24	48
Total	4	96	100	8	5	13	107	6	113	226

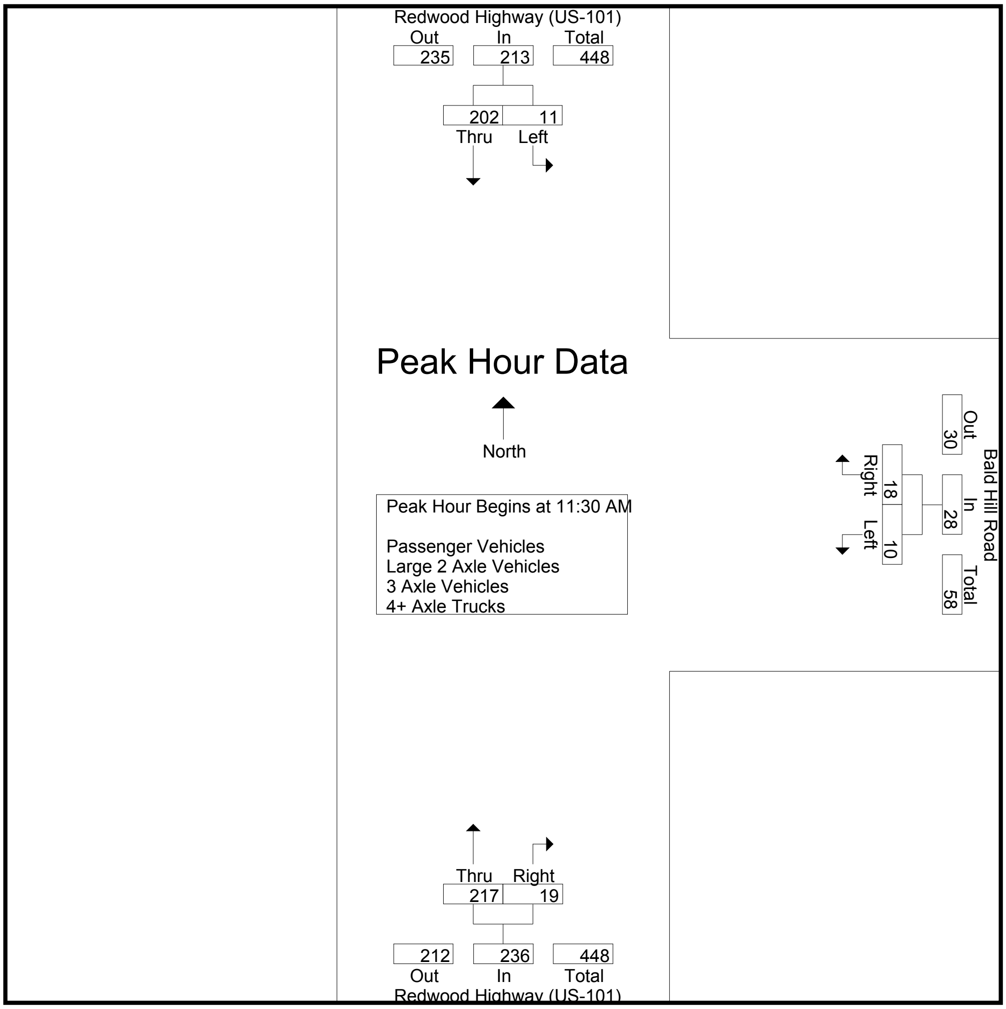
City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 3

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	15	15	1	1	2	21	1	22	39
08:15 PM	1	9	10	1	0	1	13	1	14	25
08:30 PM	0	20	20	1	2	3	12	0	12	35
08:45 PM	1	20	21	0	0	0	12	0	12	33
Total	2	64	66	3	3	6	58	2	60	132
09:00 PM	0	15	15	1	0	1	9	0	9	25
09:15 PM	1	6	7	0	1	1	10	0	10	18
09:30 PM	1	8	9	0	0	0	15	0	15	24
09:45 PM	0	9	9	0	0	0	10	1	11	20
Total	2	38	40	1	1	2	44	1	45	87
10:00 PM	0	6	6	0	0	0	7	0	7	13
10:15 PM	0	3	3	0	0	0	7	0	7	10
10:30 PM	0	2	2	0	0	0	10	0	10	12
10:45 PM	0	2	2	0	0	0	8	0	8	10
Total	0	13	13	0	0	0	32	0	32	45
11:00 PM	0	5	5	0	0	0	6	0	6	11
11:15 PM	0	4	4	0	0	0	1	0	1	5
11:30 PM	0	5	5	0	0	0	6	0	6	11
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	14	14	0	0	0	13	0	13	27
Grand Total	119	2258	2377	157	145	302	2245	177	2422	5101
Apprch %	5	95		52	48		92.7	7.3		
Total %	2.3	44.3	46.6	3.1	2.8	5.9	44	3.5	47.5	
Passenger Vehicles	110	1979	2089	132	130	262	1962	152	2114	4465
% Passenger Vehicles	92.4	87.6	87.9	84.1	89.7	86.8	87.4	85.9	87.3	87.5
Large 2 Axle Vehicles	3	118	121	4	3	7	106	8	114	242
% Large 2 Axle Vehicles	2.5	5.2	5.1	2.5	2.1	2.3	4.7	4.5	4.7	4.7
3 Axle Vehicles	6	14	20	1	0	1	40	6	46	67
% 3 Axle Vehicles	5	0.6	0.8	0.6	0	0.3	1.8	3.4	1.9	1.3
4+ Axle Trucks	0	147	147	20	12	32	137	11	148	327
% 4+ Axle Trucks	0	6.5	6.2	12.7	8.3	10.6	6.1	6.2	6.1	6.4

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 11:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:30 AM										
11:30 AM	2	40	42	**4**	5	**9**	**85**	**6**	**91**	**142**
11:45 AM	2	45	47	3	**6**	9	35	5	40	96
12:00 PM	2	46	48	1	1	2	47	5	52	102
12:15 PM	**5**	**71**	**76**	2	6	8	50	3	53	137
Total Volume	11	202	213	10	18	28	217	19	236	477
% App. Total	5.2	94.8		35.7	64.3		91.9	8.1		
PHF	.550	.711	.701	.625	.750	.778	.638	.792	.648	.840



Peak Hour Analysis From 12:00 AM to 11:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:45 AM			12:15 PM			11:30 AM		
+0 mins.	2	45	47	2	6	8	**85**	**6**	**91**
+15 mins.	2	46	48	5	4	9	35	5	40
+30 mins.	**5**	**71**	**76**	**8**	**12**	**20**	47	5	52
+45 mins.	4	50	54	4	2	6	50	3	53
Total Volume	13	212	225	19	24	43	217	19	236
% App. Total	5.8	94.2		44.2	55.8		91.9	8.1	
PHF	.650	.746	.740	.594	.500	.538	.638	.792	.648

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- Passenger Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	2	2	0	0	0	6	0	6	8
12:15 AM	0	1	1	0	0	0	2	1	3	4
12:30 AM	0	1	1	1	0	1	6	0	6	8
12:45 AM	0	2	2	0	0	0	4	0	4	6
Total	0	6	6	1	0	1	18	1	19	26
01:00 AM	0	2	2	0	0	0	1	0	1	3
01:15 AM	0	2	2	0	0	0	1	0	1	3
01:30 AM	0	2	2	0	0	0	2	0	2	4
01:45 AM	0	1	1	0	0	0	1	0	1	2
Total	0	7	7	0	0	0	5	0	5	12
02:00 AM	0	1	1	0	0	0	0	0	0	1
02:15 AM	0	2	2	0	0	0	0	0	0	2
02:30 AM	0	0	0	0	0	0	1	0	1	1
02:45 AM	0	1	1	0	0	0	2	0	2	3
Total	0	4	4	0	0	0	3	0	3	7
03:00 AM	1	1	2	1	0	1	2	1	3	6
03:15 AM	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	1	0	1	1
Total	1	1	2	1	0	1	3	1	4	7
04:00 AM	0	0	0	0	0	0	1	0	1	1
04:15 AM	0	2	2	0	0	0	0	1	1	3
04:30 AM	1	1	2	0	0	0	1	2	3	5
04:45 AM	1	5	6	0	0	0	1	0	1	7
Total	2	8	10	0	0	0	3	3	6	16
05:00 AM	1	1	2	0	0	0	4	0	4	6
05:15 AM	0	2	2	0	1	1	10	0	10	13
05:30 AM	0	4	4	0	0	0	17	0	17	21
05:45 AM	0	3	3	0	0	0	7	3	10	13
Total	1	10	11	0	1	1	38	3	41	53
06:00 AM	1	8	9	1	0	1	13	0	13	23
06:15 AM	0	8	8	0	0	0	23	0	23	31
06:30 AM	0	8	8	1	0	1	13	0	13	22
06:45 AM	2	16	18	0	0	0	12	2	14	32
Total	3	40	43	2	0	2	61	2	63	108
07:00 AM	0	19	19	0	0	0	6	0	6	25
07:15 AM	1	15	16	0	1	1	16	1	17	34
07:30 AM	2	14	16	0	4	4	18	3	21	41
07:45 AM	1	11	12	0	1	1	22	0	22	35
Total	4	59	63	0	6	6	62	4	66	135
08:00 AM	0	22	22	0	0	0	26	0	26	48
08:15 AM	3	24	27	1	2	3	17	5	22	52
08:30 AM	3	29	32	1	0	1	17	1	18	51
08:45 AM	1	23	24	1	0	1	26	4	30	55
Total	7	98	105	3	2	5	86	10	96	206
09:00 AM	1	25	26	1	1	2	45	2	47	75
09:15 AM	1	14	15	2	3	5	26	3	29	49
09:30 AM	2	33	35	2	1	3	20	1	21	59
09:45 AM	4	32	36	2	2	4	37	3	40	80
Total	8	104	112	7	7	14	128	9	137	263

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- Passenger Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	2	33	35	1	2	3	41	4	45	83
10:15 AM	2	27	29	3	2	5	33	1	34	68
10:30 AM	5	40	45	1	1	2	43	4	47	94
10:45 AM	0	33	33	0	1	1	35	3	38	72
Total	9	133	142	5	6	11	152	12	164	317
11:00 AM	1	40	41	0	1	1	21	9	30	72
11:15 AM	3	32	35	1	0	1	40	4	44	80
11:30 AM	2	36	38	2	5	7	72	5	77	122
11:45 AM	2	39	41	3	6	9	28	5	33	83
Total	8	147	155	6	12	18	161	23	184	357
12:00 PM	2	37	39	1	1	2	37	5	42	83
12:15 PM	4	65	69	2	6	8	46	2	48	125
12:30 PM	4	43	47	4	4	8	27	3	30	85
12:45 PM	4	38	42	7	12	19	44	0	44	105
Total	14	183	197	14	23	37	154	10	164	398
01:00 PM	2	37	39	4	2	6	21	4	25	70
01:15 PM	3	29	32	3	5	8	38	0	38	78
01:30 PM	0	34	34	1	4	5	23	2	25	64
01:45 PM	2	34	36	1	5	6	35	4	39	81
Total	7	134	141	9	16	25	117	10	127	293
02:00 PM	5	39	44	4	2	6	44	1	45	95
02:15 PM	1	38	39	5	0	5	36	4	40	84
02:30 PM	5	41	46	2	3	5	27	2	29	80
02:45 PM	0	44	44	3	3	6	49	6	55	105
Total	11	162	173	14	8	22	156	13	169	364
03:00 PM	2	39	41	2	3	5	17	4	21	67
03:15 PM	2	48	50	7	1	8	40	2	42	100
03:30 PM	1	41	42	3	4	7	27	4	31	80
03:45 PM	1	47	48	5	5	10	64	3	67	125
Total	6	175	181	17	13	30	148	13	161	372
04:00 PM	0	47	47	1	5	6	48	3	51	104
04:15 PM	1	46	47	4	5	9	31	2	33	89
04:30 PM	2	55	57	9	1	10	40	3	43	110
04:45 PM	1	53	54	5	4	9	46	3	49	112
Total	4	201	205	19	15	34	165	11	176	415
05:00 PM	4	44	48	4	3	7	40	4	44	99
05:15 PM	3	44	47	3	0	3	33	4	37	87
05:30 PM	5	51	56	1	2	3	39	3	42	101
05:45 PM	1	30	31	5	1	6	30	1	31	68
Total	13	169	182	13	6	19	142	12	154	355
06:00 PM	1	40	41	4	2	6	34	1	35	82
06:15 PM	0	31	31	2	2	4	42	2	44	79
06:30 PM	1	32	33	1	0	1	27	1	28	62
06:45 PM	2	27	29	2	2	4	23	2	25	58
Total	4	130	134	9	6	15	126	6	132	281
07:00 PM	2	35	37	3	3	6	33	2	35	78
07:15 PM	1	17	18	2	1	3	23	1	24	45
07:30 PM	0	18	18	2	0	2	22	2	24	44
07:45 PM	1	21	22	1	1	2	23	1	24	48
Total	4	91	95	8	5	13	101	6	107	215

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018

Groups Printed- Passenger Vehicles

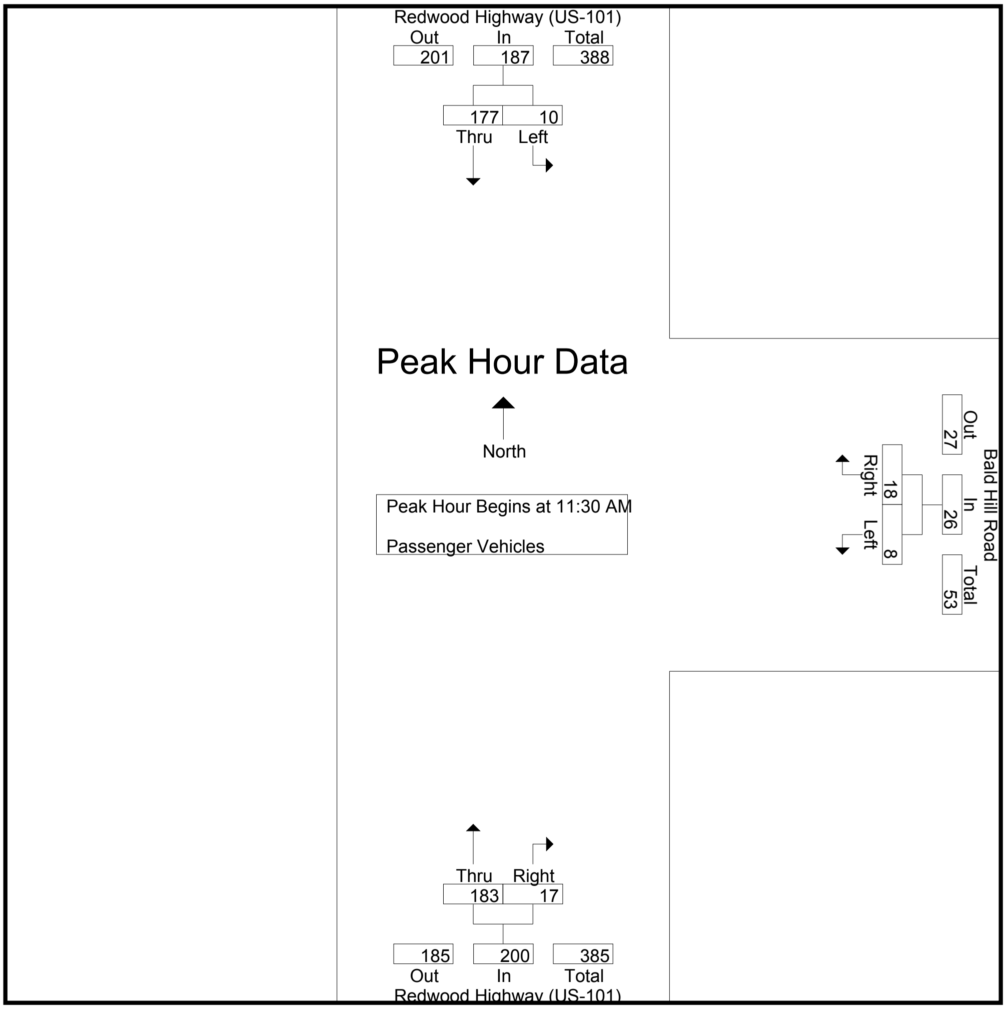
	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	15	15	1	1	2	20	1	21	38
08:15 PM	1	8	9	1	0	1	11	1	12	22
08:30 PM	0	19	19	1	2	3	11	0	11	33
08:45 PM	1	20	21	0	0	0	12	0	12	33
Total	2	62	64	3	3	6	54	2	56	126
09:00 PM	0	14	14	1	0	1	8	0	8	23
09:15 PM	1	6	7	0	1	1	9	0	9	17
09:30 PM	1	7	8	0	0	0	13	0	13	21
09:45 PM	0	9	9	0	0	0	9	1	10	19
Total	2	36	38	1	1	2	39	1	40	80
10:00 PM	0	1	1	0	0	0	7	0	7	8
10:15 PM	0	3	3	0	0	0	5	0	5	8
10:30 PM	0	2	2	0	0	0	8	0	8	10
10:45 PM	0	1	1	0	0	0	7	0	7	8
Total	0	7	7	0	0	0	27	0	27	34
11:00 PM	0	5	5	0	0	0	6	0	6	11
11:15 PM	0	2	2	0	0	0	1	0	1	3
11:30 PM	0	5	5	0	0	0	6	0	6	11
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	12	12	0	0	0	13	0	13	25
Grand Total	110	1979	2089	132	130	262	1962	152	2114	4465
Apprch %	5.3	94.7		50.4	49.6		92.8	7.2		
Total %	2.5	44.3	46.8	3	2.9	5.9	43.9	3.4	47.3	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:30 AM										
11:30 AM	2	36	38	2	5	7	**72**	**5**	**77**	122
11:45 AM	2	39	41	**3**	**6**	**9**	28	5	33	83
12:00 PM	2	37	39	1	1	2	37	5	42	83
12:15 PM	**4**	**65**	**69**	2	6	8	46	2	48	**125**
Total Volume	10	177	187	8	18	26	183	17	200	413
% App. Total	5.3	94.7		30.8	69.2		91.5	8.5		
PHF	.625	.681	.678	.667	.750	.722	.635	.850	.649	.826

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 4



Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:30 AM			11:30 AM			11:30 AM		
+0 mins.	2	36	38	2	5	7	**72**	**5**	**77**
+15 mins.	2	39	41	**3**	**6**	**9**	28	5	33
+30 mins.	2	37	39	1	1	2	37	5	42
+45 mins.	**4**	**65**	**69**	2	6	8	46	2	48
Total Volume	10	177	187	8	18	26	183	17	200
% App. Total	5.3	94.7		30.8	69.2		91.5	8.5	
PHF	.625	.681	.678	.667	.750	.722	.635	.850	.649

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- Large 2 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	1	0	1	1
01:15 AM	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	1	1	2	2
02:00 AM	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	1	0	1	1
04:00 AM	0	0	0	0	0	0	3	0	3	3
04:15 AM	0	1	1	0	0	0	1	0	1	2
04:30 AM	0	0	0	0	0	0	1	0	1	1
04:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	5	0	5	6
05:00 AM	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	2	0	2	2
05:30 AM	0	1	1	0	0	0	0	0	0	1
05:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	2	0	2	3
06:00 AM	0	1	1	0	0	0	0	1	1	2
06:15 AM	0	0	0	0	0	0	4	0	4	4
06:30 AM	0	0	0	0	0	0	1	1	2	2
06:45 AM	0	2	2	0	0	0	3	0	3	5
Total	0	3	3	0	0	0	8	2	10	13
07:00 AM	0	1	1	0	0	0	1	0	1	2
07:15 AM	0	1	1	0	0	0	1	0	1	2
07:30 AM	0	0	0	1	0	1	0	0	0	1
07:45 AM	0	0	0	0	0	0	4	0	4	4
Total	0	2	2	1	0	1	6	0	6	9
08:00 AM	0	1	1	0	0	0	3	0	3	4
08:15 AM	0	5	5	0	0	0	4	0	4	9
08:30 AM	0	3	3	0	0	0	5	0	5	8
08:45 AM	0	1	1	1	0	1	4	0	4	6
Total	0	10	10	1	0	1	16	0	16	27
09:00 AM	0	2	2	0	0	0	0	0	0	2
09:15 AM	2	4	6	0	0	0	2	0	2	8
09:30 AM	1	1	2	0	0	0	2	0	2	4
09:45 AM	0	3	3	0	0	0	2	1	3	6
Total	3	10	13	0	0	0	6	1	7	20

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018

Groups Printed- Large 2 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	0	2	2	0	0	0	5	1	6	8
10:15 AM	0	9	9	0	0	0	1	1	2	11
10:30 AM	0	4	4	0	0	0	5	0	5	9
10:45 AM	0	6	6	0	0	0	5	0	5	11
Total	0	21	21	0	0	0	16	2	18	39
11:00 AM	0	4	4	0	0	0	1	0	1	5
11:15 AM	0	2	2	0	0	0	1	0	1	3
11:30 AM	0	1	1	1	0	1	9	0	9	11
11:45 AM	0	2	2	0	0	0	4	0	4	6
Total	0	9	9	1	0	1	15	0	15	25
12:00 PM	0	3	3	0	0	0	1	0	1	4
12:15 PM	0	3	3	0	0	0	1	0	1	4
12:30 PM	0	3	3	0	0	0	0	0	0	3
12:45 PM	0	3	3	0	0	0	0	0	0	3
Total	0	12	12	0	0	0	2	0	2	14
01:00 PM	0	1	1	0	0	0	2	0	2	3
01:15 PM	0	2	2	0	0	0	1	0	1	3
01:30 PM	0	3	3	0	0	0	1	0	1	4
01:45 PM	0	2	2	0	0	0	2	0	2	4
Total	0	8	8	0	0	0	6	0	6	14
02:00 PM	0	1	1	0	0	0	0	0	0	1
02:15 PM	0	3	3	0	0	0	2	0	2	5
02:30 PM	0	3	3	0	0	0	3	0	3	6
02:45 PM	0	1	1	0	0	0	3	2	5	6
Total	0	8	8	0	0	0	8	2	10	18
03:00 PM	0	2	2	0	2	2	0	0	0	4
03:15 PM	0	3	3	0	0	0	0	0	0	3
03:30 PM	0	1	1	0	0	0	1	0	1	2
03:45 PM	0	2	2	0	1	1	0	0	0	3
Total	0	8	8	0	3	3	1	0	1	12
04:00 PM	0	2	2	0	0	0	1	0	1	3
04:15 PM	0	1	1	0	0	0	2	0	2	3
04:30 PM	0	4	4	0	0	0	1	0	1	5
04:45 PM	0	1	1	0	0	0	0	0	0	1
Total	0	8	8	0	0	0	4	0	4	12
05:00 PM	0	2	2	0	0	0	0	0	0	2
05:15 PM	0	2	2	1	0	1	0	0	0	3
05:30 PM	0	0	0	0	0	0	2	0	2	2
05:45 PM	0	1	1	0	0	0	0	0	0	1
Total	0	5	5	1	0	1	2	0	2	8
06:00 PM	0	1	1	0	0	0	1	0	1	2
06:15 PM	0	1	1	0	0	0	1	0	1	2
06:30 PM	0	2	2	0	0	0	1	0	1	3
06:45 PM	0	2	2	0	0	0	1	0	1	3
Total	0	6	6	0	0	0	4	0	4	10
07:00 PM	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	1	1	0	0	0	0	0	0	1
07:30 PM	0	0	0	0	0	0	1	0	1	1
07:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	1	0	1	2

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018

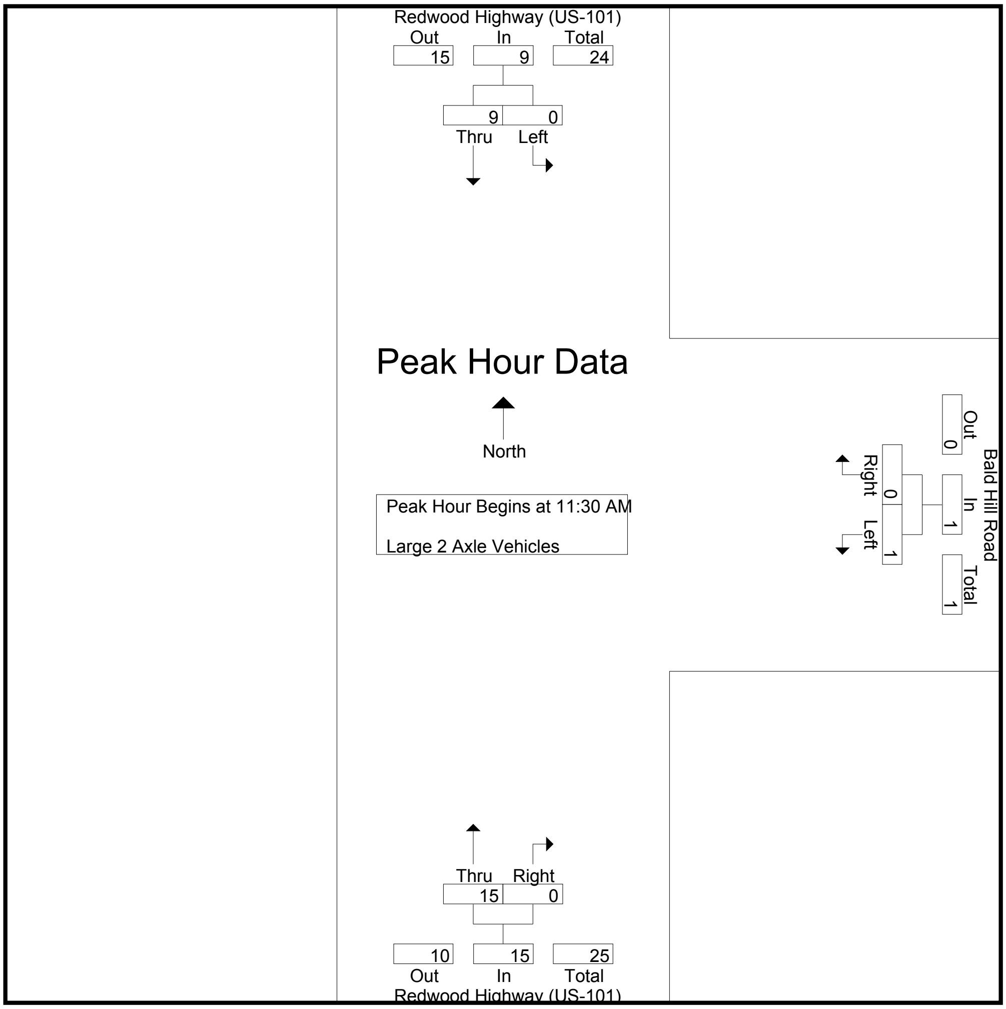
Groups Printed- Large 2 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	1	0	1	1
08:30 PM	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	1	1
09:00 PM	0	0	0	0	0	0	1	0	1	1
09:15 PM	0	0	0	0	0	0	0	0	0	0
09:30 PM	0	1	1	0	0	0	0	0	0	1
09:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	1	0	1	2
10:00 PM	0	3	3	0	0	0	0	0	0	3
10:15 PM	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	3	3	0	0	0	0	0	0	3
11:00 PM	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	1	1	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	0	0	0	1
Grand Total	3	118	121	4	3	7	106	8	114	242
Apprch %	2.5	97.5		57.1	42.9		93	7		
Total %	1.2	48.8	50	1.7	1.2	2.9	43.8	3.3	47.1	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:30 AM										
11:30 AM	0	1	1	**1**	0	**1**	**9**	0	**9**	**11**
11:45 AM	0	2	2	0	0	0	4	0	4	6
12:00 PM	0	**3**	**3**	0	0	0	1	0	1	4
12:15 PM	0	3	3	0	0	0	1	0	1	4
Total Volume	0	9	9	1	0	1	15	0	15	25
% App. Total	0	100		100	0		100	0		
PHF	.000	.750	.750	.250	.000	.250	.417	.000	.417	.568

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 4



Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:30 AM			11:30 AM			11:30 AM		
+0 mins.	0	1	1	**1**	0	**1**	**9**	0	**9**
+15 mins.	0	2	2	0	0	0	4	0	4
+30 mins.	0	**3**	**3**	0	0	0	1	0	1
+45 mins.	0	3	3	0	0	0	1	0	1
Total Volume	0	9	9	1	0	1	15	0	15
% App. Total	0	100		100	0		100	0	
PHF	.000	.750	.750	.250	.000	.250	.417	.000	.417

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- 3 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0
01:45 AM	1	0	1	0	0	0	0	0	0	1
Total	1	0	1	0	0	0	0	0	0	1
02:00 AM	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	1	1	1
03:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	1	1
04:00 AM	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
05:00 AM	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	1	0	1	1
05:45 AM	0	0	0	0	0	0	1	2	3	3
Total	0	0	0	0	0	0	2	2	4	4
06:00 AM	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	1	0	1	1
07:00 AM	0	0	0	0	0	0	1	0	1	1
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	1	0	1	0	0	0	1	0	1	2
07:45 AM	0	0	0	0	0	0	2	1	3	3
Total	1	0	1	0	0	0	4	1	5	6
08:00 AM	0	0	0	0	0	0	2	0	2	2
08:15 AM	1	0	1	0	0	0	1	0	1	2
08:30 AM	0	0	0	0	0	0	2	0	2	2
08:45 AM	0	0	0	0	0	0	2	0	2	2
Total	1	0	1	0	0	0	7	0	7	8
09:00 AM	0	0	0	0	0	0	1	0	1	1
09:15 AM	0	0	0	0	0	0	2	0	2	2
09:30 AM	0	1	1	0	0	0	1	0	1	2
09:45 AM	0	1	1	0	0	0	1	0	1	2
Total	0	2	2	0	0	0	5	0	5	7

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- 3 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	1	1	0	0	0	1	0	1	2
10:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	1	0	1	2
11:00 AM	1	0	1	0	0	0	0	0	0	1
11:15 AM	0	0	0	0	0	0	2	0	2	2
11:30 AM	0	0	0	0	0	0	2	0	2	2
11:45 AM	0	0	0	0	0	0	0	0	0	0
Total	1	0	1	0	0	0	4	0	4	5
12:00 PM	0	0	0	0	0	0	1	0	1	1
12:15 PM	1	0	1	0	0	0	1	0	1	2
12:30 PM	0	0	0	1	0	1	3	0	3	4
12:45 PM	0	0	0	0	0	0	0	1	1	1
Total	1	0	1	1	0	1	5	1	6	8
01:00 PM	0	1	1	0	0	0	0	1	1	2
01:15 PM	0	0	0	0	0	0	0	0	0	0
01:30 PM	1	0	1	0	0	0	2	0	2	3
01:45 PM	0	0	0	0	0	0	1	0	1	1
Total	1	1	2	0	0	0	3	1	4	6
02:00 PM	0	1	1	0	0	0	0	0	0	1
02:15 PM	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	1	1	0	0	0	2	0	2	3
Total	0	2	2	0	0	0	2	0	2	4
03:00 PM	0	0	0	0	0	0	1	0	1	1
03:15 PM	0	0	0	0	0	0	1	0	1	1
03:30 PM	0	0	0	0	0	0	1	0	1	1
03:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	4	0	4	4
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	1	0	1	1
04:30 PM	0	1	1	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	1	0	1	2
05:00 PM	0	3	3	0	0	0	0	0	0	3
05:15 PM	0	1	1	0	0	0	1	0	1	2
05:30 PM	0	2	2	0	0	0	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	6	6	0	0	0	1	0	1	7
06:00 PM	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
07:00 PM	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	1	1	0	0	0	0	0	0	1
07:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	0	0	0	1

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 3

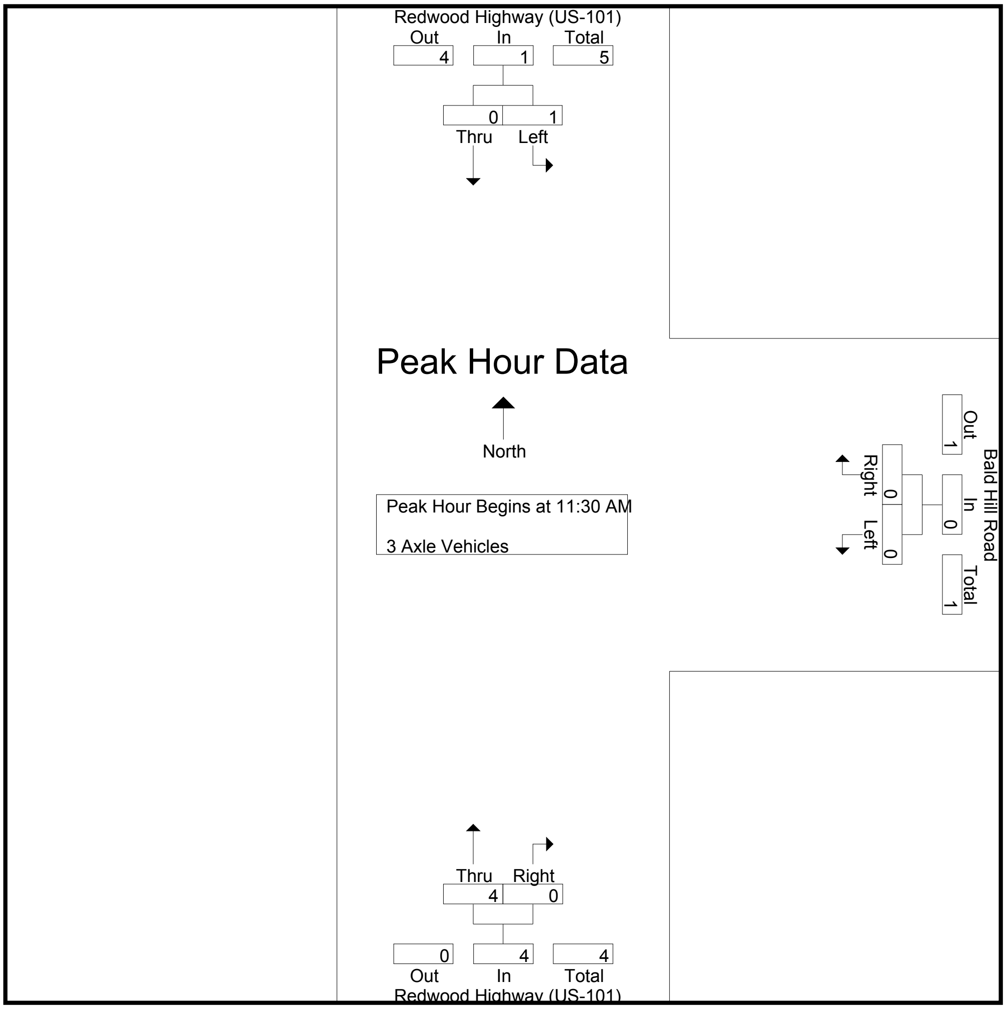
Groups Printed- 3 Axle Vehicles

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
09:00 PM	0	0	0	0	0	0	0	0	0	0
09:15 PM	0	0	0	0	0	0	0	0	0	0
09:30 PM	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Grand Total	6	14	20	1	0	1	40	6	46	67
Apprch %	30	70		100	0		87	13		
Total %	9	20.9	29.9	1.5	0	1.5	59.7	9	68.7	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:30 AM										
11:30 AM	0	0	0	0	0	0	**2**	0	**2**	**2**
11:45 AM	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	1	0	1	1
12:15 PM	**1**	0	**1**	0	0	0	1	0	1	2
Total Volume	1	0	1	0	0	0	4	0	4	5
% App. Total	100	0		0	0		100	0		
PHF	.250	.000	.250	.000	.000	.000	.500	.000	.500	.625

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 4



Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:30 AM			11:30 AM			11:30 AM		
+0 mins.	0	0	0	0	0	0	**2**	0	**2**
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	1	0	1
+45 mins.	**1**	0	**1**	0	0	0	1	0	1
Total Volume	1	0	1	0	0	0	4	0	4
% App. Total	100	0		0	0		100	0	
PHF	.250	.000	.250	.000	.000	.000	.500	.000	.500

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 1

Groups Printed- 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
12:00 AM	0	1	1	0	0	0	1	0	1	2
12:15 AM	0	1	1	0	0	0	0	0	0	1
12:30 AM	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	1	1	0	0	0	1	0	1	2
Total	0	3	3	0	0	0	2	0	2	5
01:00 AM	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	1	0	1	1
01:30 AM	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	1	1
02:00 AM	0	0	0	0	0	0	2	0	2	2
02:15 AM	0	0	0	0	0	0	2	0	2	2
02:30 AM	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	4	0	4	4
03:00 AM	0	0	0	0	0	0	2	0	2	2
03:15 AM	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	1	1	0	0	0	2	0	2	3
03:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	4	0	4	5
04:00 AM	0	3	3	0	0	0	0	1	1	4
04:15 AM	0	0	0	0	1	1	0	0	0	1
04:30 AM	0	0	0	0	1	1	2	0	2	3
04:45 AM	0	1	1	0	0	0	3	0	3	4
Total	0	4	4	0	2	2	5	1	6	12
05:00 AM	0	3	3	0	0	0	1	0	1	4
05:15 AM	0	2	2	0	0	0	1	1	2	4
05:30 AM	0	2	2	0	0	0	2	2	4	6
05:45 AM	0	4	4	1	0	1	2	0	2	7
Total	0	11	11	1	0	1	6	3	9	21
06:00 AM	0	0	0	0	0	0	1	0	1	1
06:15 AM	0	1	1	0	0	0	2	0	2	3
06:30 AM	0	5	5	1	0	1	1	1	2	8
06:45 AM	0	0	0	1	0	1	2	1	3	4
Total	0	6	6	2	0	2	6	2	8	16
07:00 AM	0	2	2	0	0	0	2	0	2	4
07:15 AM	0	2	2	0	0	0	0	0	0	2
07:30 AM	0	1	1	0	1	1	1	0	1	3
07:45 AM	0	4	4	0	0	0	4	0	4	8
Total	0	9	9	0	1	1	7	0	7	17
08:00 AM	0	3	3	1	0	1	1	0	1	5
08:15 AM	0	3	3	0	2	2	2	0	2	7
08:30 AM	0	4	4	0	0	0	4	0	4	8
08:45 AM	0	1	1	1	0	1	3	1	4	6
Total	0	11	11	2	2	4	10	1	11	26
09:00 AM	0	4	4	1	0	1	0	0	0	5
09:15 AM	0	2	2	1	0	1	3	0	3	6
09:30 AM	0	5	5	0	0	0	3	0	3	8
09:45 AM	0	0	0	1	1	2	3	0	3	5
Total	0	11	11	3	1	4	9	0	9	24

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 2

Groups Printed- 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
10:00 AM	0	4	4	0	0	0	7	0	7	11
10:15 AM	0	6	6	0	1	1	0	0	0	7
10:30 AM	0	0	0	0	0	0	2	0	2	2
10:45 AM	0	1	1	1	0	1	1	0	1	3
Total	0	11	11	1	1	2	10	0	10	23
11:00 AM	0	3	3	1	2	3	1	1	2	8
11:15 AM	0	3	3	0	0	0	2	0	2	5
11:30 AM	0	3	3	1	0	1	2	1	3	7
11:45 AM	0	4	4	0	0	0	3	0	3	7
Total	0	13	13	2	2	4	8	2	10	27
12:00 PM	0	6	6	0	0	0	8	0	8	14
12:15 PM	0	3	3	0	0	0	2	1	3	6
12:30 PM	0	4	4	0	0	0	0	0	0	4
12:45 PM	0	1	1	1	0	1	5	0	5	7
Total	0	14	14	1	0	1	15	1	16	31
01:00 PM	0	5	5	0	0	0	0	0	0	5
01:15 PM	0	3	3	0	0	0	1	0	1	4
01:30 PM	0	5	5	1	1	2	3	0	3	10
01:45 PM	0	2	2	0	1	1	1	1	2	5
Total	0	15	15	1	2	3	5	1	6	24
02:00 PM	0	4	4	1	1	2	0	0	0	6
02:15 PM	0	2	2	0	0	0	1	0	1	3
02:30 PM	0	4	4	0	0	0	0	0	0	4
02:45 PM	0	3	3	2	0	2	1	0	1	6
Total	0	13	13	3	1	4	2	0	2	19
03:00 PM	0	1	1	1	0	1	1	0	1	3
03:15 PM	0	0	0	1	0	1	4	0	4	5
03:30 PM	0	1	1	1	0	1	1	0	1	3
03:45 PM	0	4	4	0	0	0	0	0	0	4
Total	0	6	6	3	0	3	6	0	6	15
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	3	3	1	0	1	3	0	3	7
04:30 PM	0	0	0	0	0	0	1	0	1	1
04:45 PM	0	1	1	0	0	0	0	0	0	1
Total	0	4	4	1	0	1	4	0	4	9
05:00 PM	0	1	1	0	0	0	2	0	2	3
05:15 PM	0	1	1	0	0	0	2	0	2	3
05:30 PM	0	0	0	0	0	0	2	0	2	2
05:45 PM	0	1	1	0	0	0	2	0	2	3
Total	0	3	3	0	0	0	8	0	8	11
06:00 PM	0	1	1	0	0	0	3	0	3	4
06:15 PM	0	1	1	0	0	0	1	0	1	2
06:30 PM	0	0	0	0	0	0	1	0	1	1
06:45 PM	0	0	0	0	0	0	3	0	3	3
Total	0	2	2	0	0	0	8	0	8	10
07:00 PM	0	2	2	0	0	0	1	0	1	3
07:15 PM	0	0	0	0	0	0	2	0	2	2
07:30 PM	0	1	1	0	0	0	2	0	2	3
07:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	3	3	0	0	0	5	0	5	8

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018

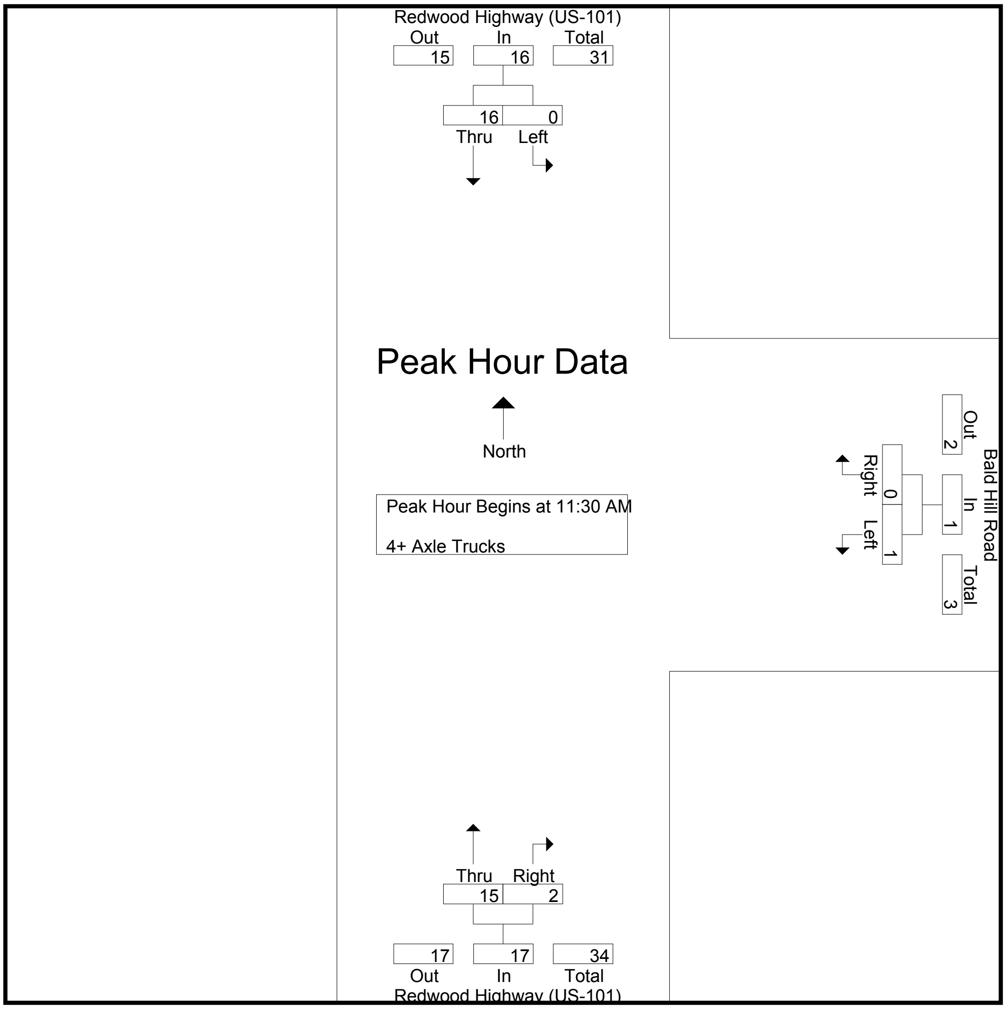
Groups Printed- 4+ Axle Trucks

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	1	0	1	1
08:15 PM	0	1	1	0	0	0	1	0	1	2
08:30 PM	0	1	1	0	0	0	1	0	1	2
08:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	2	2	0	0	0	3	0	3	5
09:00 PM	0	1	1	0	0	0	0	0	0	1
09:15 PM	0	0	0	0	0	0	1	0	1	1
09:30 PM	0	0	0	0	0	0	2	0	2	2
09:45 PM	0	0	0	0	0	0	1	0	1	1
Total	0	1	1	0	0	0	4	0	4	5
10:00 PM	0	2	2	0	0	0	0	0	0	2
10:15 PM	0	0	0	0	0	0	2	0	2	2
10:30 PM	0	0	0	0	0	0	2	0	2	2
10:45 PM	0	1	1	0	0	0	1	0	1	2
Total	0	3	3	0	0	0	5	0	5	8
11:00 PM	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	1	1	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	0	0	0	1
Grand Total	0	147	147	20	12	32	137	11	148	327
Apprch %	0	100		62.5	37.5		92.6	7.4		
Total %	0	45	45	6.1	3.7	9.8	41.9	3.4	45.3	

	Redwood Highway (US-101) Southbound			Bald Hill Road Westbound			Redwood Highway (US-101) Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:30 AM										
11:30 AM	0	3	3	**1**	0	**1**	2	**1**	3	7
11:45 AM	0	4	4	0	0	0	3	0	3	7
12:00 PM	0	**6**	**6**	0	0	0	**8**	0	**8**	**14**
12:15 PM	0	3	3	0	0	0	2	1	3	6
Total Volume	0	16	16	1	0	1	15	2	17	34
% App. Total	0	100		100	0		88.2	11.8		
PHF	.000	.667	.667	.250	.000	.250	.469	.500	.531	.607

City of Humboldt
N/S: Redwood Highway (US-101)
E/W: Bald Hill Road
Weather: Clear

File Name : Redwood Hwy_Bald Hill Rd_8-30-18
Site Code : 22318649
Start Date : 8/29/2018
Page No : 4



Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	11:30 AM			11:30 AM			11:30 AM		
+0 mins.	0	3	3	**1**	0	**1**	2	**1**	3
+15 mins.	0	4	4	0	0	0	3	0	3
+30 mins.	0	**6**	**6**	0	0	0	**8**	0	**8**
+45 mins.	0	3	3	0	0	0	2	1	3
Total Volume	0	16	16	1	0	1	15	2	17
% App. Total	0	100		100	0		88.2	11.8	
PHF	.000	.667	.667	.250	.000	.250	.469	.500	.531

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

M e m o r a n d u m

To: CHARLIE FIELDER
JANA HOLLIFIELD
MATT BRADY
MARK SUCHANEK

Date: February 3, 2014

File: Growth Factors

From: BRAD METTAM Brad Mettam
Deputy District Director,
Planning and Local Assistance

Subject: 2014 Growth Factors

Attached are the 2014 District 1 growth factor summary, the 2014 District Growth Factor Map, and a “Using D1 Growth Factors” tutorial.

Prior to 1984, Caltrans District 1 projected future traffic volumes based solely on historical growth. Future volumes were calculated using an annual percent increase that was derived from historical traffic volumes. We found that this method produced acceptable results in the short to mid-term, but due to compounding, long-range predictions (20 years or more) tended to be overestimated.

In 1984, in order to eliminate that long-range distortion noted above, we began calculating growth factors as a 20-year straight-line determinant. For example, a segment of highway with a growth factor of 1.4 is predicted to have a 40% increase in traffic over the next 20-years. Likewise, it is predicted to have a 20% increase over 10 years.

Historically, District staff has developed growth factors based on both projected travel trends and historical growth from two data sources—the “California Motor Vehicle Stock Travel and Fuel Forecast” (CMVSTAFF) and historical Average Vehicle Mile Traveled (AVMT) comparisons from “Traffic Volumes on the California State Highway System.” Since CMVSTAFF was not available for the 2014 growth factor update, county growth factor targets were developed based on California Air Resources Board traffic growth projections and historic traffic growth data.

Our growth factors are applied over highway segments that were determined using observed conditions; these segments vary in length, but they are not longer than fifty miles. Traffic volumes over segments are based on a calculated weighted average of volumes (Annual Average Daily Traffic) for the entire segment. While actual growth at the local level can vary considerably, we are looking at overall growth over the long-term. If more specific data or information are available for a particular location (actual counts, planned growth, etc.) it may be advisable to calculate a location-specific rate. However, for the purposes of facility design (20-year design-life) our generalized segment growth factors are appropriate. It should be noted that our growth factors forecast traffic growth only for the mainline (State Routes); local streets should be examined separately.

District planning staff reviews growth factors every two years, and typically revise them every two to four years. Growth factors were not updated for several years following 2006, since MVSTAFF data supported higher growth rates at a time when traffic counts were generally level or declining. The most recent MVSTAFF has been removed from the Division of Transportation Planning, Office of Transportation Forecasting and Analysis website, and they recommended using the use of the Air Resources Board EMFAC database as a substitute. Therefore, we based our 20-year District vehicle miles of travel target on ARB data. District staff would prefer to use county travel demand models to project traffic growth, or the MVSTAFF to develop growth factor targets, and we hope to do so in the future. However, neither of these data sources is currently supportable.

If you have any questions regarding the growth factors, please call Rex Jackman at (707) 445-6412 or Chris Dosch at (707) 441-4542.

Attachments:
2014 Growth Factor Summary
2014 Growth Factor Map
Using District 1 Growth Factors Tutorial

c: TROY ARSENEAU
DAVID MORGAN
JOHN CARSON
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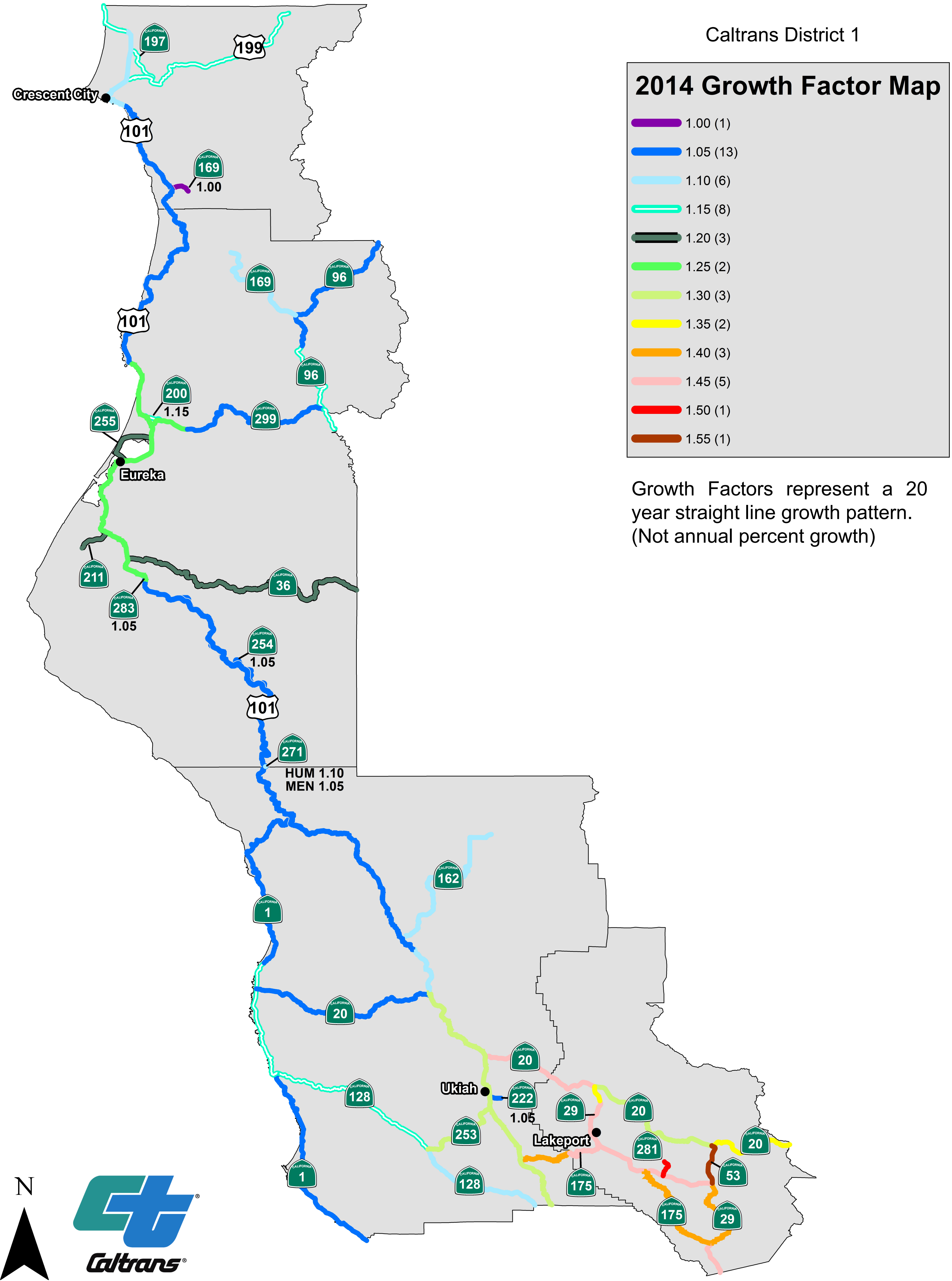
Caltrans District 1



Growth Factors represent a 20 year straight line growth pattern. (Not annual percent growth)

DISTRICT 1 - GROWTH FACTOR SUMMARY

20 YEAR GROWTH FACTORS

SEGMENT	2/2014 G.F.
MEN-1-0.00/40.27	1.05
MEN-1-40.27/64.86	1.15
MEN-1-64.86/105.57	1.05
MEN-20-0.00/33.16	1.05
MEN-20-33.22/44.11	1.45
LAK-20-0.00/8.34	1.45
LAK-20-8.34/31.62	1.30
LAK-20-31.62/46.48	1.35
LAK-29-0.00/5.81	1.45
LAK-29-5.81/20.31	1.40
LAK-29-20.31/48.40	1.45
LAK-29-48.40/52.54	1.35
HUM-36-0.00/45.68	1.20
LAK-53-0.00/7.45	1.55
HUM-96-0.00/16.00	1.15
HUM-96-16.00/44.98	1.05
MEN-101-0.10/47.27	1.30
MEN-101-47.27/55.90	1.10
MEN-101-55.90/104.15	1.05
HUM-101-0.00/51.84	1.05
HUM-101-51.84/100.71	1.25
HUM-101-100.71/137.14	1.05
DN-101-0.00/23.85	1.05
DN-101-23.85/39.98	1.10
DN-101-39.98/46.49	1.15
MEN-128-0.00/29.58	1.15
MEN-128-29.58/50.90	1.10
MEN-162-0.00/34.05	1.10
DN-169-0.0/3.52	1.00
HUM-169-13.20/33.84	1.10
MEN-175-0.00/9.85	1.40
LAK-175-0.00/8.19	1.45
LAK-175-8.25/28.04	1.40
DN-197-0.00/7.08	1.15
DN-199-0.51/36.41	1.15
HUM-200-0.00/2.68	1.15
HUM-211-73.20/79.16	1.20
MEN-222-0.00/2.15	1.05
MEN-253-0.00/17.18	1.30
HUM-254-0.00/46.53	1.05
HUM-255-0.0/8.80	1.20
MEN-271-0.0/22.72	1.05
HUM-271-0.00/0.31	1.10
LAK-281-14.00/17.00	1.50
HUM-283-0.00/0.36	1.05
HUM-299-0.00/5.93	1.25
HUM-299-5.93/38.83	1.05
HUM-299-38.83/43.04	1.15
DISTRICT GROWTH FACTOR (Weighted Average)	1.24

Using District 1 Growth Factors

- To project volumes **<u>20 years</u>** into the future, multiply the base year traffic volume by the growth factor (GF).

  Formula: (GF)*(Base Year Volume) = Projected Volume

  Example: The base year volume (2012) is 1500 AADT. The 20-year growth factor for that segment of highway is 1.3. What is the 2032 volume?

  (1.3)*(1500) = 1950 The projected 2032 traffic volume (AADT) for this segment is 1950.

- To project volumes **<u>Less than or greater than 20 years</u>** into the future, use the following formula:

  Formula: $[1+\frac{(\mathrm{GF}-1)*(\#\text{ of years into future})}{20}] * (\text{starting volume}) = \text{Projected Volume}$

  Example: The Base year volume in 2012 is 700 AADT. The 20- year growth factor is 1.4.

  A) What is the volume in 27 years?

  $\left[1+\left(\frac{(1.4-1)*(27)}{20}\right)\right] * (700) = 1078$ The projected volume in 2039 is 1078.

  B) What is the volume in 7 years?

  $\left[1+\left(\frac{(1.4-1)*(7)}{20}\right)\right] * (700) = 798$ The projected volume in 2019 is 798.

Appendix B – Existing Conditions Intersection Level of Service Calculations and Queuing Analysis

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱		↰↑
Traffic Vol, veh/h	10	18	217	19	11	202
Future Vol, veh/h	10	18	217	19	11	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	10	-	270	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	70	70	70	70
Heavy Vehicles, %	2	2	12	12	12	12
Mvmt Flow	13	23	310	27	16	289

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	631	310	0	-	310	0
Stage 1	310	-	-	-	-	-
Stage 2	321	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.22	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.308	-
Pot Cap-1 Maneuver	445	730	-	0	1196	-
Stage 1	744	-	-	0	-	-
Stage 2	735	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	438	730	-	-	1196	-
Mov Cap-2 Maneuver	438	-	-	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	735	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	438	730	1196	-
HCM Lane V/C Ratio	-	0.029	0.032	0.013	-
HCM Control Delay (s)	-	13.5	10.1	8.1	0
HCM Lane LOS	-	B	B	A	A
HCM 95th %tile Q(veh)	-	0.1	0.1	0	-

Intersection: 1: US 101 & Bald Hills Road

Movement	WB	WB	SB
Directions Served	L	R	LT
Maximum Queue (ft)	28	30	52
Average Queue (ft)	9	17	3
95th Queue (ft)	29	41	21
Link Distance (ft)	753		855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		10	
Storage Blk Time (%)	2	2	
Queuing Penalty (veh)	0	0	

Network Summary

Network wide Queuing Penalty: 1

Appendix C – Existing Plus Project Intersection Level of Service Calculations and Queuing Analysis

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱		↰↑
Traffic Vol, veh/h	28	35	217	35	27	202
Future Vol, veh/h	28	35	217	35	27	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	10	-	270	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	70	70	70	70
Heavy Vehicles, %	2	2	12	12	12	12
Mvmt Flow	36	45	310	50	39	289

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	677	310	0	-	310	0
Stage 1	310	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.22	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.308	-
Pot Cap-1 Maneuver	418	730	-	0	1196	-
Stage 1	744	-	-	0	-	-
Stage 2	701	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	402	730	-	-	1196	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	701	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	402	730	1196	-
HCM Lane V/C Ratio	-	0.089	0.061	0.032	-
HCM Control Delay (s)	-	14.8	10.3	8.1	0
HCM Lane LOS	-	B	B	A	A
HCM 95th %tile Q(veh)	-	0.3	0.2	0.1	-

Intersection: 1: US 101 & Bald Hills Road

Movement	WB	WB	SB
Directions Served	L	R	LT
Maximum Queue (ft)	63	55	65
Average Queue (ft)	21	25	8
95th Queue (ft)	49	49	36
Link Distance (ft)	753		855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		10	
Storage Blk Time (%)	6	3	
Queuing Penalty (veh)	3	1	

Network Summary

Network wide Queuing Penalty: 4

Appendix D – Cumulative Conditions (2038) Intersection Level of Service Calculations and Queuing Analysis

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱		↰↑
Traffic Vol, veh/h	10	18	217	19	11	202
Future Vol, veh/h	10	18	217	19	11	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	10	-	270	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	70	70	70	70
Heavy Vehicles, %	2	2	12	12	12	12
Mvmt Flow	13	23	326	29	17	303

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	663	326	0	-	326	0
Stage 1	326	-	-	-	-	-
Stage 2	337	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.22	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.308	-
Pot Cap-1 Maneuver	426	715	-	0	1179	-
Stage 1	731	-	-	0	-	-
Stage 2	723	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	419	715	-	-	1179	-
Mov Cap-2 Maneuver	419	-	-	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.5	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	419	715	1179	-
HCM Lane V/C Ratio	-	0.031	0.032	0.014	-
HCM Control Delay (s)	-	13.9	10.2	8.1	0
HCM Lane LOS	-	B	B	A	A
HCM 95th %tile Q(veh)	-	0.1	0.1	0	-

Intersection: 1: US 101 & Bald Hills Road

Movement	WB	WB	SB
Directions Served	L	R	LT
Maximum Queue (ft)	36	30	59
Average Queue (ft)	9	17	6
95th Queue (ft)	31	40	29
Link Distance (ft)	753		855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		10	
Storage Blk Time (%)	2	2	
Queuing Penalty (veh)	0	0	

Network Summary

Network wide Queuing Penalty: 1

Appendix E – Cumulative Conditions Plus Project Intersection Level of Service Calculations and Queuing Analysis

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱		↰
Traffic Vol, veh/h	28	35	228	36	28	212
Future Vol, veh/h	28	35	228	36	28	212
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	10	-	270	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	70	70	70	70
Heavy Vehicles, %	2	2	12	12	12	12
Mvmt Flow	36	45	326	51	40	303

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	709	326	0	-	326	0
Stage 1	326	-	-	-	-	-
Stage 2	383	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.22	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.308	-
Pot Cap-1 Maneuver	401	715	-	0	1179	-
Stage 1	731	-	-	0	-	-
Stage 2	689	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	385	715	-	-	1179	-
Mov Cap-2 Maneuver	385	-	-	-	-	-
Stage 1	701	-	-	-	-	-
Stage 2	689	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	12.6		0		1	
HCM LOS	B					

Minor Lane/Major Mvmt		NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)		-	385	715	1179	-
HCM Lane V/C Ratio		-	0.093	0.063	0.034	-
HCM Control Delay (s)		-	15.3	10.4	8.2	0
HCM Lane LOS		-	C	B	A	A
HCM 95th %tile Q(veh)		-	0.3	0.2	0.1	-

Queuing and Blocking Report
Cumulative + Project

05/21/2019

Intersection: 1: US 101 & Bald Hills Road

Movement	WB	WB	NB	SB
Directions Served	L	R	R	LT
Maximum Queue (ft)	63	55	6	68
Average Queue (ft)	22	24	0	10
95th Queue (ft)	49	49	5	39
Link Distance (ft)	753			855
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		10	270	
Storage Blk Time (%)	6	3		
Queuing Penalty (veh)	3	1		

Network Summary

Network wide Queuing Penalty: 4

Appendix F – Signal Warrant Analysis

Conditions	Part A				Part B		
	1	2	3	Met (Y/N) (all 3 conditions must be met)	Two+ Lanes	One Lane	Met (Y/N) (Figure 4C-3)
Intersection	Total Delay (veh-hrs) (≥4 veh-hrs?)	Highest Minor Appr. Volume (veh) (≥ 100 vph?)	Total Entering Volume (veh) (entering volume ≥ 800 vph?)		Both Approaches - Major Street (veh)	Higher Approach - Minor Street (veh)	
Existing Condition Scenario							
No. 1 - Bald Hills Rd. / Highway 101	0.09	28	477	N	449	28	N
Existing + Project Condition Scenario							
No. 1 - Bald Hills Rd. / Highway 101	0.22	63	544	N	481	63	N
Cumulative (2038) Condition Scenario							
No. 1 - Bald Hills Rd. / Highway 101	0.09	28	500	N	472	28	N
Cumulative (2038) + Project Condition Scenario							
No. 1 - Bald Hills Rd. / Highway 101	0.22	63	567	N	504	63	N

Appendix G – Harmelink Model Calculations

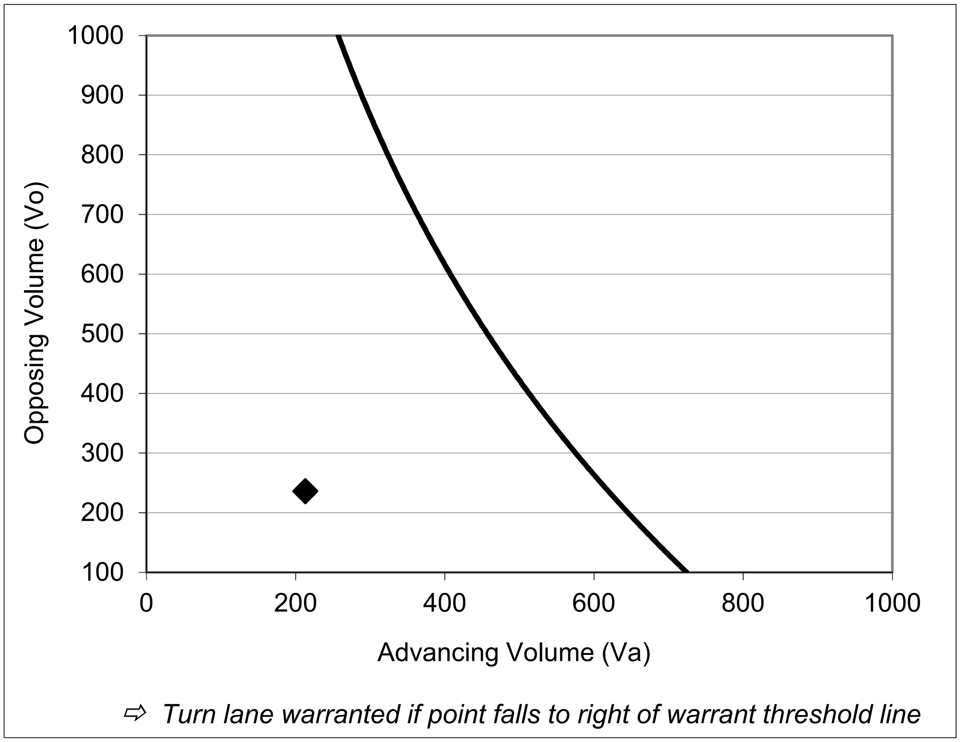
LEFT TURN LANE
WARRANT ANALYSIS

Study Intersection	**US 101 and Bald Hills Road**
Study Scenario	**Existing Condition**

INPUT		
Advancing Volume	Va	213
Opposing Volume	Vo	236
Left Turn Volume	Vl	11
Speed	SP	55 MPH
Two-Lane Undivided Highway		

Percentage Left Turns	%lt	5.2 %
Advancing Volume Threshold	AV	619

If AV>Va then warrant is met



⇨ *Turn lane warranted if point falls to right of warrant threshold line*

▬ Warrant Threshold for 5.2% left turns and speed of 55

◆ Study Intersection

Left Turn Lane Warranted	**NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997. The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

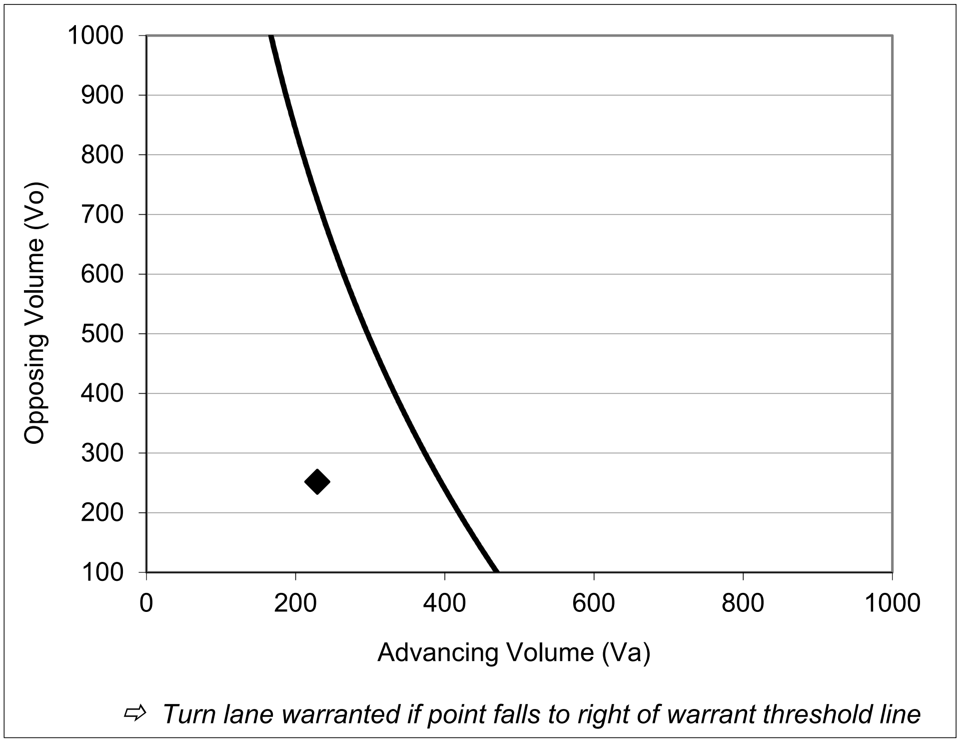
LEFT TURN LANE
WARRANT ANALYSIS

Study Intersection	**US 101 and Bald Hills Road**
Study Scenario	**Existing + Project Condition**

INPUT		
Advancing Volume	Va	229
Opposing Volume	Vo	252
Left Turn Volume	Vl	27
Speed	SP	55 MPH
Two-Lane Undivided Highway		

Percentage Left Turns	%lt	11.8 %
Advancing Volume Threshold	AV	395

If AV>Va then warrant is met



⇨ *Turn lane warranted if point falls to right of warrant threshold line*

- ▬ Warrant Threshold for 11.8% left turns and speed of 55
- ◆ Study Intersection

Left Turn Lane Warranted	**NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997. The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

LEFT TURN LANE
WARRANT ANALYSIS

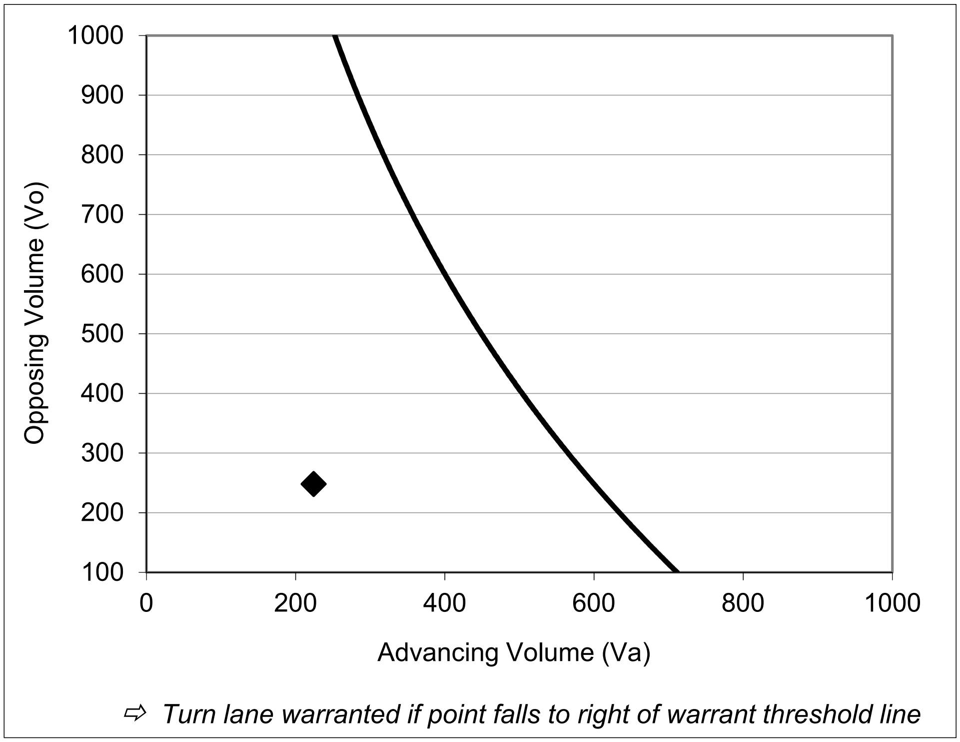
Study Intersection **US 101 and Bald Hills Road**

Study Scenario **Cumulative Condition**

INPUT		
Advancing Volume	Va	224
Opposing Volume	Vo	248
Left Turn Volume	Vl	12
Speed	SP	55 MPH
Two-Lane Undivided Highway		

Percentage Left Turns	%lt	5.4 %
Advancing Volume Threshold	AV	600

If AV>Va then warrant is met



⇨ *Turn lane warranted if point falls to right of warrant threshold line*

▬ Warrant Threshold for 5.4% left turns and speed of 55
◆ Study Intersection

Left Turn Lane Warranted **NO**

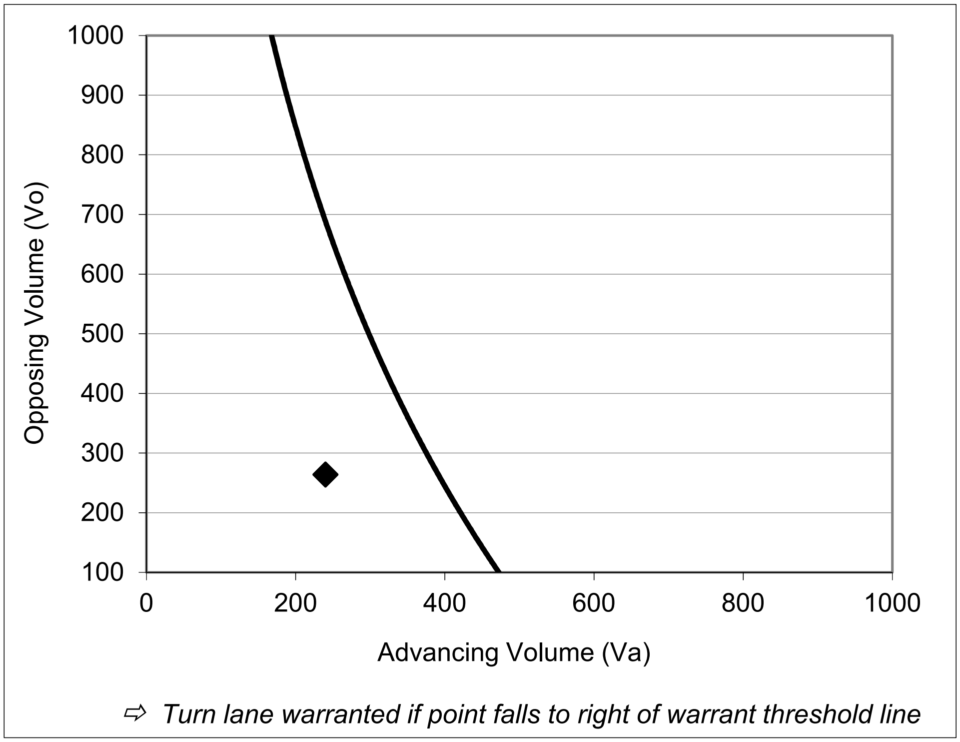
Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997. The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

LEFT TURN LANE
WARRANT ANALYSIS

Study Intersection	**US 101 and Bald Hills Road**
Study Scenario	**Cumulative + Project Condition**

INPUT		
Advancing Volume	Va	240
Opposing Volume	Vo	264
Left Turn Volume	Vl	28
Speed	SP	55 MPH
Two-Lane Undivided Highway		

Percentage Left Turns	%lt	11.7 %
Advancing Volume Threshold	AV	391
If AV>Va then warrant is met		



Left Turn Lane Warranted	**NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997. The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

Appendix H – CalEEMod VMT Analysis Results

Redwood National and State Park Vistor Center Project - Brush Dance Days

Humboldt County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	40.00	Acre	40.00	1,742,400.00	0
Health Club	5.85	1000sqft	0.13	5,847.00	0
User Defined Recreational	1.00	User Defined Unit	0.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	103
Climate Zone	1			**Operational Year**	2024
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - VMT Analysis Only

Land Use - From TIS

Construction Phase - Operational VMT Only

Vehicle Trips - Trip Gen from TIS, 100% Primary, 171 mi C-C, 20 mi C-NW

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblVehicleTrips	CC_TL	6.60	171.00

tblVehicleTrips	CC_TL	6.60	171.00
tblVehicleTrips	CC_TL	6.60	171.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	CNW_TL	6.60	20.00
tblVehicleTrips	CNW_TL	6.60	20.00
tblVehicleTrips	CNW_TL	6.60	20.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	DV_TP	39.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	9.00	0.00
tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	PR_TP	52.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	ST_TR	22.75	2.85
tblVehicleTrips	ST_TR	20.87	37.38
tblVehicleTrips	ST_TR	0.00	58.82
tblVehicleTrips	SU_TR	16.74	2.85
tblVehicleTrips	SU_TR	26.73	37.38
tblVehicleTrips	SU_TR	0.00	58.82
tblVehicleTrips	WD_TR	1.89	2.85
tblVehicleTrips	WD_TR	32.93	37.38
tblVehicleTrips	WD_TR	0.00	58.82

2.0 Emissions Summary

2.1 Overall Construction

Not Applicable

2.2 Overall Operational

Not Applicable

3.0 Construction Detail

Not Applicable

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	114.00	114.00	114.00	3,764,974	3,764,974
Health Club	218.56	218.56	218.56	9,220,184	9,220,184
User Defined Recreational	58.82	58.82	58.82	3,661,192	3,661,192
Total	391.38	391.38	391.38	16,646,350	16,646,350

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	14.70	171.00	20.00	33.00	48.00	19.00	100	0	0
Health Club	14.70	171.00	20.00	16.90	64.10	19.00	100	0	0
User Defined Recreational	14.70	171.00	20.00	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.506370	0.040262	0.210861	0.130062	0.033832	0.005682	0.014144	0.046470	0.003574	0.001376	0.005181	0.001483	0.000702
Health Club	0.506370	0.040262	0.210861	0.130062	0.033832	0.005682	0.014144	0.046470	0.003574	0.001376	0.005181	0.001483	0.000702
User Defined Recreational	0.506370	0.040262	0.210861	0.130062	0.033832	0.005682	0.014144	0.046470	0.003574	0.001376	0.005181	0.001483	0.000702

Appendix I – Previous Studies

Traffic Impact Study

REDWOOD NATIONAL PARK LODGE
APNs 520-012-13 and 519-231-18

April 9, 2012

Prepared for:
Green Diamond Resource Company

LACO Project No. 7291.08

LACO

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TRAFFIC IMPACT STUDY

Prepared for:
REDWOOD NATIONAL PARK LODGE
Green Diamond Resource Company - Orick Mill Site Entitlements
Orick, California 95555

Assessor's Parcel Numbers 520-012-13 and 519-231-18

Prepared by:
LACO Associates
21 W. 4th Street
Eureka, California 95501

Netra Khatri, RCE 75428, Exp. 12/31/13

Travis Moe, EIT 139578

April 9, 2012
LACO Project No. 7291.08

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INTRODUCTION AND STUDY PARAMETERS

Introduction

This Report presents an analysis of the potential traffic impacts that will be associated with the proposed Redwood National Park Lodge at the former Orick Mill site off Highway 101 in Orick, Humboldt County, California.

This Traffic Study was completed in accordance with the guidelines in “Caltrans Guide for the Preparation of Traffic Impact Studies”, December 2002. The analysis provides an evaluation of operating levels under existing and existing-plus-project conditions. The purpose of this Traffic Study is to provide the California Department of Transportation (Caltrans) and County of Humboldt with data that they can use to make informed decisions regarding the potential traffic impacts of the proposed project, and any associated improvements that would be required in order to mitigate these impacts to a level of insignificance as defined in the “Caltrans Guide for the Preparation of Traffic Impact Studies”, Humboldt County’s General Plan or other policies.

Traffic impacts are evaluated by determining the number of trips the new uses would be expected to generate, and distributing the new trips to the surrounding street system, based on existing travel patterns or anticipated travel patterns specific to the proposed projects, then analyzing the impact the new traffic is expected to have on critical intersections included in the study.

Scope of Services

Presented below is the scope of services for the traffic analysis for the proposed project:

1. Develop trip generation estimates for the proposed project;
2. Document the geometry (lane width, sight distance, shoulders, etc.) of the study intersections;
3. Calculate before-project and after-project Level of Service (LOS) at the intersection (alternative configurations may be considered for the intersections, which may result in several possible results);
4. Assess traffic impacts both quantitatively (LOS) and qualitatively (safety, pedestrian and bicycle considerations, compliance with county, state, and federal standards, etc.) at the intersection;
5. Recommend improvements, if any, based on the findings of the analysis; and
6. Meet with Caltrans to review the findings and preliminary recommendations of the draft report.

Project Study Area

The approximate location of the study area is presented in Figure 1 and Figure 2. The proposed project consists of a total of 247 camping and RV sites with associated restroom and parking facilities. Specifically, 34 platform tent sites, 53 tent camping sites, 37 cottages, and 123 RV sites will be included in the project. The site will also contain a guest lodge, employee dormitory, general store, restaurant and recreation building intended to serve the patrons of the park. The

Conceptual Site Plan of the proposed project with number of units and square footage is presented in Appendix A. The project will include the construction of roads, parking facility, and utilities for the development. In particular, the project will result in the improvement and extension of the south entry drive (along Bald Hills Road), and the construction of other interior roads, walkways, and landscaping. Pedestrian and bicycle access within the project site will be provided to the public via paved roads and shoulders.

After analyzing the existing road and intersection geometry in the vicinity of the project area, it was determined that the traffic analysis study area would consist of the following intersections:

- Intersection #1, Bald Hills Road with Project Main Entrance
- Intersection #2, Highway 101 with Bald Hills Road

In addition to the above two intersections, there exists an intersection 0.6 miles north of Bald Hills Road on Highway 101, which was determined to be not feasible for the project main entrance due to intersection geometry deficiencies, especially the sight distance (Appendix B).

Methodologies

LOS is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, LOS A represents free flow conditions and LOS F represents forced flow or breakdown conditions. The LOS designation is generally indicated by a measure of delay.

The study intersections were analyzed using the unsignalized intersection capacity method. This method determines a LOS for each minor turning movement by estimating the level of average delay in seconds per vehicle. The movement with the highest level of delay is presented as the Worst Case LOS. The through movements on an un-controlled main street are assumed to operate at free flow and a LOS A. The project study intersections were analyzed as a Two-Way Stop Control (TWSC) intersection.

A more complete description of the study intersections is included in the next section. LOS criteria for un-signalized intersections are shown in Table 1.

Table 1: LOS Criteria for Unsignalized Intersection

Level of Service	**Delay Range (**seconds/vehicle)
A	≤ 10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Source: Highway Capacity, Transportation Research Board, 2000

Caltrans Guide for the Preparation of Traffic Impact Studies, December 2002 states that:

> *Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.*

For the purposes of this traffic evaluation, LOS C operation was assumed to be the minimum acceptable for individual movements at the study intersections.

EXISTING CONDITIONS

Description of Study Area

As stated earlier in the report, the study area consists of two intersections at the Highway 101 crossing with Bald Hills Road and the project main entrance crossing with Bald Hills Road. The location of these intersections and their lane configurations are shown in Figure 2 and Figure 3.

Intersection #1 is the southernmost project entrance located on Bald Hills Road, approximately ¼ mile east of Highway 101. The project access is a three-way intersection with no posted stop controls. The project entrance has an approximately 68-foot apron flush with Bald Hills Road and tapers back to a 41-foot wide gated entrance to the former mill site. There is no posted maximum speed limit at this two-way entry drive. At this location, Bald Hills Road has two 12-foot lanes with a 1-foot shoulder in either direction. The posted speed limit on Bald Hills Road in the vicinity of the project area is 35 miles per hour (mph).

Intersection #2 is the Bald Hills Road access point located along Highway 101 approximately 1.1 miles north of the Redwood Creek Bridge in Orick California. The access point is characterized by a separate 12-foot wide right-hand turn lane (approximately 240 feet long) for northbound traffic on Highway 101 turning right on Bald Hills Road. There is no dedicated left turn pocket for southbound traffic on Highway 101 turning left on to Bald Hills Road. The intersection is a three-way intersection with stop controls for westbound traffic, including a stop bar and signage. The apron of Bald Hills Road is 65 feet and tapers back to 31 feet wide, before crossing a small overpass bridge and further narrowing to 24 feet. There is currently no posted maximum speed limit at this intersection. At this location, Highway 101 has two 12-foot wide lanes with approximately 2.5 foot shoulders in both directions. In addition, there exists a 240-foot long, 12-foot wide shoulder parallel to a 12-foot right-hand turn lane. The posted maximum speed limit at this stretch of Highway 101 is 55 mph.

Sight distances at the Highway 101/Bald Hills Road intersection, as well as the Bald Hills/project entrance, are more than the minimum required by American Association of State Highway and Transportation Officials (AASHTO) guidelines.

Existing street widths, speed limits, and minimum required sight distances at the intersection are presented in Table 2.

Table 2: Street Widths, Speed Limits, and Minimum Required Sight Distances at the Roads under Consideration

Roadway Name	Speed Limit (miles/hour)	Minimum Recommended Sight Distance (feet)	Actual Sight Distance (feet)	Roadway Width (feet)	Shoulder Width (feet)
Highway 101 @ Bald Hills Road	55	610	>610	36	3-10
Bald Hills Road @ project entrance	35	250	>250	24	1

Note: Recommended sight distances are from the 2001 AASHTO A Policy on Geometric Design of Highways and Streets.

Existing Traffic Volumes and Level of Service

Daily peak-hour traffic volume on Bald Hills Road was obtained by the traffic counters installed on Bald Hills Road in front of the project main entrance for a one week duration (Feb 10, 2012 – Feb 17, 2012). A summary of Traffic Count Data is presented in Appendix C. This traffic data was compared to the traffic data collected by the County in April-May 2006. As the project area is located in the vicinity of Redwood National Park, it is anticipated that the traffic volumes would be higher in summer period (May-August). Therefore it was assumed that the data collected by the County represented more accurate peak-hour volumes and was use for the LOS analysis.

Daily peak-hour traffic volume on Highway 101 in the vicinity of the project was obtained from 2010 traffic volume data provided by the Traffic Data Branch of Caltrans and was used for the project as existing traffic volume. A summary of traffic volumes at Highway 101 is presented in Table 3. As only peak-hour data was available for Highway 101, this was used for both AM and PM peak-hour LOS calculations.

Table 3: Summary of Existing Traffic Volumes on Highway 101 at Post Mile 10.87

Description	Southbound Peak-hour	Southbound Peak Month	Southbound AADT	Northbound Peak-hour	Northbound Peak Month	Northbound AADT
Bald Hills Road	540	5100	3700	540	5100	3700

LOS calculation summaries for the existing traffic patterns for the study area intersections are shown in Table 4, with copies of the calculations generated using HCS+ provided in Appendix D. Each intersection directional movements are represented in the tables below, and are accompanied by the corresponding direction delay and LOS. Northbound traffic on Highway 101 turning right into Bald Hills Road operates under free-flow conditions as this movement is not restricted by signage nor do northbound travelers turning right need to yield to opposing traffic. Since the intersection is a three-way intersection, there is no associated northbound left turning movement, southbound right turning movement, or westbound through movement.

Table 4: Summary of Intersection LOS for Existing AM and PM Peak-hour Traffic Conditions

Time Period	Study Intersection	US 101 Northbound		US 101 Southbound		Bald Hills Rd. Eastbound		Bald Hills Rd. Westbound	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	-	-	7.4	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	8.8	A	-	-	17.4	C
PM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	-	-	7.4	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	8.9	A	-	-	18.5	C

Notes: Delay is in average number of seconds per vehicle
LOS = Level of Service

Existing Pedestrian/Bicycle Conditions

The project intersections do not have crosswalks or any dedicated bike lanes on any of the major or minor streets within the study area. The shoulders on Highway 101 are approximately 2.5 feet and are used by bicyclists and pedestrians. The shoulders on Bald Hills Road are approximately 1-foot; however, they are not paved. There are no sidewalks on Highway 101 or Bald Hills Road. The existing trails in the vicinity of the project are depicted in Appendix E.

No pedestrian or bicycle traffic was observed during the field observations on February 10, 2012. Due to the scenic nature of the area, an assumed value of three bicyclists/pedestrians per peak-hour will be used at the study intersections.

Accidents/Collision Log

Accident/collision information (07/10/99-11/1009) within the vicinity of the study area was obtained from the California Highway Patrol-Humboldt Area (Michael Campbell). The collision data showed that there were 20 filed traffic accidents (two/year) within the project vicinity during this time frame. Detailed Accident Log information is presented in Appendix F of this report. The collision descriptions do not precisely identify the study intersections; rather, they identify the nearest cross street.

ANTICIPATED EXISTING-PLUS-PROJECT CONDITIONS

Project Trip Generation and Distribution

Vehicle trips generated by the proposed projects were calculated using *Trip Generation*, 7th Edition, Institute of Transportation Engineers (ITE), 2003. A vehicle trip is defined as a single or one-direction vehicle movement with either the origin or the destination inside the project area. This publication is a standard reference used by jurisdictions throughout the country, and is based on actual trip generation studies performed at numerous locations in areas of varied population. It was assumed that the proposed campground and RV sites are best represented by the "Campground/RV Park" land use (ITE LU # 416), and lodge guest and employee dormitory is best represented by the "Resort Hotel" land use (ITE LU # 330).

The trip distribution characteristics for the study intersection are calculated based on existing travel patterns along the adjacent stretch of Highway 101 and Bald Hills Road. The existing peak-hour traffic distribution at Intersection #1 is approximately 50 percent eastbound and 50 percent westbound; however, we anticipate this distribution may not remain the same after the project. Therefore, three scenarios are presented in the below section, one assuming that the peak-hour traffic will distribute to existing travel pattern (50-50-split), second assuming that project peak-hour traffic will distribute 40 percent eastbound and 60 percent westbound, and third assuming that project peak-hour traffic will distribute 30 percent eastbound and 70 percent west bound.

The existing peak-hour trip distribution at Intersection #2 is approximately 50 percent northbound and 50 percent southbound and we anticipate this distribution will remain the same after the project; however, the volume of peak-hour traffic and LOS at this intersection will be influenced by the trip distribution at Intersection #1.

The LOS results for all three scenarios at both the intersections are presented in the below section, and the results of the project trip generation and associated movements of these trips to and from the project are depicted in Appendix G.

Existing-Plus-Project Traffic Conditions and Level of Service

This traffic analysis accounts for pedestrian traffic, heavy vehicle traffic (trucks and RVs), and approximate road grades. Considering that the vast majority of the area surrounding the site is Redwood National and State Park land, it is anticipated that there will be no major development in the future in the vicinity of the project area that will impact the traffic at the project intersections.

LOS calculation summaries for the existing-plus-project condition for the study intersections with traffic distribution of 50-50-split at the project main entrance are depicted in Table 5, with copies of the calculations generated by HCS+ provided in Appendix D. The peak-hour traffic volumes are depicted on Figure 2 and Figure 3.

Table 5: Summary of Intersection LOS for Existing Plus Project AM and PM Peak-hour Traffic Conditions with 50-50 Split at the Project Entrance

Time Period	Study Intersection	US 101 Northbound		US 101 Southbound		Bald Hills Rd. Eastbound		Bald Hills Rd. Westbound	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
AM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	9.2	A	7.5	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	9	A	-	-	19.5	C
PM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	10.4	B	7.9	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	9.3	A	-	-	23.6	C

Notes: Delay is in average number of seconds per vehicle
LOS = Level of Service

Results show that, for the daily AM and PM peak-hour LOS for all traffic movement remains unchanged. However, maximum drop in delay of 2.1 seconds for the AM period was observed for the westbound traffic at Intersection #2. The maximum drop in delay of 5.1 seconds for the PM period was observed for the westbound traffic at Intersection #2.

LOS calculation summaries for the existing-plus-project condition for the study intersections with traffic distribution of 60-40-split at the project main entrance are depicted in Table 6, with copies of the calculations generated by HCS+ provided in Appendix D. The peak-hour traffic volumes are depicted on Figure 4 and Figure 5.

Table 6: Summary of Intersection LOS for Existing Plus Project AM and PM Peak-hour Traffic Conditions with 60-40 Split at the Project Entrance

Time Period	Study Intersection	US 101 Northbound		US 101 Southbound		Bald Hills Rd. Eastbound		Bald Hills Rd. Westbound	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
AM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	9.4	A	7.5	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	9	A	-	-	19.9	C
PM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	10.2	B	7.8	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	9.4	A	-	-	25.1	D

Notes: Delay is in average number of seconds per vehicle
LOS = Level of Service

Results show that, for the daily AM and PM peak-hour LOS for all traffic movements remains unchanged except for PM period westbound movement where LOS drops from C to D with a delay of 6.6 seconds.

LOS calculation summaries for the existing-plus-project condition for the study intersections with traffic distribution of 70-30 split at the project main entrance are depicted in Table 7, with copies of the calculations generated by HCS+ provided in Appendix D. The peak-hour traffic volumes are depicted on Figure 6 and Figure 7.

Table 7: Summary of Intersection LOS for Existing-Plus-Project AM and PM Peak-hour Traffic Conditions with 70-30 Split at the Project Entrance

Time Period	Study Intersection	US 101 Northbound		US 101 Southbound		Bald Hills Rd. Eastbound		Bald Hills Rd. Westbound	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	9	A	7.5	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	9	A	-	-	20.4	C
PM	Project Entrance and Bald Hills Road (Intersection # 1)	-	-	10	B	7.8	A	-	-
	US 101 and Bald Hills Road (Intersection #2)	-	-	9.5	A	-	-	27.1	D

Notes: Delay is in average number of seconds per vehicle
LOS = Level of Service

Results show that, for the daily AM and PM peak-hour LOS for all traffic movement remains unchanged, except for PM period westbound movement where LOS drops from C to D with a delay of 8.6 seconds.

Existing-Plus-Project Pedestrian/Bicycle Conditions

The proposed development projects will result in an unquantified increase in pedestrian and bicycle traffic. The existing width of the shoulders on Highway 101 and Bald Hills Road appear less than adequate for cyclists and pedestrians generated from the project. The project intends to connect the existing trails in the vicinity of the project with a project multipurpose path in such a manner that, pedestrians and bike riders from the project can go to Lost Man Trail and Redwood Creek Trail without going to Highway 101.

CONCLUSIONS AND RECOMMENDATIONS

At Intersection #1, the LOS analysis for the daily peak-hour shows that the LOS will remain within the acceptable limit of C for existing-plus-proposed project traffic volumes for all three scenarios (50-50, 60-40, and 73-30 splits). Comparing Tables 4 with 5, 6, and 7, we conclude that there is only a slight increase in average delay at the intersection, with the largest increase in delay totaling 0.5 seconds for the eastbound traffic for 50-50 split. The project will add southbound delays at Intersection #1; however, these delays and associated LOS are within minimum acceptable limits. Adequate sight distance in both directions (east and west) is available to vehicles exiting the project site, though there is currently no stop controls in place.

At Intersection #2, the LOS analysis for the daily peak-hour for 50-50 split at the project entrance show that the LOS will remain within the acceptable limit of C for existing-plus-proposed project traffic volumes. Comparing Tables 4 and 5, we conclude that there is only a slight increase in average delay at the intersection, with the largest increase in delay totaling 5.1 seconds for the westbound traffic for PM period.

At Intersection #2, the LOS analysis for the daily peak-hour for 60-40 split at the project entrance show that the LOS will remain within acceptable limit of C for existing-plus-proposed project traffic volumes, except for westbound PM period movement, where LOS drops from C to D. Comparing Tables 4 and 6, we conclude that there is a slight increase in average delay at the intersection, with the largest increase in delay totaling 8.6 seconds for the westbound traffic for PM period.

At Intersection #2, the LOS analysis for the daily peak-hour for 70-30 split at the project entrance show that the LOS will remain within acceptable limit of C for existing-plus-proposed project traffic volumes, except for westbound PM period movement, where LOS drops from C to D. Comparing Tables 4 and 7, we conclude that there is a slight increase in average delay at the intersection, with the largest increase in delay totaling 6.6 seconds for the westbound traffic for PM period.

Based on the above discussion, we recommend the following improvements be completed before construction of the project:

- The geometry of the access road to the project and interior roads should be designed for California Legal Design Vehicle (CLDV 50-ft radius) as described in Caltrans Highway Design Manual 2009. The existing width at the project entrance is adequate to accommodate CLDV 50- ft radius. A sketch of proposed improvements and lane configuration at Intersection #1 is presented in Appendix C.
- If the project site is developed with anything other than described in this document, further evaluation of the study intersection will need to take place.
- Convert the existing logging road north of the project (east of Hwy 101) to a multipurpose path (bike and pedestrian use), which will connect the project to Berry Glenn on north, and ultimately to the Lost man Trail without using Highway 101. A sketch of connection to existing trails to the project is presented in Appendix H.
- Stripe a “ladder” crosswalk marking and install pedestrian crossing symbol (MUTCD W11-2 and W16-7P) approximately 600 feet east of project main entrance to connect the project multi-purpose path to existing Redwood Creek Trail.
- With consultation with the Caltrans and Humboldt County Road department install MUTCD signage “SHARE THE ROAD” (W11-1 and W16-1) in the vicinity of the project on Highway 101 and Bald Hills Road.

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A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2001

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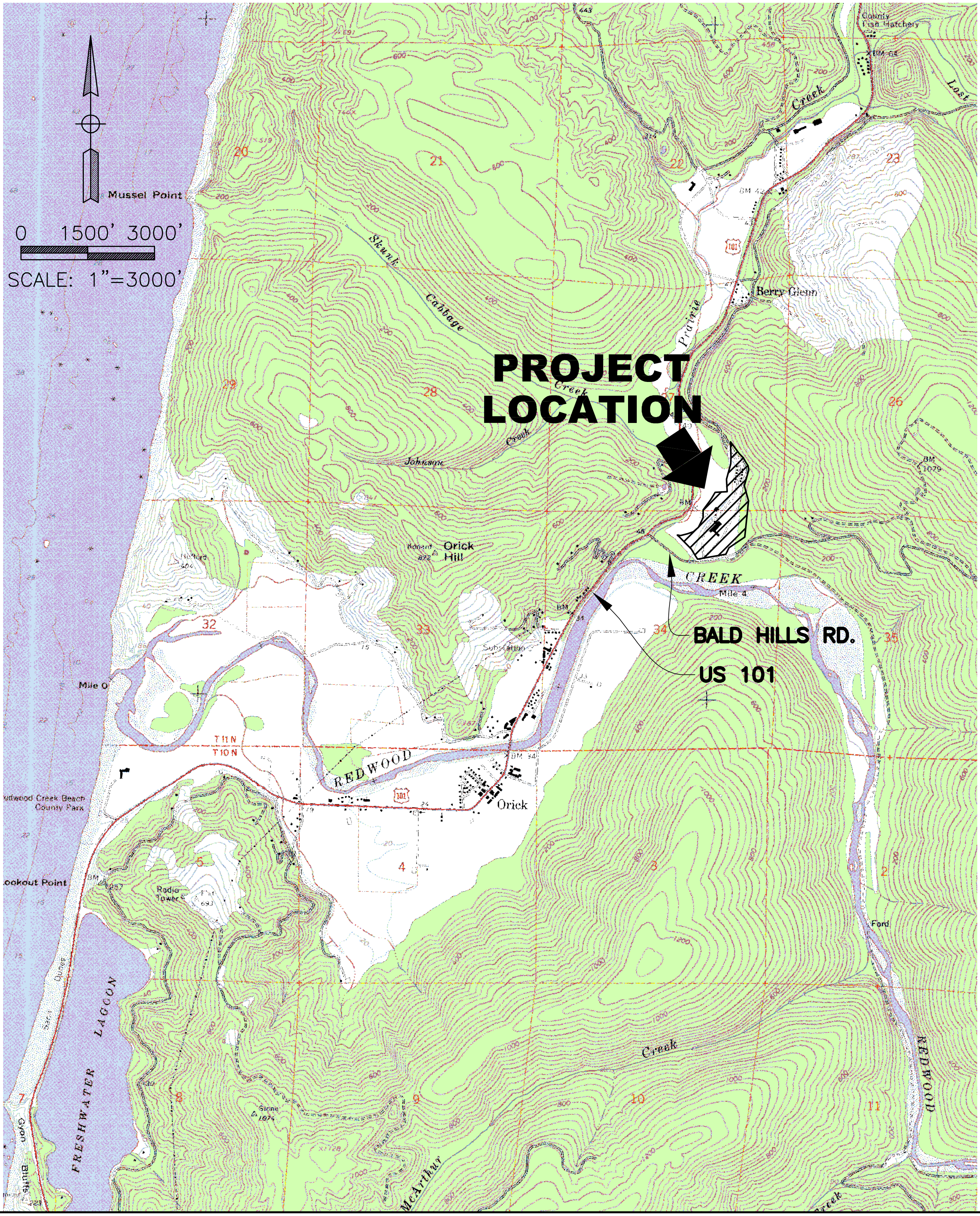
PROJECT	ORICK MILL SITE	BY	TAM/JB	FIGURE 1
CLIENT	GREEN DIAMOND CO.	DATE	4/3/12	
LOCATION	ORICK, HUMBOLDT CO. CA	CHECK	NBK	JOB NO. 7291.08
	VICINITY MAP	SCALE	SHOWN	



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T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 1.dwg

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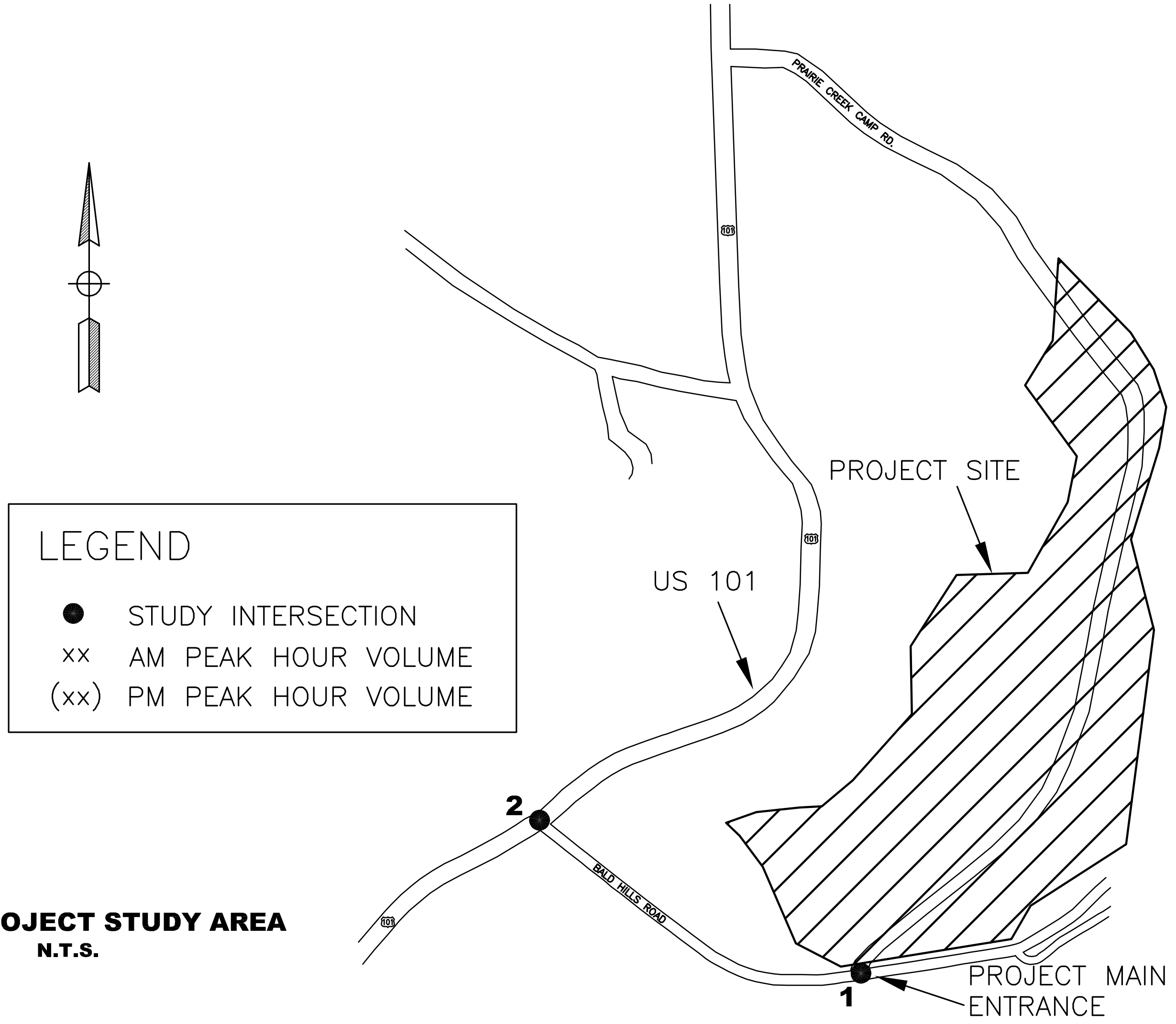
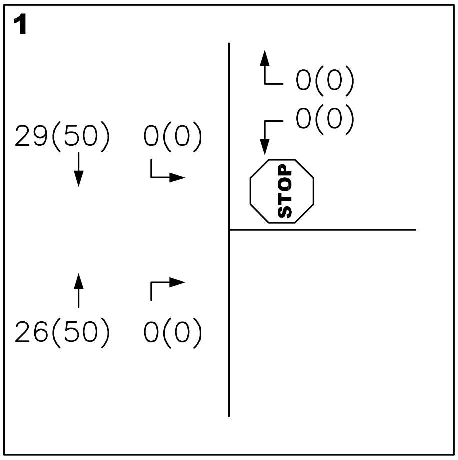
PROJECT	ORICK MILL SITE	BY	TAM	FIGURE	2
CLIENT	GREEN DIAMOND CO.	DATE	4/3/12		
LOCATION	ORICK, HUMBOLDT CO. CA	CHECK	NBK	JOB NO.	7291.08
	PEAK HOUR TRAFFIC VOLUMES	SCALE	SHOWN		

INTERSECTION #1: 50/50 TRAFFIC SPLIT AT PROJECT MAIN ENTRANCE.

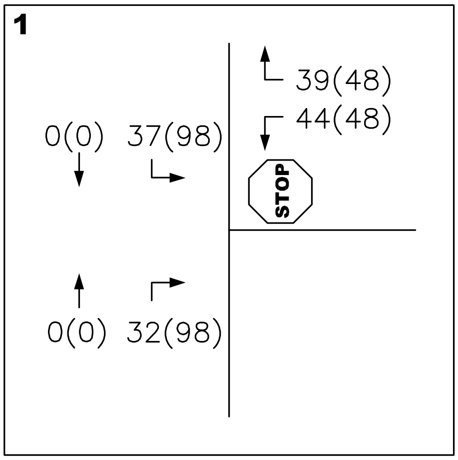


PROJECT STUDY AREA
N.T.S.

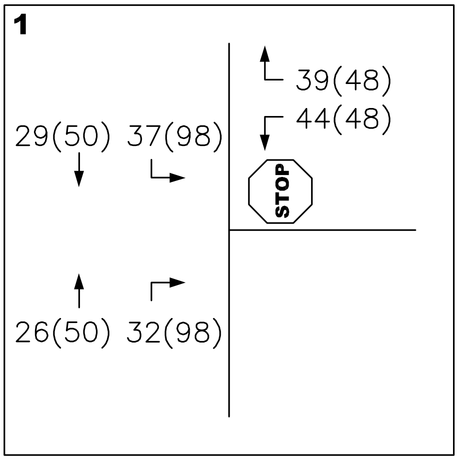
EXISTING PEAK HOUR TRAFFIC VOLUME



PROJECT PEAK HOUR TRAFFIC VOLUME



EXISTING PLUS PROJECT PEAK HOURS TRAFFIC VOLUME



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T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 2.dwg

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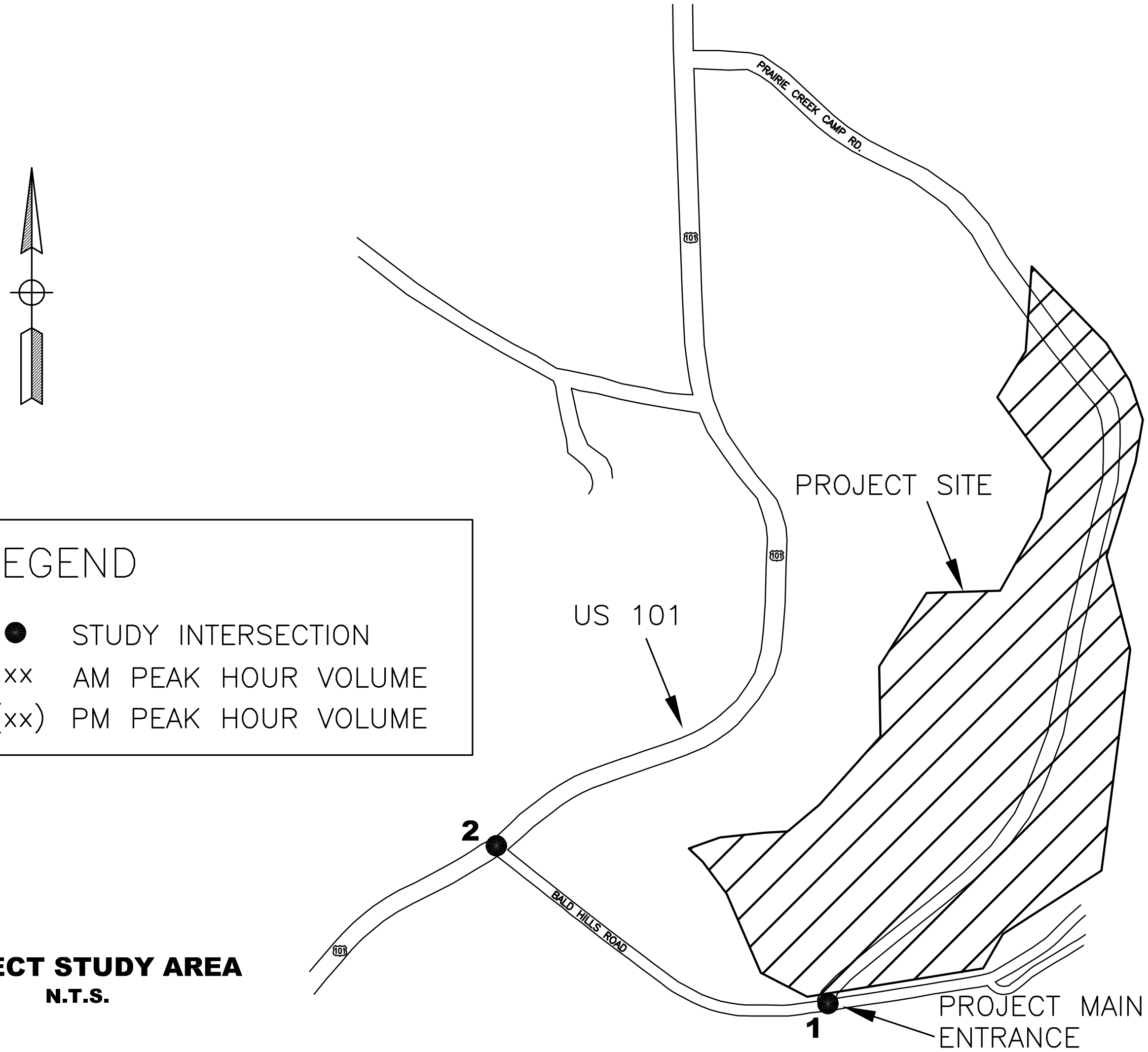
PROJECT ORICK MILL SITE
CLIENT GREEN DIAMOND CO.
LOCATION ORICK, HUMBOLDT CO. CA
PEAK HOUR TRAFFIC VOLUMES

BY TAM/JB
DATE 4/3/12
CHECK NBK
SCALE SHOWN

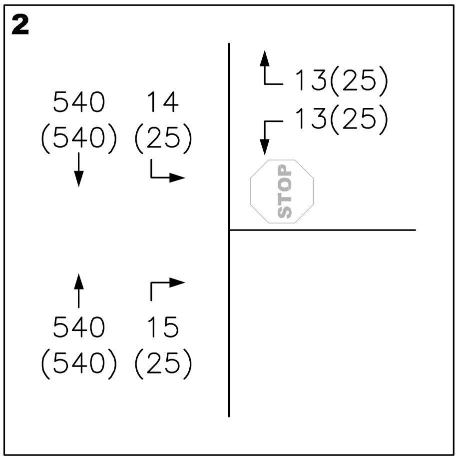
FIGURE 3
JOB NO. 7291.08

INTERSECTION #1: 50/50 TRAFFIC SPLIT AT PROJECT MAIN ENTRANCE.

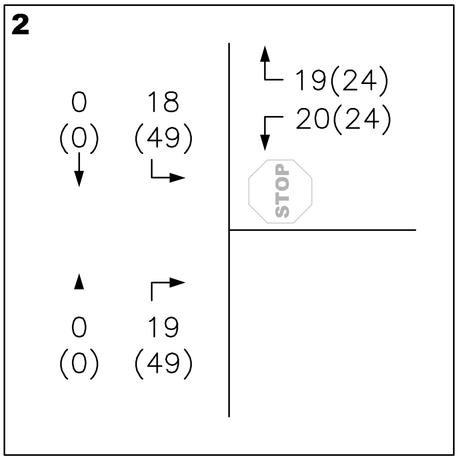


PROJECT STUDY AREA
N.T.S.

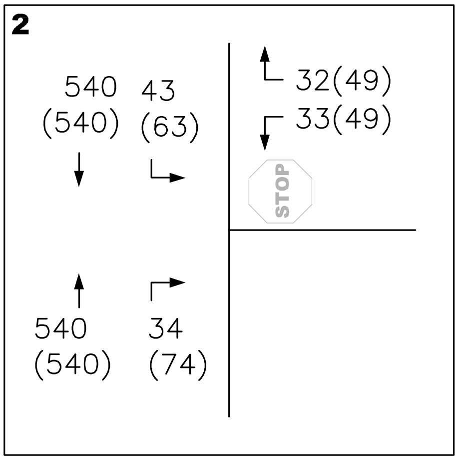
EXISTING PEAK HOUR TRAFFIC VOLUME



PROJECT PEAK HOUR TRAFFIC VOLUME



EXISTING PLUS PROJECT PEAK HOURS TRAFFIC VOLUME



Apr 05,2012-4:47pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 3.dwg

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EUREKA · UKIAH
CONSULTING ENGINEERS
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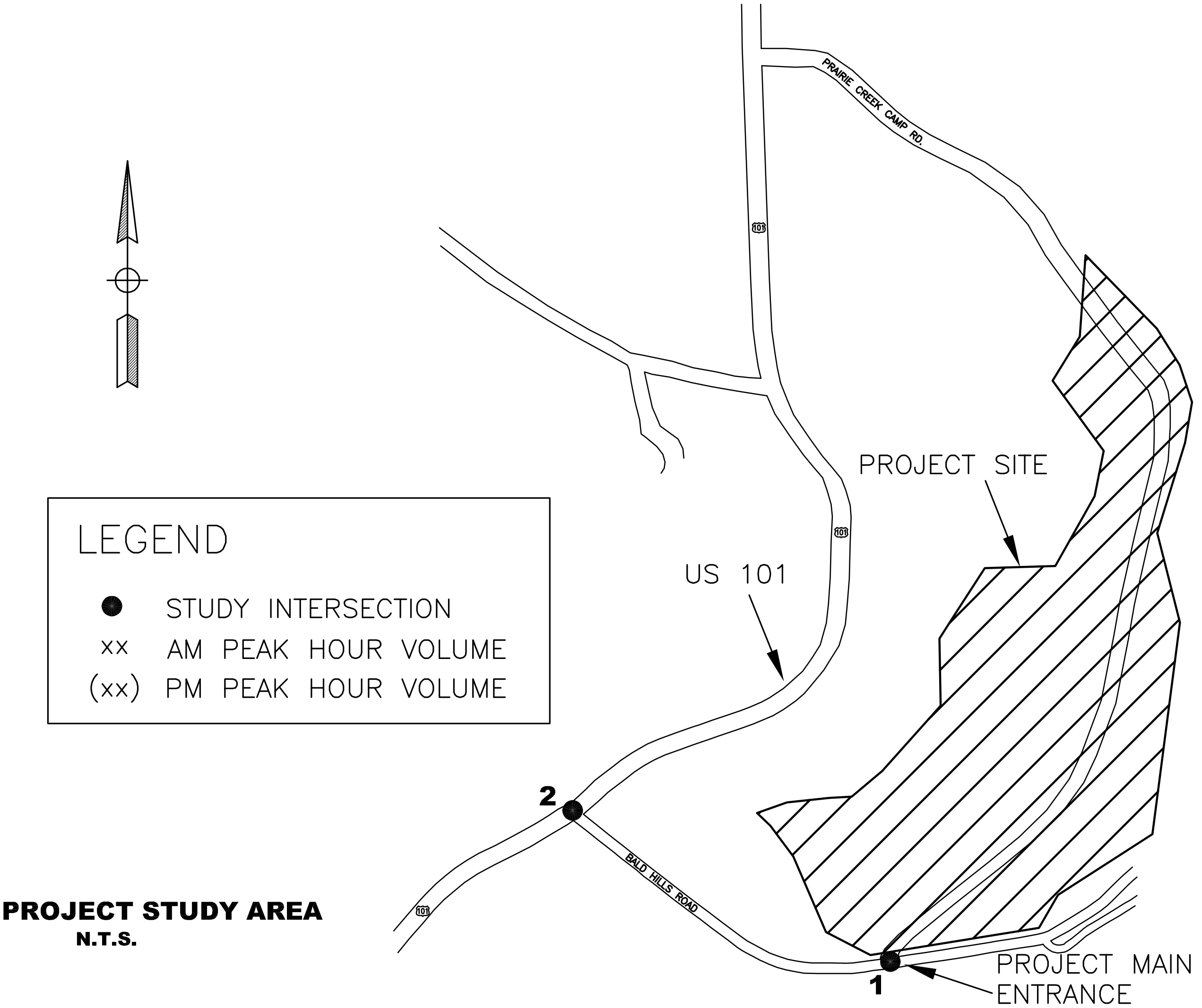
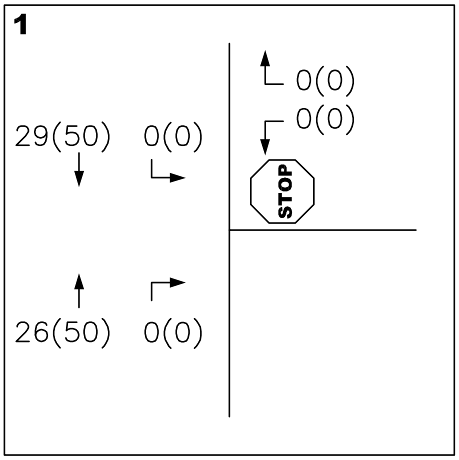
PROJECT	ORICK MILL SITE	BY	TAM/JB	FIGURE	4
CLIENT	GREEN DIAMOND CO.	DATE	4/3/12		
LOCATION	ORICK, HUMBOLDT CO. CA	CHECK	NBK	JOB NO.	7291.08
	PEAK HOUR TRAFFIC VOLUMES	SCALE	SHOWN		

INTERSECTION #1: 60/40 TRAFFIC SPLIT AT PROJECT MAIN ENTRANCE.

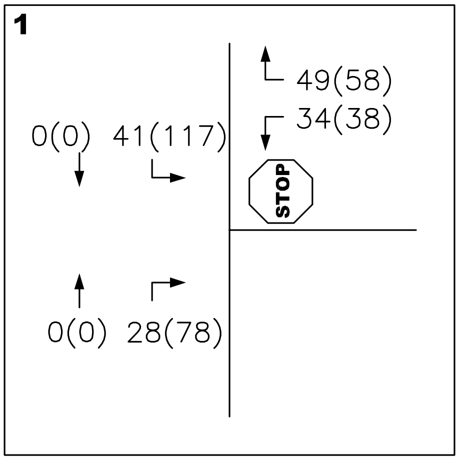


PROJECT STUDY AREA
N.T.S.

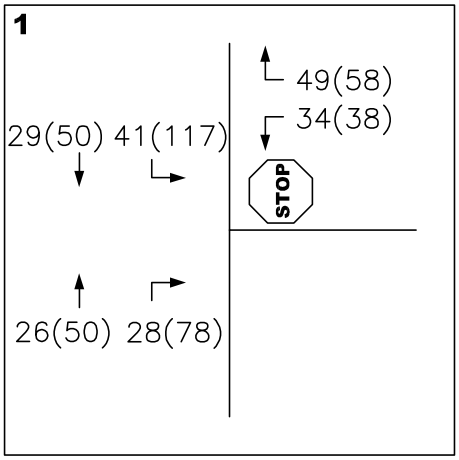
EXISTING PEAK HOUR TRAFFIC VOLUME



PROJECT PEAK HOUR TRAFFIC VOLUME



EXISTING PLUS PROJECT PEAK HOURS TRAFFIC VOLUME



Apr 05,2012-4:48pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 4.dwg

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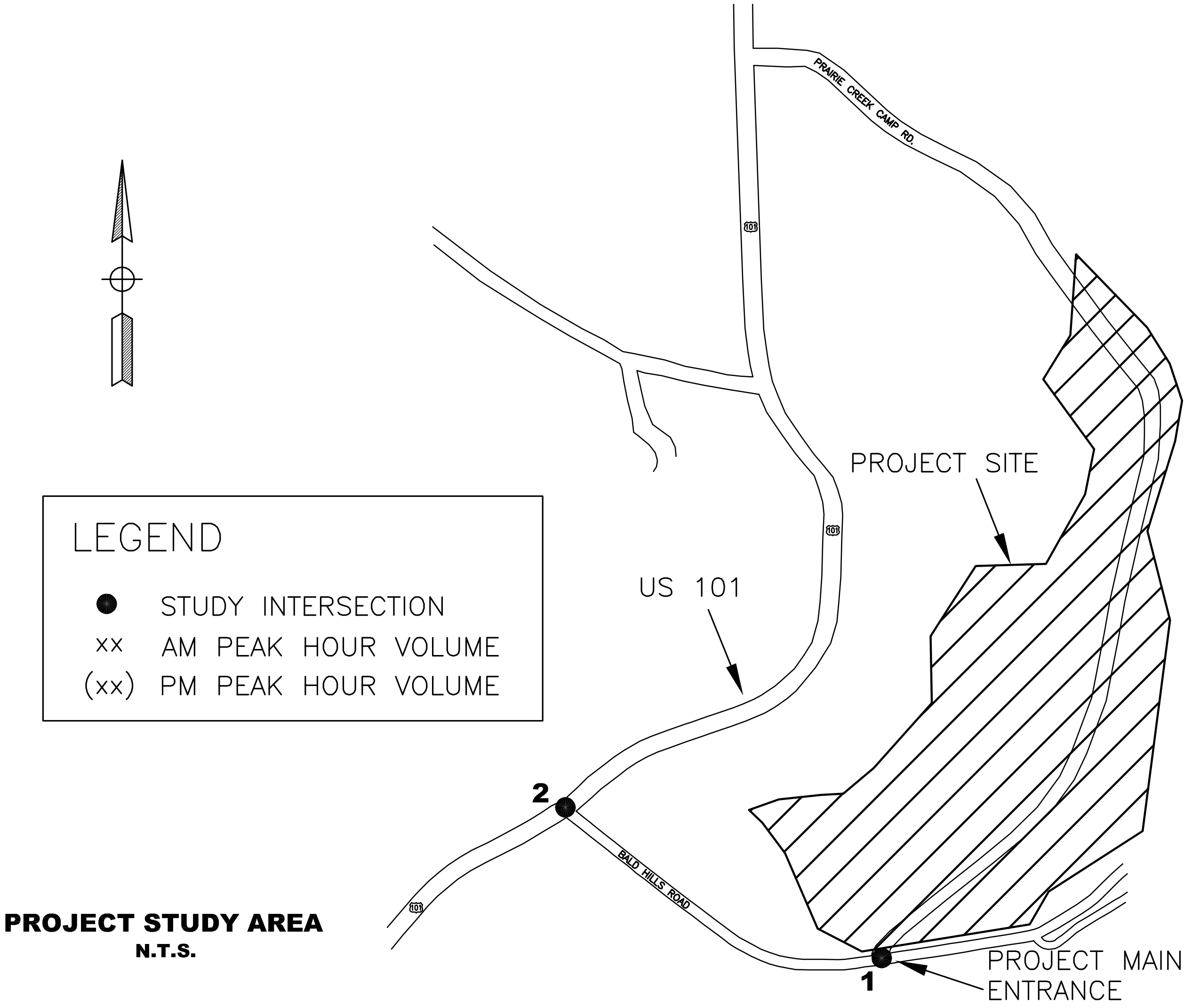
PROJECT	ORICK MILL SITE	BY	TAM/JB	FIGURE	5
CLIENT	GREEN DIAMOND CO.	DATE	4/3/12		
LOCATION	ORICK, HUMBOLDT CO. CA	CHECK	NBK	JOB NO.	7291.08
	PEAK HOUR TRAFFIC VOLUMES	SCALE	SHOWN		

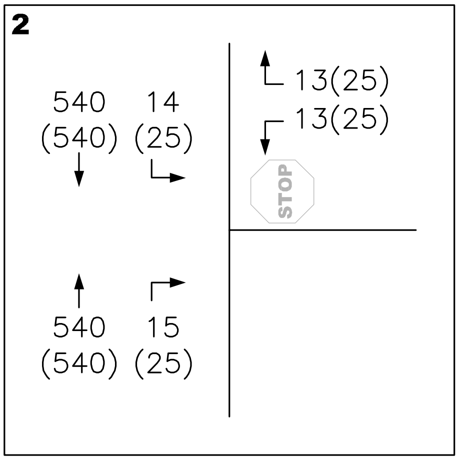
INTERSECTION #2: 60/40 TRAFFIC SPLIT AT PROJECT MAIN ENTRANCE.



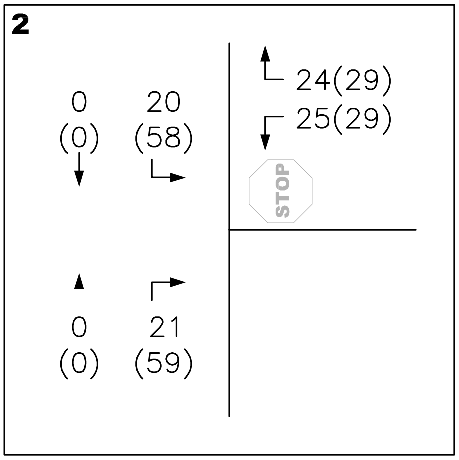
LEGEND
● STUDY INTERSECTION
xx AM PEAK HOUR VOLUME
(xx) PM PEAK HOUR VOLUME

PROJECT STUDY AREA
N.T.S.

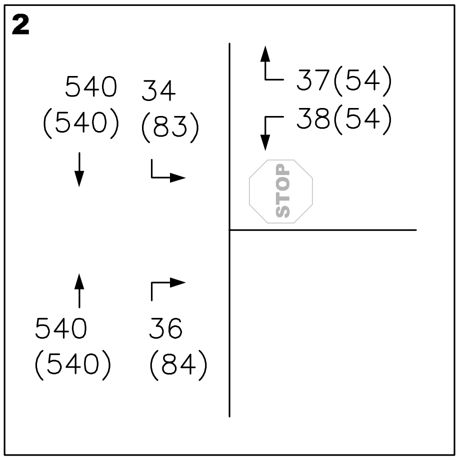
EXISTING PEAK HOUR TRAFFIC VOLUME



PROJECT PEAK HOUR TRAFFIC VOLUME



EXISTING PLUS PROJECT PEAK HOURS TRAFFIC VOLUME



Apr 05,2012-5:03pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 5.dwg

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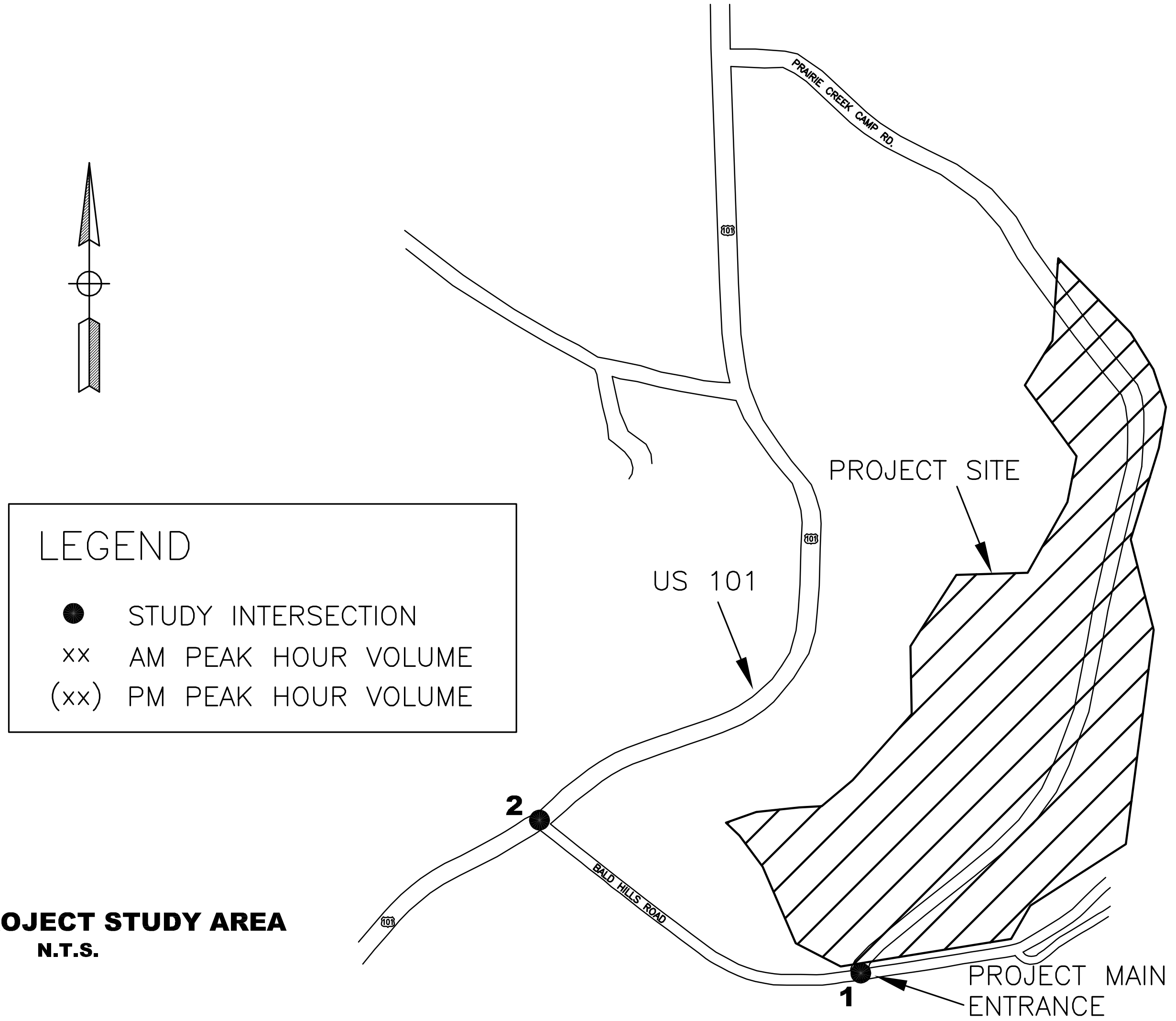
PROJECT ORICK MILL SITE
CLIENT GREEN DIAMOND CO.
LOCATION ORICK, HUMBOLDT CO. CA
PEAK HOUR TRAFFIC VOLUMES

BY TAM/JB
DATE 4/3/12
CHECK NBK
SCALE SHOWN

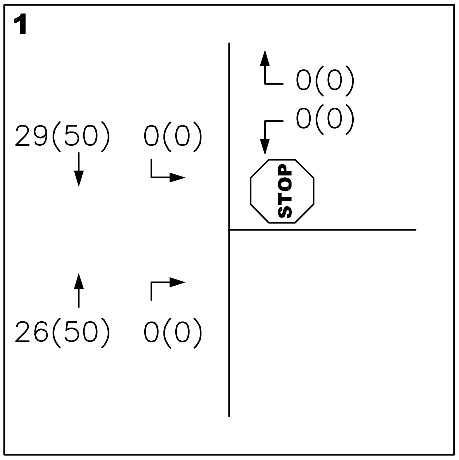
FIGURE 6
JOB NO. 7291.08

INTERSECTION #2: 70/30 TRAFFIC SPLIT AT PROJECT MAIN ENTRANCE.

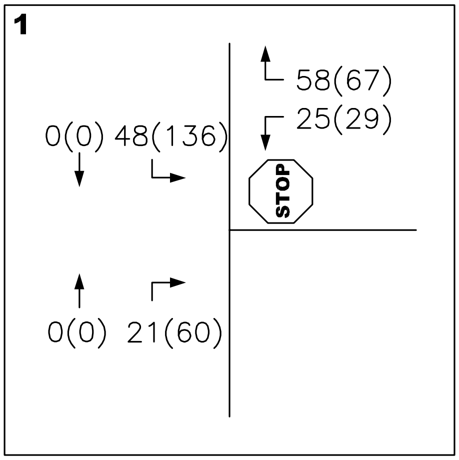


PROJECT STUDY AREA
N.T.S.

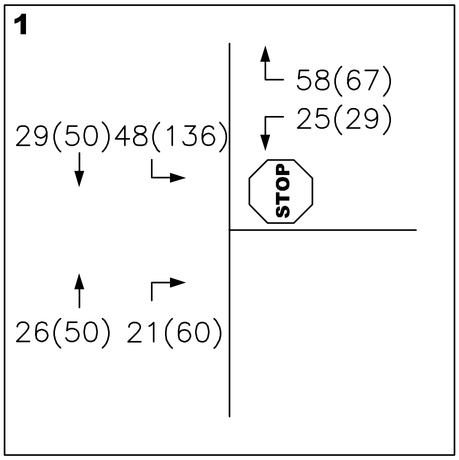
EXISTING PEAK HOUR TRAFFIC VOLUME



PROJECT PEAK HOUR TRAFFIC VOLUME



EXISTING PLUS PROJECT PEAK HOURS TRAFFIC VOLUME



Apr 09.2012–5:40pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 6.dwg

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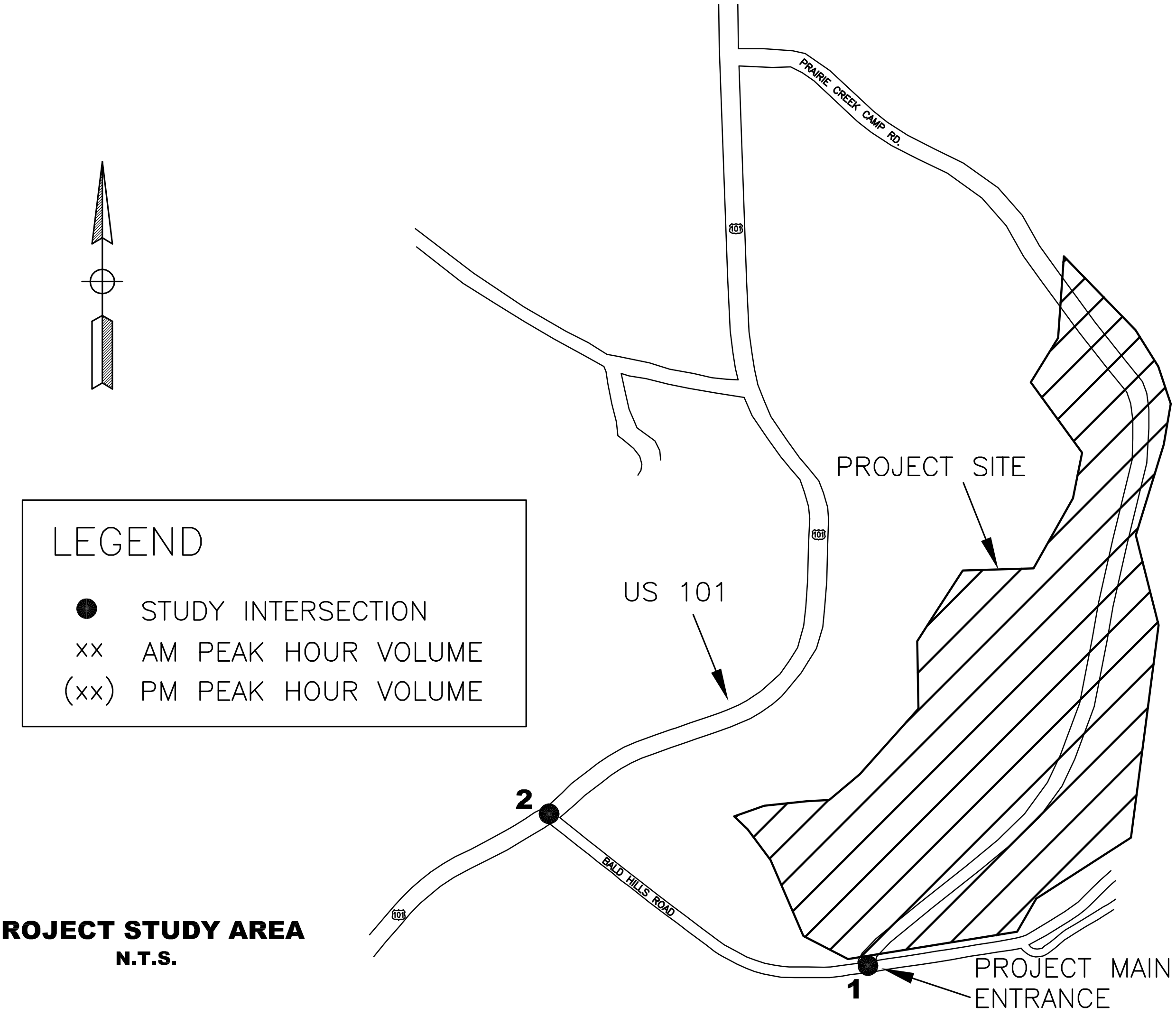
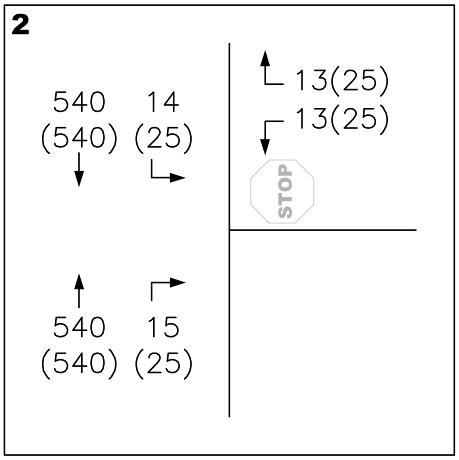
PROJECT	ORICK MILL SITE	BY	TAM/JB	FIGURE	7
CLIENT	GREEN DIAMOND CO.	DATE	4/3/12		
LOCATION	ORICK, HUMBOLDT CO. CA	CHECK	NBK	JOB NO.	7291.08
	PEAK HOUR TRAFFIC VOLUMES	SCALE	SHOWN		

INTERSECTION #2: 70/30 TRAFFIC SPLIT AT THE PROJECT MAIN ENTRANCE

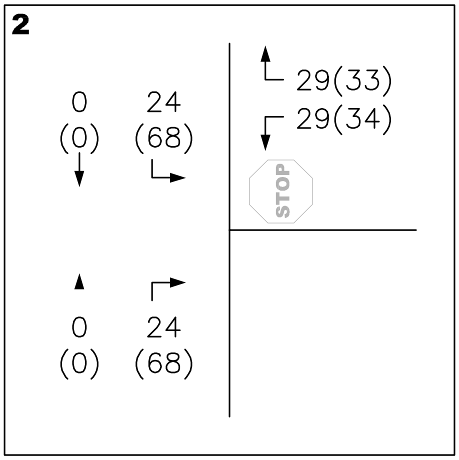


PROJECT STUDY AREA
N.T.S.

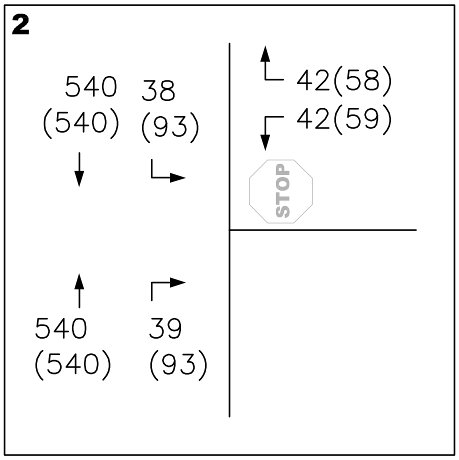
EXISTING PEAK HOUR TRAFFIC VOLUME



PROJECT PEAK HOUR TRAFFIC VOLUME



EXISTING PLUS PROJECT PEAK HOURS TRAFFIC VOLUME



Apr 05,2012–5:04pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC FIG 7.dwg

APPENDIX A

Conceptual Master Plan

REDWOOD NATIONAL PARK LODGE

SUMMARY OF AMENITIES		
AMENITY	SIZE	QUANTITY
GENERAL STORE / RESTAURANT	7,000 SQ FT	1
RECREATION / STORAGE BUILDING	8,000 SQ FT	1
R.V. CLUBHOUSE	5,000 SQ FT	1
R.V. CHECK-IN OFFICE	1,000 SQ FT	1
R.V. MAINTENANCE BLDG.	400 SQ FT	2
CAMPING OFFICE / RESTROOM BLDG.	2,000 SQ FT	1
CAMPING RESTROOMS	1,500 SQ FT	1
SERVICE STATION BLDG.	1,800 SQ FT	1
EMPLOYEE DORMITORY	3,000 SQ FT	1
FULL-SERVICE RV SITES	27' X 50'-85'	123
PARK MODEL COTTAGES	14' X 42'	37
TENT CAMPING SITES	24' DIA.	53
PLATFORM TENTS	16' X 16'	34

PARKING SUMMARY		
SPACE USE	SIZE	QUANTITY
DAY VISITOR	9' X 20'	24
LODGE GUEST	9' X 20'	36
CAMPING GUEST	9' X 20'	92
EMPLOYEE	9' X 20'	15
TOTAL		167

LACO ASSOCIATES

NICHOLS
MELBURG
&
ROSSETTO
ARCHITECTS + ENGINEERS

SCHEME 'A'

CONCEPTUAL SITE PLAN

NORTH

ORICK MILL SITE

SCALE: 1" = 100'-0"

0' 50' 100' 200' 400' 800'

FEB. 28, 2012

APPENDIX B

Orick Mill Site North Entrance Intersection Assessment Memo prepared by LACO

Memo

To: Mike Nelson

From: Becky Dale / Netra Khatri

Date: November 24, 2010

Re: Orick Mill Site North Entrance Intersection Assessment

A site visit and field assessment was conducted for the Orick Mill Site North Entrance on November 24, 2010 by Netra Khatri, P.E., and Becky Dale, E.I.T., both of LACO Associates (LACO). Due to the Redwood Park Lodge Company's interest in possibly obtaining the Mill Site for the future development of a campground and eco lodge, LACO carried out the site visit in order to determine if the study intersection could be reconfigured to safely handle the traffic associated with the future campground and eco lodge. Extensive roadway reconfiguring and widening would prove difficult at this intersection, due to the presence of a concrete bridge (known as Prairie Creek 4-29) 65 feet south of the intersection.

During the field assessment, the intersection geometry was measured and documented. Parameters of interest included posted speed limit, sight distance, the presence or absence of crosswalks and bike lanes, roadway slope, and shoulder and travel way widths at various distances from the intersection. The bridge dimensions and location relative to the intersection were also measured and recorded.

In order to determine if the intersection can be reconfigured to safely handle project traffic, both the Caltrans *Highway Design Manual* (HDM) and the American Association of State Highway and Transportation Officials (AASHTO) *Policy on Geometric Design of Highways and Streets* were referenced. The standards outlined in these two documents are the baseline requirements for State highway design. Pertinent design criteria from these references are summarized in Table 1 below.

Table 1: Highway Design Criteria

Design Parameter	Measured Dimensions (ft)	Required Dimensions for 55 mph (ft)	Required Dimensions for 30 mph (ft)	Source
Intersection Sight Distance for Passenger Cars	370	610	335	AASHTO *Geometric Design of Highways and Streets* Exhibit 9-55
Intersection Sight Distance for Recreational Vehicles	NA	768	420	AASHTO *Geometric Design of Highways and Streets* Exhibit 9-55
Right-Turn Lane Length	NA	483	235	Caltrans *Highway Design Manual* Table 405.2 B
Left-Turn Lane Length	NA	483	235	Caltrans *Highway Design Manual* Table 405.2 B

Redesign and reconfiguration of the study intersection to provide the necessary facilities to safely handle the future campground traffic would prove problematic. As currently situated, the intersection provides poor sight distance when looking to the north. Field measurements assessed the northbound site distance to be approximately 370 feet from the intersection's stop bar, which is considerably less than the AASHTO minimum passenger car sight distance of 610 feet for speed of 55 mph. In addition to the issues with inadequate sight distance, the existing roadway is not wide enough to the north of the intersection to allow for the development of a left-turn pocket while maintaining the minimum desired shoulder width of 3 feet. The required length of this left-turn pocket would create a potentially-unsafe situation in which the left-turn lane would wrap around a tight, blind corner to the north of the study intersection.

A way to reduce the sight distance requirements would be to lower the speed within the vicinity of the study intersection. In order to initiate the reduction of speed limits on State highways, Caltrans must first be solicited to perform an Engineering and Traffic Survey (E&TS) for the general area. If Caltrans then proposes, based on the E&TS, to change a speed limit, both the California Highway Patrol (CHP) and the local government must conduct a public hearing on the proposed change before determining the new speed limit. According to the *Highway and Streets* manual, the intersection's passenger vehicle sight distance of 370 feet would be just above the accepted minimum adopted by AASHTO if the speed limit on Highway 101 were reduced down to 30 mile per hour.

In conclusion, it appears the study intersection is not an ideal location for a future campground and eco lodge entry point from Highway 101 unless the speed is reduced to 30 mph in the vicinity of the project area. The intersection is constrained by both poor site distance and a narrow roadway, which does not easily allow for the necessary addition of a left-turn lane into the study intersection. Access to the site should be gained at another location which can be more-readily reconfigured to include a right-turn lane and a left-turn lane while maintaining the appropriate shoulder widths for pedestrian use.

APPENDIX C

Orick Mill Site North Summary of Traffic Count Data on Bald Hills Road

Date	**CO**	**Time Period**	**Description**	**Eastbound Peak Hour**	**Eastbound ADT**	**Westbound Peak Hour**	**Westbound ADT**	**ADT**	**Data Source**
4/24/2006	HUM	AM	Bald Hills Rd.	9	29	13	45	74	County
4/24/2006	HUM	PM	Bald Hills Rd.	4	29	6	45	74	County
4/25/2006	HUM	AM	Bald Hills Rd.	50	152	50	146	298	County
4/25/2006	HUM	PM	Bald Hills Rd.	29	152	26	146	298	County
5/1/2006	HUM	AM	Bald Hills Rd.	36	237	28	241	478	County
5/1/2006	HUM	PM	Bald Hills Rd.	25	237	46	241	478	County
5/2/2006*	HUM	PM	Bald Hills Rd.	45	89	44	76	165	County
5/1/2006*	HUM	PM	Bald Hills Rd.	11	89	6	76	165	County
6/4/2006	HUM	AM	Bald Hills Rd.	59				505	County
6/4/2006	HUM	PM	Bald Hills Rd.	61				505	County
6/5/2006	HUM	AM	Bald Hills Rd.	43				403	County
6/5/2006	HUM	PM	Bald Hills Rd.	56				403	County
6/6/2006	HUM	AM	Bald Hills Rd.	64				453	County
6/6/2006	HUM	PM	Bald Hills Rd.	56				453	County
6/7/2006	HUM	AM	Bald Hills Rd.	45				515	County
6/7/2006	HUM	PM	Bald Hills Rd.	50				515	County
2/11/12-2/17/12	HUM		Bald Hills Rd.	17	83	18	81	164	LACO

* 3 hrs data missing

CO	County
ADT	Average Daily Traffic

APPENDIX D

Level of Service Calculations

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*1*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak Hour*		

Project Description	*Existing Peak Hour*		
East/West Street:	*Bald Hills Road*	North/South Street:	*Project Main Entrance*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*29*			*26*	*0*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*29*	*0*	*0*	*26*	*0*
Percent Heavy Vehicles	*14*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*0*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*0*						*0*	
C (m) (veh/h)	*1511*							
v/c	*0.00*							
95% queue length	*0.00*							
Control Delay (s/veh)	*7.4*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*1*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak Hour*		

Project Description *Existing Plus Project Peak Hour*

East/West Street: *Bald Hills Road*	North/South Street: *Project Entrance*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*37*	*29*			*26*	*32*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*37*	*29*	*0*	*0*	*26*	*32*
Percent Heavy Vehicles	*14*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*44*		*39*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*44*	*0*	*39*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*37*						*83*	
C (m) (veh/h)	*1471*						*1502*	
v/c	*0.03*						*0.06*	
95% queue length	*0.08*						*0.18*	
Control Delay (s/veh)	*7.5*						*9.2*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--				*9.2*		
Approach LOS	--	--				*A*		

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TWO-WAY STOP CONTROL SUMMARY

General Information / Site Information

Analyst	*Netra Khatri*	Intersection	*1*
Agency/Co.	*LACO*	Jurisdiction	
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak Hour*		

Project Description *Existing Plus Project Peak Hour: 60-40*

East/West Street: *Bald Hills Road*

North/South Street: *Project Entrance*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	41	29			26	28
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	41	29	0	0	26	28
Percent Heavy Vehicles	14	--	--	14	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				49		34
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	49	0	34
Percent Heavy Vehicles	0	0	0	14	0	0
Percent Grade (%)	0			0		
Flared Approach		N			Y	
Storage		0			1	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					L		R
v (veh/h)	41					49		34
C (m) (veh/h)	1476					787		1032
v/c	0.03					0.06		0.03
95% queue length	0.09					0.20		0.10
Control Delay (s/veh)	7.5					9.9		8.6
LOS	A					A		A
Approach Delay (s/veh)	--	--				9.4		
Approach LOS	--	--				A		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Netra Khatri*
Agency/Co.	*LACO*
Date Performed	*3/25/2012*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*1*
Jurisdiction	*Humboldt County*
Analysis Year	*2012*

Project Description *Existing Plus Project Peak Hour:73-30*

East/West Street: *Bald Hills Road*

North/South Street: *Project Entrance*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*48*	*29*			*26*	*21*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*48*	*29*	*0*	*0*	*26*	*21*
Percent Heavy Vehicles	*14*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*25*		*58*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*25*	*0*	*58*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (veh/h)	*48*					*25*		*58*
C (m) (veh/h)	*1484*					*773*		*1038*
v/c	*0.03*					*0.03*		*0.06*
95% queue length	*0.10*					*0.10*		*0.18*
Control Delay (s/veh)	*7.5*					*9.8*		*8.7*
LOS	*A*					*A*		*A*
Approach Delay (s/veh)	--	--				*9.0*		
Approach LOS	--	--				*A*		

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TWO-WAY STOP CONTROL SUMMARY

General Information / Site Information

Analyst	*Netra Khatri*	Intersection	*1*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*PM Peak Hour*		

Project Description *Existing Peak Hour*

East/West Street: *Bald Hills Road*	North/South Street: *Project Entrance*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*50*			*50*	*0*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*50*	*0*	*0*	*50*	*0*
Percent Heavy Vehicles	*14*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*0*		*0*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*0*						*0*	
C (m) (veh/h)	*1481*							
v/c	*0.00*							
95% queue length	*0.00*							
Control Delay (s/veh)	*7.4*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Netra Khatri	Intersection	1
Agency/Co.	LACO	Jurisdiction	Caltrans
Date Performed	3/25/2012	Analysis Year	2012
Analysis Time Period	Peak Hour		

Project Description *Existing Plus Project Peak Hour*

East/West Street: *Bald Hills Road* North/South Street: *Project Entrance*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	98	50			50	98
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	98	50	0	0	50	98
Percent Heavy Vehicles	14	--	--	14	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				48		48
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	48	0	48
Percent Heavy Vehicles	0	0	0	14	0	0
Percent Grade (%)	0			0		
Flared Approach		N			Y	
Storage		0			1	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	98						96	
C (m) (veh/h)	1361						1160	
v/c	0.07						0.08	
95% queue length	0.23						0.27	
Control Delay (s/veh)	7.9						10.4	
LOS	A						B	
Approach Delay (s/veh)	--	--				10.4		
Approach LOS	--	--				B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*1*
Agency/Co.	*LACO*	Jurisdiction	*Humboldt County*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*PM Peak Hour*		

Project Description *Existing Plus Project Peak Hour:60-40*

East/West Street: *Bald Hills Road*	North/South Street: *Project Entrance*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*117*	*50*			*50*	*78*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*117*	*50*	*0*	*0*	*50*	*78*
Percent Heavy Vehicles	*14*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*38*		*58*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*38*	*0*	*58*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (veh/h)	*117*					*38*		*58*
C (m) (veh/h)	*1385*					*551*		*970*
v/c	*0.08*					*0.07*		*0.06*
95% queue length	*0.28*					*0.22*		*0.19*
Control Delay (s/veh)	*7.8*					*12.0*		*8.9*
LOS	*A*					*B*		*A*
Approach Delay (s/veh)	--	--				*10.2*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Netra Khatri*
Agency/Co.	*LACO*
Date Performed	*3/25/2012*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*1*
Jurisdiction	*Humboldt County*
Analysis Year	*2012*

Project Description *Existing Plus Project Peak Hour:70-30*

East/West Street: *Bald Hills Road*

North/South Street: *Project Entrance*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*136*	*50*			*50*	*60*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*136*	*50*	*0*	*0*	*50*	*60*
Percent Heavy Vehicles	*14*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*29*		*67*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*29*	*0*	*67*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (veh/h)	*136*					*29*		*67*
C (m) (veh/h)	*1406*					*523*		*981*
v/c	*0.10*					*0.06*		*0.07*
95% queue length	*0.32*					*0.18*		*0.22*
Control Delay (s/veh)	*7.8*					*12.3*		*8.9*
LOS	*A*					*B*		*A*
Approach Delay (s/veh)	--	--				*10.0*		
Approach LOS	--	--				*A*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		**Site Information**	
Analyst	*Netra Khatri*	Intersection	*2*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak Hour*		

Project Description *Existing AM Peak Hour*

East/West Street: *Bald Hills Road*

North/South Street: *US 101*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*15*	*14*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*15*	*14*	*540*	*0*
Percent Heavy Vehicles	*0*	*--*	*--*	*14*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*13*		*13*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*13*	*0*	*13*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*14*		*26*				
C (m) (veh/h)		*956*		*432*				
v/c		*0.01*		*0.06*				
95% queue length		*0.04*		*0.19*				
Control Delay (s/veh)		*8.8*		*17.4*				
LOS		*A*		*C*				
Approach Delay (s/veh)	*--*	*--*	*17.4*					
Approach LOS	*--*	*--*	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*2*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak Hour*		

Project Description *Existing Plus Project Peak Hour*

East/West Street: *Bald Hills Road*	North/South Street: *US 101*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*34*	*32*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*34*	*32*	*540*	*0*
Percent Heavy Vehicles	*0*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*33*		*32*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*33*	*0*	*32*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*32*		*65*				
C (m) (veh/h)		*940*		*398*				
v/c		*0.03*		*0.16*				
95% queue length		*0.11*		*0.58*				
Control Delay (s/veh)		*9.0*		*19.5*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*19.5*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*2*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak Hour*		

Project Description *Existing Plus Project Peak Hour: 60-40*

East/West Street: *Bald Hills Road*

North/South Street: *US 101*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*36*	*34*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*36*	*34*	*540*	*0*
Percent Heavy Vehicles	*0*	*--*	*--*	*14*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*38*		*37*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*38*	*0*	*37*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*34*		*75*				
C (m) (veh/h)		*939*		*395*				
v/c		*0.04*		*0.19*				
95% queue length		*0.11*		*0.69*				
Control Delay (s/veh)		*9.0*		*19.9*				
LOS		*A*		*C*				
Approach Delay (s/veh)	*--*	*--*	*19.9*					
Approach LOS	*--*	*--*	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Netra Khatri*
Agency/Co.	*LACO*
Date Performed	*3/25/2012*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*2*
Jurisdiction	*Caltrans*
Analysis Year	*2012*

Project Description *Existing Plus Project Peak Hour:70-30*

East/West Street: *Bald Hills Road*	North/South Street: *US 101*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*39*	*38*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*39*	*38*	*540*	*0*
Percent Heavy Vehicles	*0*	*--*	*--*	*14*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*42*		*42*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*42*	*0*	*42*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*38*		*84*				
C (m) (veh/h)		*936*		*392*				
v/c		*0.04*		*0.21*				
95% queue length		*0.13*		*0.80*				
Control Delay (s/veh)		*9.0*		*20.4*				
LOS		*A*		*C*				
Approach Delay (s/veh)	*--*	*--*	*20.4*					
Approach LOS	*--*	*--*	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*2*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*Peak Hour*		

Project Description *Existing Peak Hour*

East/West Street: *Bald Hills Road*

North/South Street: *US 101*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*25*	*25*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*25*	*25*	*540*	*0*
Percent Heavy Vehicles	*0*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*25*		*25*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*25*	*0*	*25*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*25*		*50*				
C (m) (veh/h)		*948*		*414*				
v/c		*0.03*		*0.12*				
95% queue length		*0.08*		*0.41*				
Control Delay (s/veh)		*8.9*		*18.5*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*18.5*					
Approach LOS	--	--	*C*					

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Generated: 3/26/2012 11:12 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Netra Khatri*
Agency/Co.	*LACO*
Date Performed	*3/25/2012*
Analysis Time Period	*Peak Hour*

Site Information

Intersection	*2*
Jurisdiction	*Caltrans*
Analysis Year	*2012*

Project Description *Existing Plus Project Peak Hour*

East/West Street: *Bald Hills Road*

North/South Street: *US 101*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*74*	*74*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*74*	*74*	*540*	*0*
Percent Heavy Vehicles	*0*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*49*		*49*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*49*	*0*	*49*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*74*		*98*				
C (m) (veh/h)		*908*		*340*				
v/c		*0.08*		*0.29*				
95% queue length		*0.27*		*1.17*				
Control Delay (s/veh)		*9.3*		*23.6*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*23.6*					
Approach LOS	--	--	*C*					

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Generated: 3/26/2012 11:13 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Netra Khatri*	Intersection	*2*
Agency/Co.	*LACO*	Jurisdiction	*Caltrans*
Date Performed	*3/25/2012*	Analysis Year	*2012*
Analysis Time Period	*PM Peak Hour*		

Project Description *Existing Plus Project Peak Hour:60-40*

East/West Street: *Bald Hills Road* North/South Street: *US 101*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*84*	*83*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*84*	*83*	*540*	*0*
Percent Heavy Vehicles	*0*	--	--	*14*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*54*		*54*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*54*	*0*	*54*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*83*		*108*				
C (m) (veh/h)		*900*		*328*				
v/c		*0.09*		*0.33*				
95% queue length		*0.30*		*1.40*				
Control Delay (s/veh)		*9.4*		*25.1*				
LOS		*A*		*D*				
Approach Delay (s/veh)	--	--	*25.1*					
Approach LOS	--	--	*D*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Netra Khatri*
Agency/Co.	*LACO*
Date Performed	*3/25/2012*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*2*
Jurisdiction	*Caltrans*
Analysis Year	*2012*

Project Description *Existing Plus Project Peak Hour:70-30*

East/West Street: *Bald Hills Road*

North/South Street: *US 101*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*540*	*93*	*93*	*540*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*540*	*93*	*93*	*540*	*0*
Percent Heavy Vehicles	*0*	*--*	*--*	*14*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*59*		*58*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*59*	*0*	*58*
Percent Heavy Vehicles	*0*	*0*	*0*	*14*	*0*	*14*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*Y*	
Storage		*0*			*2*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*93*		*117*				
C (m) (veh/h)		*893*		*311*				
v/c		*0.10*		*0.38*				
95% queue length		*0.35*		*1.69*				
Control Delay (s/veh)		*9.5*		*27.1*				
LOS		*A*		*D*				
Approach Delay (s/veh)	*--*	*--*	*27.1*					
Approach LOS	*--*	*--*	*D*					

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APPENDIX E

Existing Trails in the Vicinity of the Project Area

LACO ASSOCIATES
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CONSULTING ENGINEERS
1-800-515-5054
WWW.LACOASSOCIATES.COM

PROJECT ORICK MILL SITE	BY JB	APPENDIX E	
CLIENT GREEN DIAMOND CO.	DATE 4/3/12		
LOCATION ORICK, HUMBOLDT COUNTY, CA.	CHECK NBK	JOB NO. 7291.08	
EXISTING TRAILS IN VICINITY OF THE PROJECT SITE	SCALE AS SHOWN		

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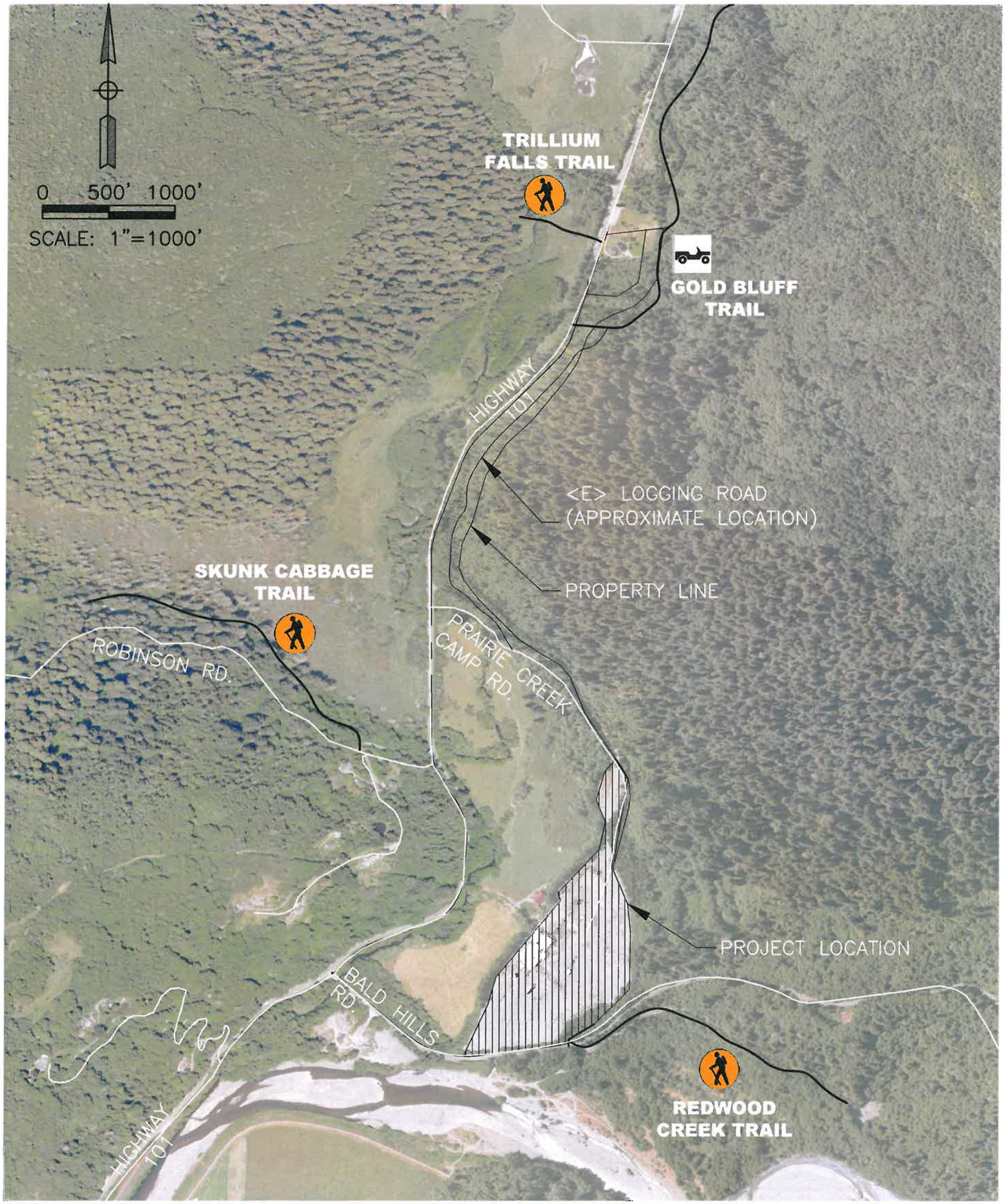

Apr 03,2012-2:00pm
T:\Cadfiles\7200\7291.08 ORICK MILL WETLANDS\DWG\ STUDY INTERSECTION AND TRAFFIC APPENDIX H.dwg

APPENDIX F

Accident Logs

H. N. Linschoten
Captain
Commander

Hal Rosendahl
Sergeant 1
Brett Fabbri
Sergeant 2
Doug Tupen
Sergeant 3
Matthew Larsen
Sergeant 4
Chris Powell
Sergeant 5

Kimberly Holland
OSS1
Kim Allen
OA 1
Laurie Sperry
OA 2

Officer P. Dahlen 15627
Public Affairs Officer

Officer C. Jackson 15062
VIN, Tow, School Bus

Officer C. Nelson 14428
Court Evidence Officer

Officer M. Campbell 16321
Accident Review

Mike Nunes
Automotive Technician II

David Omwake
Maintenance

CALIFORNIA
HIGHWAY
PATROL

Humboldt Area Office
255 East Samoa Blvd
Arcata, CA 95521
(707) 822-5981
(707) 822-8939 (FAX)

Date: 02/09/12

To: TRAVIS MOE

Attn:

From: MICHAEL CAMPBELL

Re: COLLISIONS 101 / BALD HILLS RD

Number of Pages including cover page: 2

125-32 (Rev. 05-2008)

Area Information System
Humboldt Area

US 101 / Bald Hills Road
02/09/12 15:29:49

Log Number	Date	Time	Officer	Status	Evidence #	Occured On	Cross Street
2009110027	11/10/09	1405	Bowen J (017539)	F	E20090324	US 101	Bald Hills Road
2009020018	02/11/09	0001	Ranney S (018198)	F		US 101	Bald Hills Road
2008100033	10/07/08	1400	Steen C E (015610)	F		US 101	Bald Hills Road
2008090063	09/26/08	1458	Hartman S (011357)	F		US 101	Bald Hills Road
2008090048	09/23/08	2359	Cornwell J N (011771)	F		US 101	Bald Hills Road
2008060054	06/23/08	0330	Jackson C P (015062)	F		US 101	Bald Hills Road
2007110051	11/19/07	2300	McMillan K (014516)	F		US 101	Bald Hills Road
2007110020	11/11/07	2500	Marinez R V (013551)	F		US 101	Bald Hills Road
2007090020	09/08/07	0323	McPherson C (016005)	F		US 101	Bald Hills Road
2007070016	07/07/07	1425	Myers J D (016478)	F		US 101	Bald Hills Road
2004120090	12/11/04	1745	Area O R (025000)	F		US 101	Bald Hills Road
2004100084	10/29/04	1515	Neitzke S R (012303)	F		US 101	Bald Hills Road
2003080028	08/01/03	2110	Mills C J (009479)	F		US 101	Bald Hills Road
2002020021	02/05/02	2055	Josang D E (012320)	F		US 101	Bald Hills Road
2002010014	01/06/02	0215	Cornwell J N (011771)	F		US 101	Bald Hills Road
2001080022	08/04/01	2500	Filler K R (011934)	F		US 101	Bald Hills Road
2000080013	08/08/00	1130	Jimenez R (009288)	F		US 101	Bald Hills Road
2000050041	05/16/00	1630	Berry M J (013796)	F		US 101	Bald Hills Road
1999120066	12/23/99	2130	Neitzke S R (012303)	F		US 101	Bald Hills Road
1999070038	07/10/99	1220	Beverly J W (008892)	F		US 101	Bald Hills Road

Requested By 016321, Total Records: 20

APPENDIX G

Trip Generation and Distribution Calculations

Trip generation and distribution for the proposed projects based on existing peak hour travel pattern at Bald Hills Road

Campground/RV Park (ITE Land Use 416*)					
No. of Units	247				
Trips AM (Peak Hour)	**Trip rate/occupied camp or RV site**	128			
		In (42%)		Out (58%)	
	0.52	54		74	
		E (53%)	W (47%)	E (53%)	W (47%)
		29	25	39	35
Trips PM (Peak Hour)	**Trip rate/occupied camp or RV site**	262			
		In (69%)		Out (31%)	
	1.06	181		81	
		E (50%)	W (50%)	E (50%)	W (50%)
		90	91	41	40

*** ITE Trip Generation Manual 7th Edition**

Lodge (ITE Land Use 330*)					
No. of Units	51				
Trips AM (Peak Hour)	**Trip rate/occupied camp or RV site**	24			
		In (63%)		Out (37%)	
	0.47	15		9	
		E (53%)	W (47%)	E (53%)	W (47%)
		8	7	5	4
Trips PM (Peak Hour)	**Trip rate/occupied camp or RV site**	30			
		In (50%)		Out (50%)	
	0.59	15		15	
		E (50%)	W (50%)	E (50%)	W (50%)
		8	7	8	7

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Trip generation and distribution for the proposed projects based on anticipated peak hour travel pattern of 60% westbound and 40% eastbound split at Bald Hills Road

Campground/RV Park (ITE Land Use 416*)					
No. of Units	247				
Trips AM (Peak Hour)	**Trip rate/occupied**	128			
		In (42%)		Out (58%)	
	0.52	54		74	
		E (40%)	W (60%)	E (40%)	W (60%)
		22	32	30	44
Trips PM (Peak Hour)	**Trip rate/occupied**	262			
		In (69%)		Out (31%)	
	1.06	181		81	
		E (40%)	W (60%)	E (40%)	W (60%)
		72	108	32	49

*** ITE Trip Generation Manual 7th Edition**

*****					
No. of Units	51				
Trips AM (Peak Hour)	**Trip rate/occupied**	24			
		In (63%)		Out (37%)	
	0.47	15		9	
		E (40%)	W (60%)	E (40%)	W (60%)
		6	9	4	5
Trips PM (Peak Hour)	**Trip rate/occupied**	30			
		In (50%)		Out (50%)	
	0.59	15		15	
		E (40%)	W (60%)	E (40%)	W (60%)
		6	9	6	9

*** ITE Trip Generation Manual 7th Edition**

Trip generation and distribution for the proposed projects based on anticipated peak hour travel pattern of 70% westbound and 30% eastbound split at Bald Hills Road

Campground/RV Park (ITE Land Use 416*)					
No. of Units	247				
Trips AM (Peak Hour)	**Trip rate/occupied camp or RV site**	128			
		In (42%)		Out (58%)	
	0.52	54		74	
		E (30%)	W (70%)	E (30%)	W (70%)
		16	38	22	52
Trips PM (Peak Hour)	**Trip rate/occupied camp or RV site**	262			
		In (69%)		Out (31%)	
	1.06	181		81	
		E (30%)	W (70%)	E (30%)	W (70%)
		55	126	24	57

*** ITE Trip Generation Manual 7th Edition**

Lodge (ITE Land Use 330*)					
No. of Units	51				
Trips AM (Peak Hour)	**Trip rate/occupied camp or RV site**	24			
		In (63%)		Out (37%)	
	0.47	15		9	
		E (30%)	W (70%)	E (30%)	W (70%)
		5	10	3	6
Trips PM (Peak Hour)	**Trip rate/occupied camp or RV site**	30			
		In (50%)		Out (50%)	
	0.59	15		15	
		E (30%)	W (70%)	E (30%)	W (70%)
		5	10	5	10

*** ITE Trip Generation Manual 7th Edition**

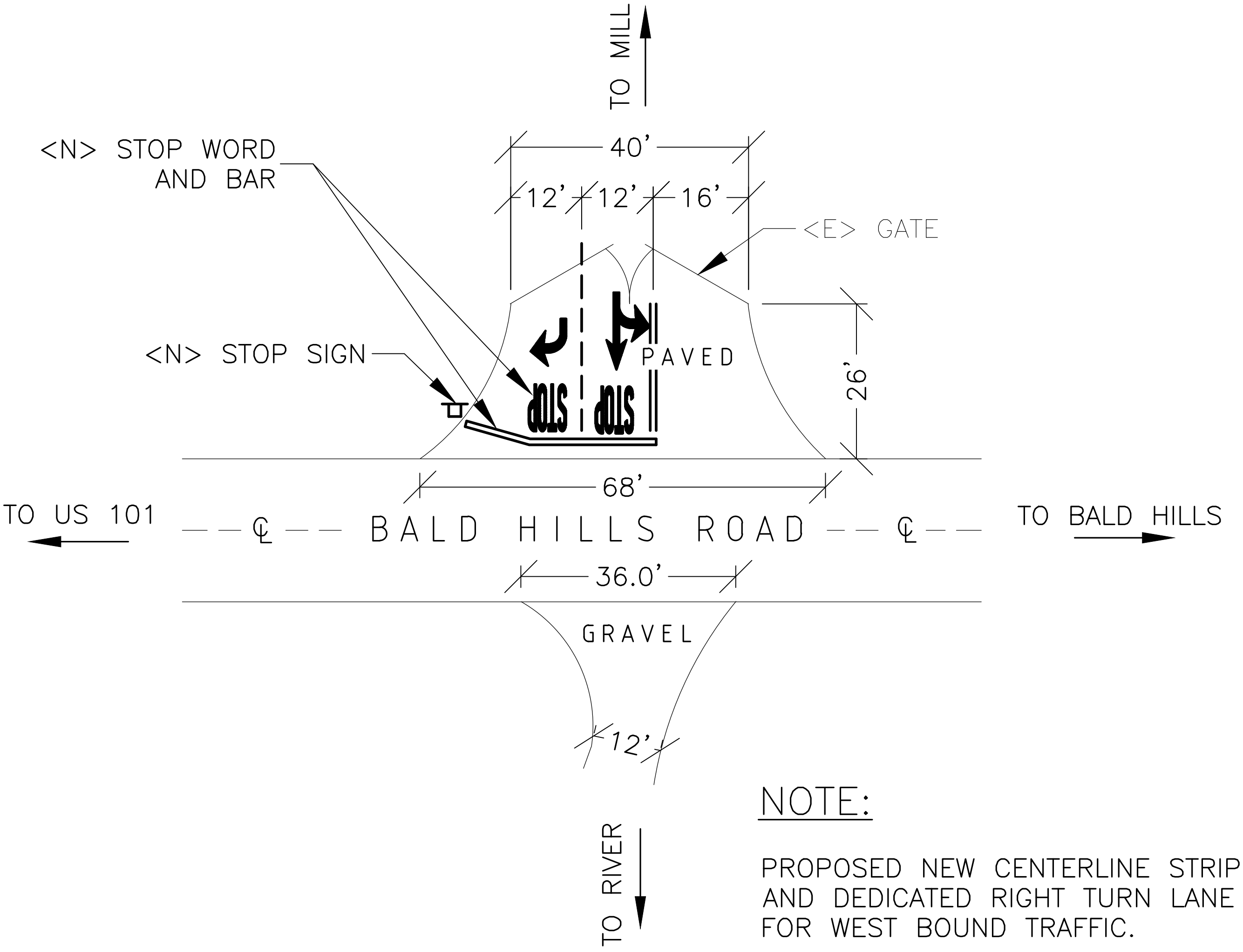
APPENDIX H

Proposed Lane Configuration and Signage at the Project Intersection

LACO ASSOCIATES
EUREKA · UKIAH
CONSULTING ENGINEERS
1-800-515-5054
WWW. LACOASSOCIATES.COM

PROJECT ORICK MILL SITE	BY JDB	APENDIX G	
CLIENT REDWOOD PARKS LODGE CO.	DATE 3/27/12		
LOCATION ORICK, CA	CHECK NBK	JOB NO. 7291.08	
PROPOSED GEOMETRIC DIMENSIONS	SCALE AS SHOWN		

INTERSECTION #1



NOTE:

PROPOSED NEW CENTERLINE STRIPING AND DEDICATED RIGHT TURN LANE FOR WEST BOUND TRAFFIC.

PLAN
N.T.S.

Mar 27,2012-10:53am
T:\Cadfiles\7200\7291 ORICK MILL SITE\dwg\ 7291 TRAFFIC INT 1.dwg

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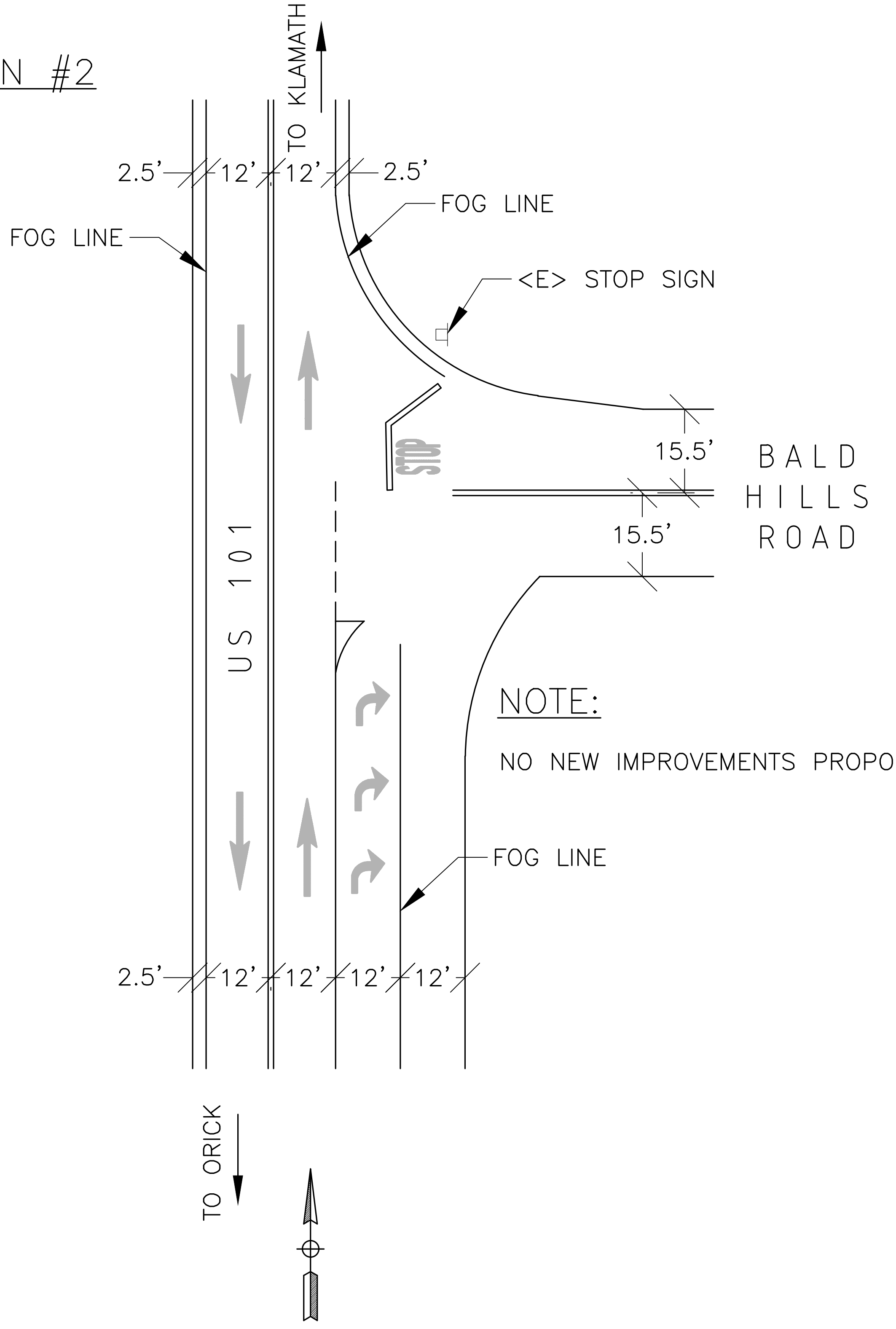
PROJECT	ORICK MILL SITE	BY	JDB	APENDIX G
CLIENT	REDWOOD PARKS LODGE CO.	DATE	3/27/12	
LOCATION	ORICK, CA	CHECK	NBK	JOB NO. 7291.08
	EXISTING GEOMETRIC DIMENSIONS	SCALE	AS SHOWN	

INTERSECTION #2



NOTE:

NO NEW IMPROVEMENTS PROPOSED.

PLAN
N.T.S.

Mar 27,2012–10:53am
T:\Cadfiles\7200\7291 ORICK MILL SITE\dwg\ 7291 TRAFFIC INT 2.dwg

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 1, P. O. BOX 3700
EUREKA, CA 95502-3700
PHONE (707) 445-6412
FAX (707) 441-5869
TTY 711

Flex your power!
Be energy efficient!

July 5, 2012

1-HUM-101-122.27
APNs 519-231-18 & 520-012-13
Draft TIS

Michael E. Wheeler
Humboldt County Community Development Services
3015 H Street
Eureka, CA 95501

Dear Mr. Wheeler,

While attending the early consultation meeting in Orick on April 23, we were asked by representatives of LACO to review and comment on the Draft Traffic Impact Study. We have not received a formal referral from the County and were not given a suggested timeframe for the review period. The project is located at the former Orick Mill site, north of the unincorporated community of Orick on the northeast side of the intersection of US 101 and Bald Hills Road. We have routed the draft through District staff and have the following comments that we would like the County and consultant to address:

We commend the recommendation that the project convert an old logging road to a multi-purpose trail connecting the project site to two different locations within Redwood National Park. We would encourage the project to also provide a non-motorized path between the project site and the levee which is used as an informal trail to the commercial center in Orick. This section of US 101 has become a significant tourist attraction because of its designations as both the Pacific Coast Bike Route (PCBR) and the California Coastal Trail (CCT). Adding this small portion of trail to the south will formalize and extend a section of the PCBR and CCT and contribute to the safe movement of touring cyclists and pedestrians who want to visit town from the project site.

Our major concern is with the lack of left turn channelization analysis for the southbound left turn from US 101 to Bald Hills Road. Currently, there are no dedicated turning facilities on this narrow two lane stretch of highway. A development of this size and type, at a minimum, requires an examination of the turning movement. We request that the County require a left turn warrant analysis using an industry approved approach such as the Harmelink model.

In addition, we offer the following informational comments:

- Page 4: Traffic volumes provided by the Caltrans Traffic Data Branch are two-way volumes. The TIS used this data as one-way volumes for both southbound and northbound.
- Page 4: The description of how data was collected should include more details, for example: turning movement counts were obtained from the County from <this date> to

<this date> and mainline US 101 counts were obtained from the Traffic Volume Counts from the Caltrans website…

- Page 4, Table 3: Post mile on Highway 101 at Bald Hills Road is 122.25, not 10.87.
- Figures 2, 4, and 6: AM and PM peak hour volumes are switched on Bald Hills Rd (See Appendix C). Left-turn and right-turn volumes on US 101 are switched accordingly in Figure 3, 5 and 7.
- Page 7, Tables 5 to 7: AM and PM LOS and delay results at *"Intersection #1 Southbound"* are for *"Project Entrance Southbound"*, not *"US 101 Southbound"*.
- All monument and private directional signage shall be located outside the Caltrans right-of-way and in compliance with visibility standards of the County's zoning code.

If you have any questions or comments, please feel free to contact me at the number above or call Rex Jackman, Chief of District 1 Office of Transportation Planning at (707) 445-6412.

Sincerely,

LEISHARA WARD
Associate Transportation Planner

c: Netra Khatri, LACO Associates

TECHNICAL MEMORANDUM

Traffic Safety Analysis
Save the Redwood League

Date: August 18, 2017
Project No.: 7787.23

Prepared For: Save the Redwood League

Prepared By: Rebecca Dower, PE

REGISTERED PROFESSIONAL ENGINEER
REBECCA L. DOWER
80868
8/18/17
CIVIL
STATE OF CALIFORNIA

Cc: Deirdre Clem (LACO)

Attachments:		
	Appendix 1:	Location Map
	Appendix 2:	Present and Future Operating Conditions
	Appendix 3:	Existing Intersection Geometry and Features
	Appendix 4:	Sight Distance Summary
	Appendix 5:	Proposed Left Turn Lane – Conceptual Design

1.0 PROJECT INFORMATION

1.1 Introduction

This Traffic Safety Analysis Technical Memorandum (hereinafter "TSA") presents an analysis of the existing traffic safety and potential traffic safety impacts associated with the intersection of Highway 101 and Bald Hills Road, at the former Orick Mill site off Highway 101 in Orick, Humboldt County, California. The Save the Redwoods League (League) seeks to assist in the development of the relocation of the Redwood Visitor Center to the former Orick Mill site (site). The League, in coordinate with the National Park Service, seeks to improve the traffic safety of the intersection prior to developing any improvements. Highway 101 is operated and maintained by the California Department of Transportation (Caltrans) and is comprised of a rural, high-speed (55 mph), two-lane roadway along the section adjacent to the site. Correspondence with Caltrans officials has indicated that traffic safety improvements to the intersection in the form additional turn lanes/turn pockets is desirable.

1.2 Scope of Work

The scope of services associated with this TSA is presented below:

- To produce a Traffic Safety Analysis of the site utilizing the draft Traffic Impact Study (TIS) previously prepared by LACO on April 9, 2012.
- To assess the current and needed functionality of the area adjacent to the intersection in order to facilitate safe use of the roadway for vehicle slowing/stopping, turning, and simultaneous use of the road by vehicles and pedestrians/cyclists.
- To prepare exhibits detailing a new southbound left turn pocket north of the intersection of Highway 101 and Bald Hills Road, and a modified northbound right turn pocket, if appropriate.
- To identify Left-turn lane features, such as optimal turn lane length, including taper, deceleration and storage.

1.3 Project Study Area

A traffic impact study (TIS) was performed by LACO in 2012. Traffic impacts are evaluated by determining the number of trips the new uses would be expected to generate, and distributing the new trips to the surrounding street system, based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic is expected to have on critical intersections included in the study. The study intersections were analyzed using the unsignalized intersection capacity method. The project study intersections were analyzed as a Two-Way Stop Control (TWSC) intersection.

The project study area involves the Bald Hills Road access point to the project area located along Highway 101 approximately 1.1 miles north of the Redwood Creek Bridge in Orick, California. A Location Map of the project study area is enclosed in Appendix 1. The main features of this intersection are summarized below:

- Highway 101 has two 12-foot wide lanes with approximately 2.5 foot shoulders in both directions
- A separate 12-foot wide right-hand turn lane (approximately 240 feet long) paralleled by a 12-foot wide shoulder;
- No dedicated left turn pocket for southbound traffic on Highway 101 turning left on to Bald Hills Road;
- A stop bar and signage for westbound traffic;
- No posted maximum speed limit at this intersection. The posted maximum speed limit at this stretch of Highway 101 is 55 mph.

2.0 EXISTING TRAFFIC CONDITIONS

2.1 Existing and Anticipated Project-Generated Traffic Volumes

Within the 2012 Traffic Impact Study prepared by LACO, the existing (2012) traffic volumes were obtained. For the purposes of this TSA, it is assumed that the traffic volumes in the study area have not significantly increased since the date of preparation of the 2012 study.

Based on a model (prepared by others) for the determination of peak visitation at the new Redwood Visitor Center, it is expected that peak visitation of 415 visitors per hour could be possible. Furthermore, based on the observed passenger-to-vehicle density of 2.7 visitors per vehicles at other National Park Service facilities, it is anticipated that a peak-hour total of 154 vehicles would be associated with the project. Following the existing traffic distribution trends, it is assumed that half of these new vehicles would approach the site as northbound traffic, and half would approach the site as southbound traffic, and an equal number of traffic would leave the intersection in the same way it currently does. This assumption is believed to represent a conservative over-estimate of the peak hour traffic, particularly during the AM timeframe.

Table 1. Existing and Existing plus Project Peak Hours Traffic Volumes

	Northbound Through (US 101)	**Southbound Through (US 101)**	**Southbound Left (US 101 to Bald Hills Rd.)**	**Northbound Right (US 101 to Bald Hills Rd.)**	**Westbound Left (Bald Hills Rd. to US 101)**	**Westbound Right (Bald Hills Rd. to US 101)**
Existing (2012) Traffic Volumes	540 (540)*	540 (540)	38 (93)	39 (93)	42 (59)	42 (58)
Project-Generated Traffic Volumes	0	0	77 (77)	77 (77)	77 (77)	77 (77)
Existing plus Project Traffic Volumes	540 (540)	540 (540)	115 (170)	116 (170)	119 (136)	1119 (135)

*AM (PM) peak hour volume

2.2 Accident Rate Analysis

For use in the TIS, collision information for highway 101/ Bald Hills Road was obtained from the California Highway Patrol-Humboldt Area. The collision data showed that there were 20 filed traffic accidents within the project vicinity from 07/10/1999 to 11/2009[5]. The collision descriptions do not precisely identify the study intersections; rather, they identify the nearest cross street. LACO contacted CHP on 6/26/2017 to provide an update on the accident information. There was no reliable updated info available for the study area.

Caltrans Performance Measures for Rural Transportation Systems Guidebook, [6], provides a standardized and supportable safety performance measurement process that can be applied to transportation systems in rural areas. The methodology described in the guidebook uses accident data and traffic volumes (AADT) to determine an accident rate, which can then be trended over time for the same location. For the safety performance measure, this is considered the basic level, and there are no intermediate or advanced methodologies for this measure. Traffic counts are provided from Caltrans Traffic Census Program. [3]

$$AR = \frac{A.1000000}{L.Y.AADT.365}$$

Where:

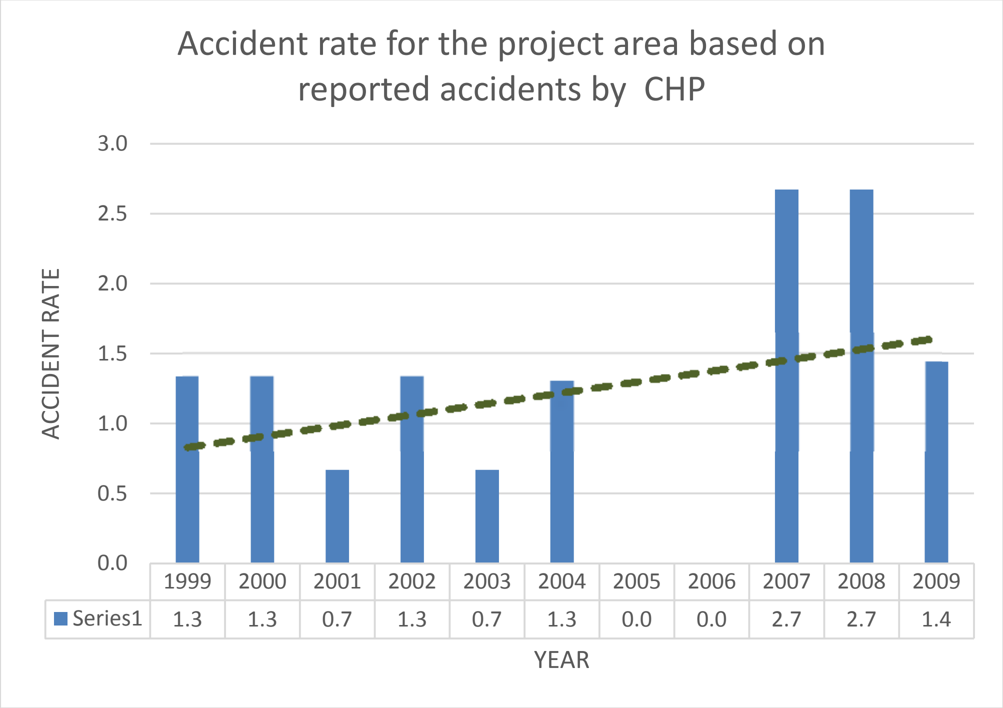
- AR = Accident rate per million vehicle miles traveled
- A = Number of accidents
- L = Length of the segment in miles
- Y = Number of years
- AADT = Average annual daily traffic along the corridor
- 365 = Number of days in a year

The result of accident rate analysis for the study intersection has been summarized in table 2 and illustrated in figure 2. As can be seen in figure 2 there were an increasing trend in accident rate for the study intersection in the specified duration.

Table 2. Accident rate analysis result for the study intersection for the period of 07/10/1999 to 11/2009

Year	***1999***	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***	***2007***	***2008***	***2009***
# of Accident	2	2	1	2	1	2	0	0	4	4	2
# of Year	1	1	1	1	1	1	1	1	1	1	1
ADT	4100	4100	4100	4100	4100	4200	4200	4100	4100	4100	3800
Accident Rate	1.3	1.3	0.7	1.3	0.7	1.3	0.0	0.0	2.7	2.7	1.4

Figure 2 Accident rate graph for the project area



2.3 Analyzing Caltrans Route Concept Report

The Route Concept Report (RCR) [7], is a planning document which describes the Department's conceptual improvement options for a given transportation route or corridor. Considering reasonable financial constraints and projected travel demand over a 20-year planning period, the RCR considers transportation facility needs for each route or corridor. Appendix 2 shows present and future operating conditions for Route 101 in Humboldt County. The study intersection is located in segment 15.

Based on RCP, we can conclude that the study area is not among the areas of concern on Route 101, which are selected based on an analysis of level of service (calculated using the 2000 Highway Capacity Manual) and collision history.

It should be considered that this concept does not cover the impact of new development in the area which will have a significant impact on the traffic volumes and traffic safety in the adjacent routs and intersection.

3.0 ANALYSIS OF INTERSECTION SAFETY

A figure illustrating the existing intersection geometry and roadway features is enclosed in Appendix 3. The following subsection describe the various components of traffic safety that were assessed as part of this TSA.

3.1 Sight Distance

Sight distances at the Highway 101 (as Major road) and Bald Hills Road (as Minor road) intersection are calculated using AASHTO green book guidelines. The study intersection is an intersection with stop control on a minor road, which is identified as Case B in AASHTO green book. It also falls in Case F category which characterizes recommended sight distance for Left turn from major road. We have also considered a Case F1 to consider the horizontal curves' effect in the study intersection area. Figures illustrating the result of the intersection sight distances and stopping sight distance calculations are enclosed in Appendix 3. Table 3 presents a summary of the results and compares the calculated values with available sight distances in the study intersection.

For the time gap calculations, AASHTO requires to include appropriate adjustments to the time gaps for the approach grade of minor road. The slope of roads in the intersection area is determined using the existing topographic survey. The slope in the Bald Hills Road westbound is increasing and approximately measured as five percent to the centerline of highway 101. The slopes in highway 101 is less than three percent.

Table 3. Sight Distance Summary

Sight Distance Locations	Required Sight Distance (feet)	Approx. Available Sight Distance (feet)	Additional Comments
Case B1: Left turn from Bald Hills Road (minor road)	850	Southbound:700	**NOT OK**
		Northbound: 950	OK-Needs some maintenance to have a full SD.
Case B2: right turn from Bald Hills Road (minor road)	728	Southbound:700	**NOT OK**
		Northbound: 950	OK
Case F: Left turn from Highway 101 (major road)	525	730	OK
Case F1: Left turn from Highway 101 (major road) by considering the curves' effect	495	610	OK

3.2 Left Turn Lane Warrants

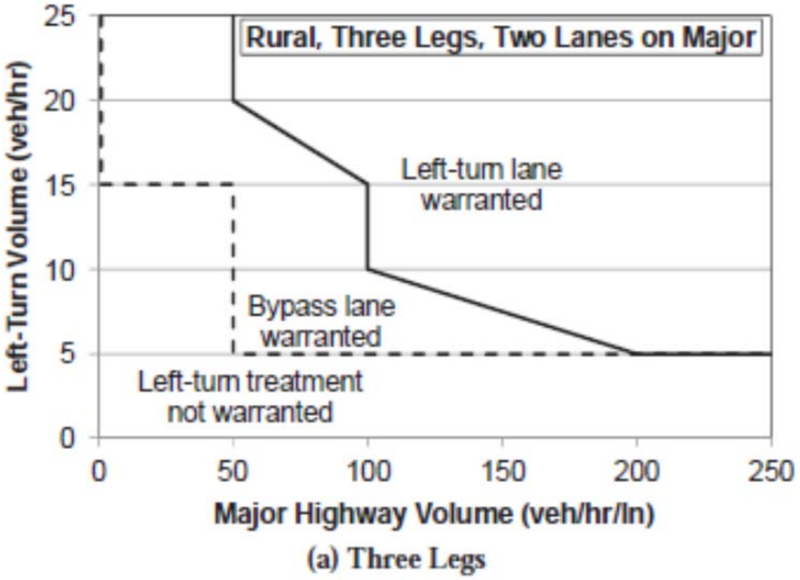
Left-turn lanes can reduce the potential for collisions and improve capacity by removing stopped vehicles from the main travel lane. In this section we are going to determine whether the project information indicates that a left-turn lane is necessary or beneficial.

The recommended left-turn treatment warrants for rural two-lane highways based on *NCHRP Report 745* are reproduced in Table 4 and relevant volumes for the study intersection are highlighted based on Table 4 information. Figure 3 can be used to determine if site conditions warrants a left-turn lane.

Table 4: The recommended left-turn treatment warrants for rural two-lane highways (NCHRP Report 745)

Left-Turn Lane Peak-Hour Volume (veh/hr)	Three-Leg Intersection, Major Two-Lane Highway Peak-Hour Volume (veh/hr/ln)	Three-Leg Intersection, Major Two-Lane Highway Peak-Hour Volume (veh/hr/ln)	Four-Leg Intersection, Major Two-Lane Highway Peak-Hour Volume (veh/hr/ln)	Four-Leg Intersection, Major Two-Lane Highway Peak-Hour Volume (veh/hr/ln)
5	50	200	50	150
10	50	100	< 50	50
15	< 50	100	< 50	50
20	< 50	50	< 50	< 50
25	< 50	50	< 50	< 50
30	< 50	50	< 50	< 50
35	< 50	50	< 50	< 50
40	< 50	50	< 50	< 50
45	< 50	50	< 50	< 50
50 or More	< 50	50	< 50	< 50

Figure 3 Accident Rate Graph for the Project Area



The existing peak hour left-turn volume at this location is 38 for AM and 93 for PM. For two-lane rural highway intersections with three legs, figure 3 illustrates that a left turn lane is warranted for such roadways when traffic volumes exceed 50 trips per hour. Therefore a left-turn should be warranted at this location and should be considered, even prior to adding project-generated traffic.

Reasons for considering the installation of a left-turn lane in the study intersection are:

- Potential for slowed or stopped traffic in the southbound 101 travel lane which increase the risk of rear-end accidents.
- Drivers have to wait a long time to make a left turn.
- There are a high number of left-turning vehicles.
- Speeds are too high to safely make left turns to or from Bald Hills Road.

3.3 On-Site Assessment of Safety Conditions

In June 28, 2107 a safety review was performed by Mr. Noroozi, a LACO licensed engineer, at the project study area to review the existing safety conditions at the intersection. Below are some of the identified safety issues:

Safety Issue #1: Potential for slowed or stopped traffic in the travel lane. Vehicles have to stop fully in the southbound line when a left turn is going to be made.

Related traffic movement: Left turn from Highway 101 to Bald Hills Road

Risk(s):

- Increasing risk of rear-end crashes of vehicles slowed or stopped

Recommended safety measures:

- Short term*:* Reducing the speed in the affected area, installing warning sign informing drivers of possible stopped or slowed vehicles in the southbound 101.
- Long term: Left-turn channelization in southbound highway 101

1-A track stopped at the intersection to make a left turn to Bald Hills RD. Then a car had to stop behind it waiting for the truck.

2- Another car approached and stopped in the highway

3- Truck made the left turn and road is opened! The stopped vehicles have to accelerate again from stop.

View looking south through Highway 101 to study intersection

Safety Issue #2: This maneuver poses several concurrent challenges: first, identifying a safe gap in traffic on highway 101, and second, turning left “up” the slope to the left and without the benefit of a dedicated acceleration lane. The existing intersection sight distance is less than recommended.

Related traffic movement: Left turn from Bald Hills road to Highway 101

Risk(s):

- Increasing risk of side-impact collisions,
- Increasing risk of vehicle to pedestrians/ cyclist crashes due to challenges that drivers are facing and causing them confusion and not paying attention to the pedestrians/cyclist users.
- Increasing the likelihood of multi-vehicle crashes.

Recommended safety measures:

- Improve the sight distance visibility in northbound highway 101 to reach to the recommended values.

	
Drivers does not have enough sight distance to predict the available gap time and should go up the slope.	The northbound truck is almost reaching the turning truck when the turn is fully done.

View looking south through Highway 101 to study intersection

Safety Issue #3: Decreased sight distance in northbound and southbound 101 due to vegetation, slope and curve effect. Intersection is located in a crest vertical curve that decreases the intersection visibility.

Related traffic movement: Left turn from Bald Hills Road to Highway 101, Left turn from Highway 101 to Bald Hills Road.

Risk(s):

- Increasing risk of side-impact collisions,
- Increasing risk of vehicle to pedestrians/cyclist crashes due to challenges that drivers are facing and causing them confusion and not paying attention to the pedestrians/cyclist users.
- Increasing the likelihood of multi-vehicle crashes.

Recommended safety measure(s):

- Improve the sight distance visibility by trimming/removing vegetation.

Fast growing vegetation in combination with the road slope and curve effect degrade the existing sight distance in northbound and southbound 101.

View looking north from Bald Hills Road

View looking south through Highway 101

Safety Issue #4: Narrow shoulder width in northbound and southbound Highway 101 in combination with the curve effect decrease the safety of potential pedestrian and cyclist users.

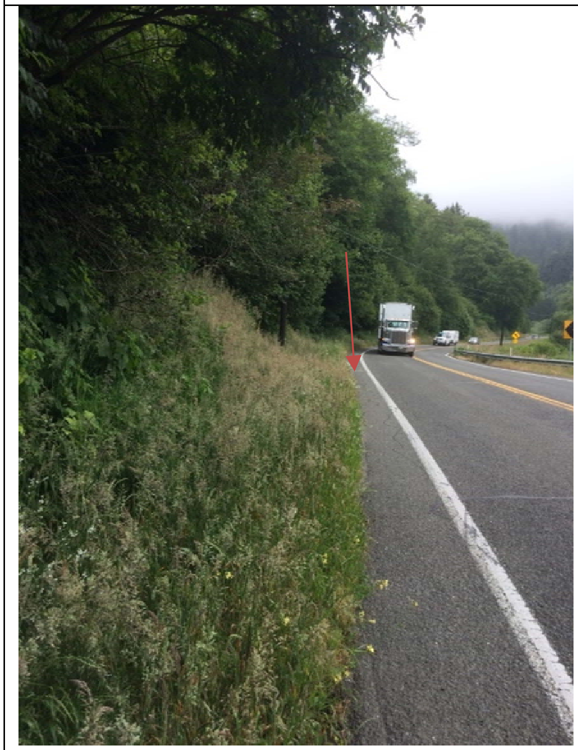
Related traffic movement: All traffic movements.

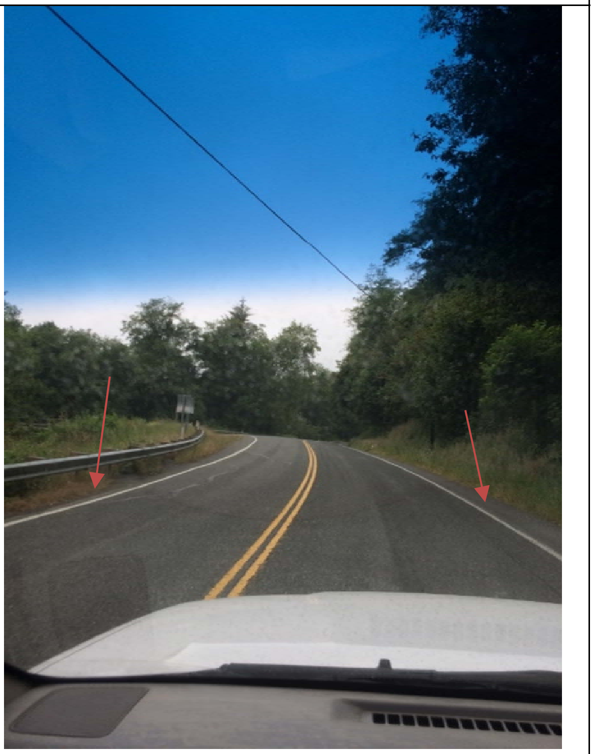
Risk(s):

- Increasing risk of vehicle to pedestrians/cyclist crashes
- Increasing the likelihood of multi-vehicle crashes.

Recommended safety measure(s):

- Shoulder widening to meet the minimum requirements.





Narrow shoulders –pedestrian safety Intersection visibility

View looking north through Highway 101

View looking south through Highway 101

4.0 PRELIMINARY DESIGN OF NEW IMPROVEMETNS

4.1 Left Turn Lane Design

The dimensions and other physical characteristics of the proposed new left turn lane are specified in this section based on geometric design principles illustrated in the Highway Design Manual [1]. A left-turn lane should be designed in relation to the main lanes of the adjacent roadway. The design speed of 55 mph is selected based on the posted speed on Highway 101. There is a warning speed sign of 40 mph in southbound Highway 101 for the horizontal curve right before the curve that include the Bald Hills Road, but cannot be considered for the intersection area as the gap is acceptable for the drivers to increase the speed up to posted speed. The basic information needed for use with the developed left-turn lane warrants based on NCHRP Report 745 are summarized in table 5.

Table 5. The basic information needed for use with the developed left-turn lane warrants

Project information for Study Intersection	
Development (rural or urban/suburban)	Rural
Number of lanes on the major roadway	Two
Number of approaches (three legs or four legs)	three legs
Major roadway volume (vehicles per hour per lane)	540
Truck traffic percentage	15
Left-turn Volume (vehicles per hour)	135
Speed (mph)	55

4.1.1 Determine the Width of Left-Turn Lane

Based on *Caltrans Highway Design Manual (HDM),* [1], the lane width for both single and double left-turn lanes on State highways shall be 12 feet.

4.1.2 Determine the Length of the Approach Taper.

The *HDM* presents the formula for the calculation of approach tapers. Considering the study intersection design speed, the length of the approach taper is calculated as:

$$L = W * S$$

Where:

- L = length (ft)
- W = lateral offset (ft)
- S = speed (mph)

The section of Highway 101 within the project study area has a posted speed of 55 mph, and a lateral offset of 12 feet is desired. Therefore, the approach taper length for the left-turn lanes on Highway 101 was calculated as follows:

- L =12 ×55 = 660 ft

4.1.3 Determine the Length of the Bay Taper

On rural high-speed highways, such as the section of Highway 101 within the project study area, a 120-foot length is considered appropriate for the length of bay taper, according to the *HDM*.

4.1.4 Determine the Length of the Deceleration Lane

Deceleration lane lengths are given in *HDM* Table 405.2B; the bay taper length is included within the deceleration lane length presented in that table. A deceleration lane length of 480 feet is was determined for the study intersection.

4.1.5 Determine the Length of Left-Turn Storage Lane

According to *HDM*, at a minimum, space for two vehicles should be provided at 25 feet per vehicle. If the peak hour truck traffic is 10 percent or more, space for at least one passenger car and one truck (at 35 feet per vehicle) should be provided. Based on the information presented in reference [3], the percentage of truck traffic within the project study area is approximately 15 percent. Therefore the storage lane is cumulated as follows:

By considering one car and one truck: Left-turn storage length= 35+25=60
In order to accommodate the estimated left-turn volume in the study intersection, NCHRP report 745 has been consulted and the length of the left-turn storage is calculated as:

$$L = \frac{V}{N_c} KS$$

Where:
L = design length for left-turn storage (ft)
V = estimated left-turn volume, vehicles per hour (veh/hr)
Nc = number of cycles per hour. For the Green Book unsignalized procedure, this would be 30
(V/N is the average number of turning vehicles per cycle).
k = factor that is the length of the longest queue (design queue length) divided by average queue length (a value of 2.0 is commonly used for major arterials, and a value of 1.5 to 1.8 might be considered for an approach on a minor street or on a collector where capacity will not be critical). For the Green Book procedure, this would be 1.0.
s = average length per vehicle, including the space between vehicles, generally assumed to be 25 ft

$$L = \frac{135}{30} \times 25 \approx 113\,ft$$

4.1.6 Design Result

The figure presented in Appendix 3 illustrates the existing condition of the highway 101/ Bald Hills intersection and figure in appendix 5 shows the conceptual design configuration with implementation of the exclusive southbound left-turn lane on southbound Highway 101. This conceptual design is based on a standard left-turn channelization and the required widening will require extensive construction work on the east side of study intersection.

4.2 Right Turn Lane Design

An existing 12-feet wide right-turn lane (approximately 240 feet long) is provided for northbound traffic on Highway 101 turning right on Bald Hills Road. According to HDM and considering the design speed of 55 mph, deceleration length of 480 feet is recommended for the right-turn from Highway 101 to Bald Hills Road. The approximate available deceleration length is 470 feet almost meets the recommended values. Therefore no improvement is recommended for the right-turn.

5.0 CONCLUSION

A summary of findings and safety recommendations are presented in Table 6. Additionally, the safety of the intersection may be further enhanced through the construction of a new acceleration lane for vehicles making a westbound left turn from Bald Hills Road onto US 101. The feasibility of this enhancement would need to be further analyzed, as significant topographic constraints exist at the study intersection, limiting the available total roadway width.

Table 6. Summary of Recommendations

	Topic	Findings	Recommendation(s)		
			Short term	**Regular**	**Long term**
1	Sight Distance	Left-turn and Right-turn from Bald Hills road does not have a proper sight distance	Trim/cut existing Vegetation and trees to provide the recommended SD	Trim Vegetation and trees regularly	Shoulder widening
2	Left-Turn Channelization	The existing intersection cannot accommodate the left turn traffic safely	Additional road warning signs in , Example:  SW60 (CA) Lower advised speed in the intersection area	NA	Adding a left-turn lane for the Southbound 101 to Bald Hills Rd.
3	Right-Turn Canalization	The existing right-turn lane meets the recommended standards	No action required	NA	No action required
4	Pedestrian and Cyclist Safety	The existing intersection cannot accommodate pedestrian and cyclist users safely	Additional Warning signage for pedestrian and cyclists	NA	Shoulder widening, adding appropriate road markings and signage

6.0 REFERENCES

1. California Department of Transportation, “Highway Design Manual, Chapter 400, Intersections at grade” March 7, 2014.
2. American Association of State Highway and Transportation Officials (AASHTO), “A Policy on Geometric Design of Highways and Streets”, 6th edition, 2001.
3. http://www.dot.ca.gov/trafficops/census/ *2015 traffic volumes on California State Highways* and *2015 Annual Average Daily Truck Traffic*.
4. Transportation research Board, NCHRP Report 745, “Left-Turn Accommodations at Unsignalized Intersections”, 2013.
5. LACO Project No. 7291.08 draft report, “Traffic Impact study for Redwood national park League”, 2012.
6. California Department of Transportation, “Performance Measures for Rural Transportation Systems Guidebook”, June 2006.
7. California Department of Transportation, “Route Concept report, route 101 corridor”, October 2002
8. California MUTCD 2014 Edition

APPENDIX 1

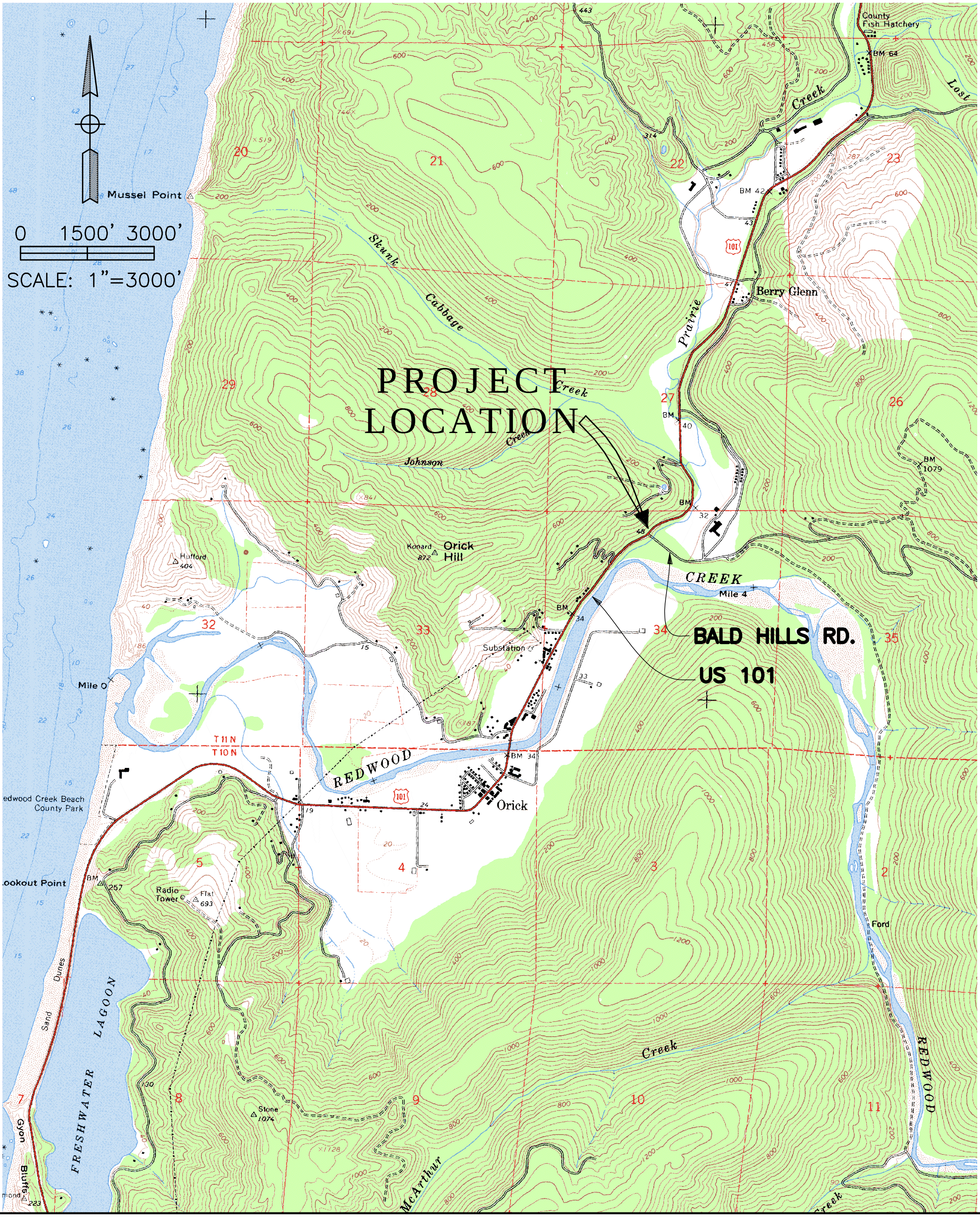
Location Map

LACO

EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 www.lacoassociates.com

PROJECT	ORICK MILL SITE	BY	ASV	FIGURE 1-0
CLIENT	SAVE THE REDWOODS LEAGUE	DATE	7/13/17	
LOCATION	ORICK, CA	CHECK	AN	JOB NO. 7787.23
	LOCATION MAP	SCALE	SHOWN	



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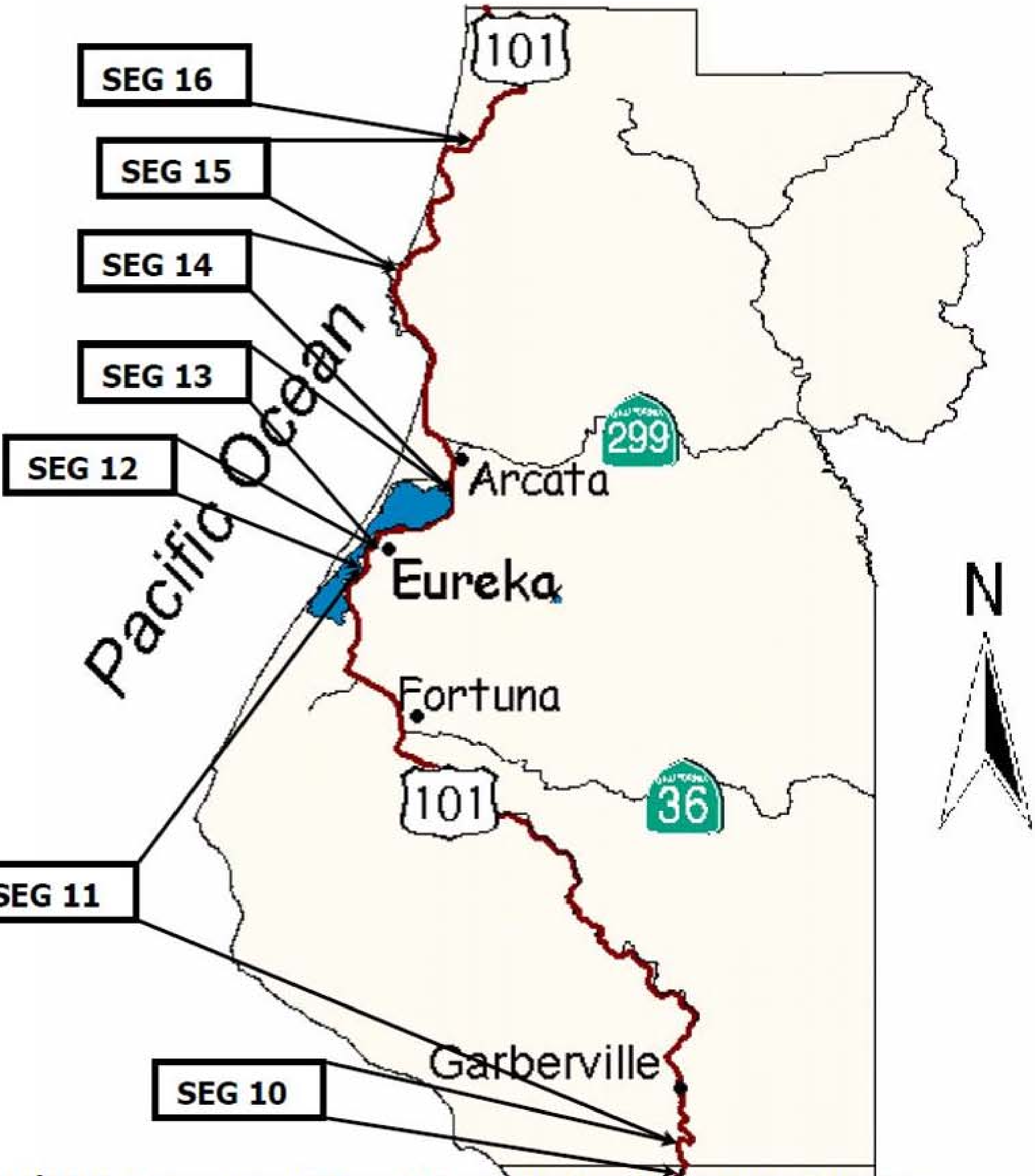
APPENDIX 2

Present and Future Operating Condition for Route 101in Humboldt County

ROUTE 101 RCR

PRESENT AND FUTURE OPERATING CONDITIONS
ROUTE 101 IN HUMBOLDT COUNTY

SEG NO.	KM POST	POST MILE	PRESENT (2000) TRAF. VOL. (LOS)	FUTURE (2020) TRAF. VOL.(LOS)	EXISTING FACILITY
16	R202.4/R220.6	R125.8/R137.1	3,600 (A)	5,000 (A)	4-E
15	176.1/R202.4	109.4/R125.8	4,600 (C)	6,000 (D)	2-C
14	130.1/176.1	85.8/109.4	18,600 (B)	26,000 (C)	4-F/E
13	128.4/130.1	79.8/85.8	34,800 (C)	48,700 (E)	4-F/E
12	120.4/128.4	74.8/79.8	34,600 SUF*	48,400 SUF*	4F/E-5&6Couplet
11	R9.0/120.4	R5.6/74.8	11,600 (B)	15,000 (B)	4-F/E
10	T0.0/R9.0	T0.0/R5.6	5,000 (C)	6,400 (D)	2-C

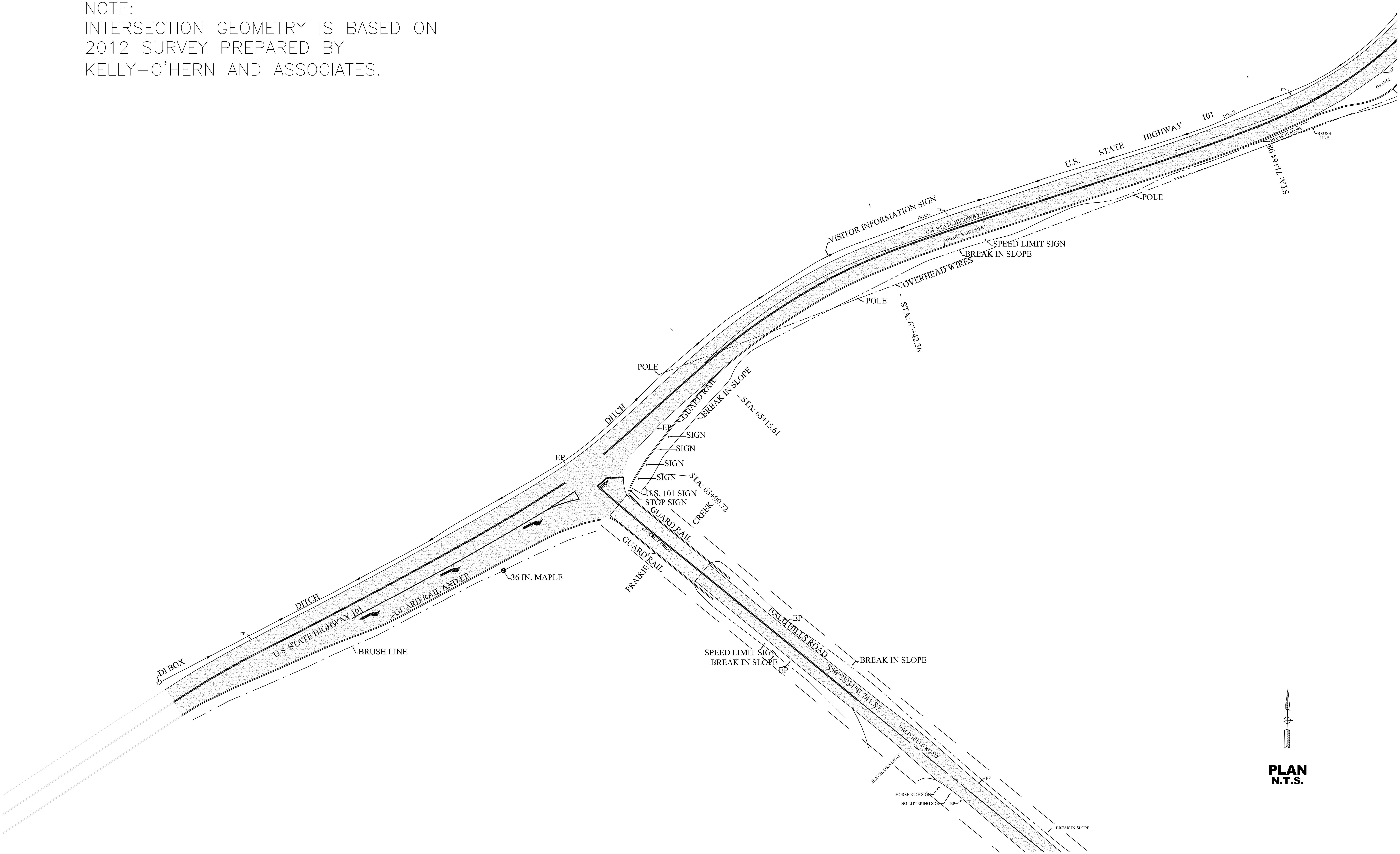


- SUF (signalized unstable flow): signalized intersections control level of service, and some intersections within the segment experience unstable flow at peak hour.

APPENDIX 3

Existing Intersection Geometry and Roadway Features

NOTE:
INTERSECTION GEOMETRY IS BASED ON
2012 SURVEY PREPARED BY
KELLY–O'HERN AND ASSOCIATES.



PLAN
N.T.S.

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1-800-515-5054 www.lacoassociates.com

NO.	HISTORY / REVISION	BY	CHK.	DATE

ORICK MILL SITE
HIGHWAY101 & BALD HILLS ROAD INTERSECTION
EXISTING GEOMETRY & ROAD FEATURES

SAVE THE REDWOODS LEAGUE
ORICK, CA

DRAWN	RGB
CHECK	RLD
APPROVED	RLD
DATE	8/17/17
JOB NUMBER	7787.23
FIGURE	7

Aug 17,2017-6:18pm
T:\Cadfiles\7700\7787.23 SAVE THE REDWOOD TRAFFIC SAFETY ANALYSIS\ 7787.23 FIGURE 7.dwg

APPENDIX 4

Sight Distance Summary

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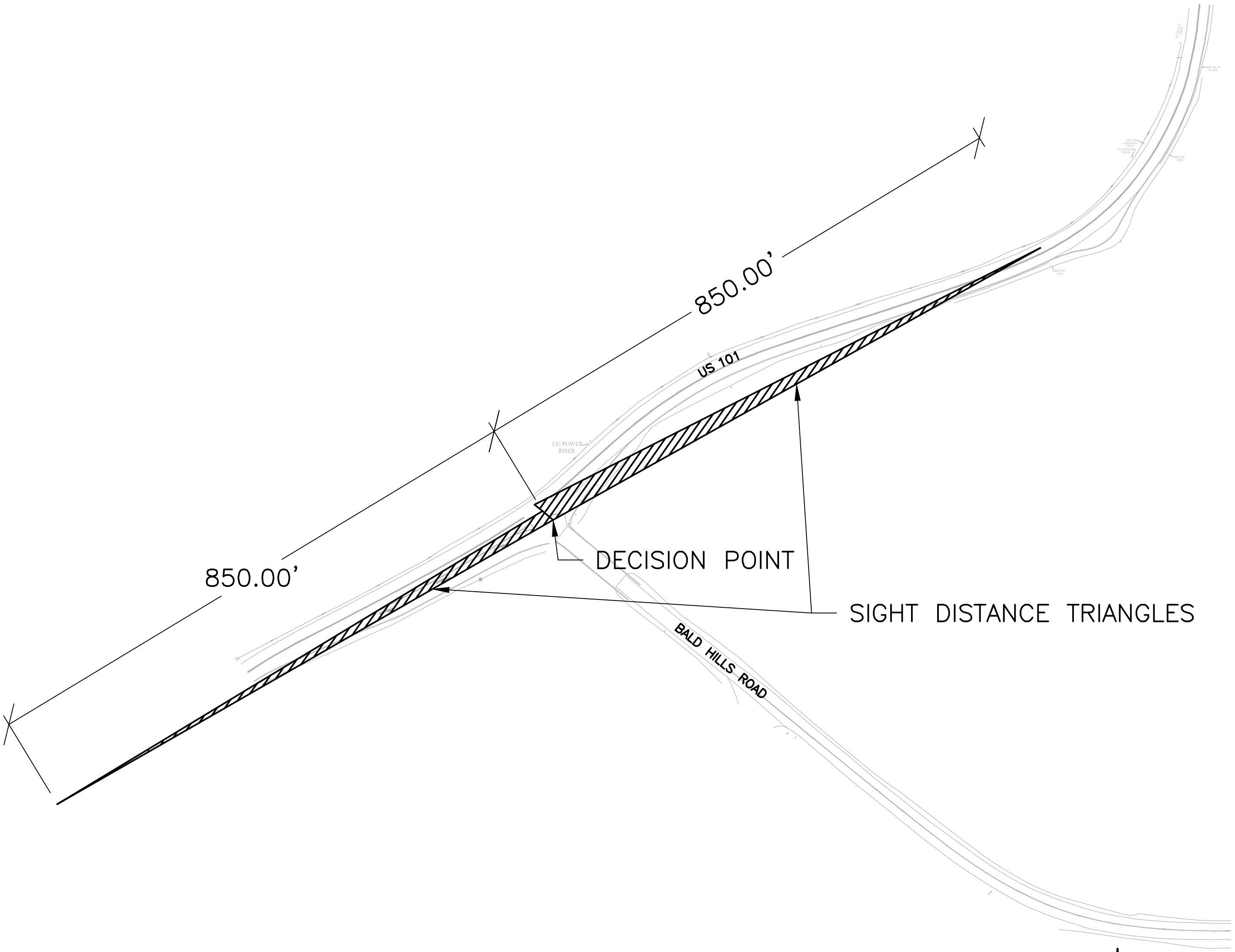
1-800-515-5054 www.lacoassociates.com

PROJECT	ORICK MILL SITE	BY	RGB	FIGURE 3
CLIENT	SAVE THE REDWOODS LEAGUE	DATE	8/17/17	
LOCATION	ORICK, CA	CHECK	RLD	JOB NO. 7787.23
	SIGHT DISTANCE SUMMARY- CASE B1	SCALE	NTS	

HIGHWAY101 BALD HILLS ROAD INTERSECTION
CASE B1: LEFT TURN FROM MINOR ROAD



RECOMMENDED INTERSECTION SIGHT DISTANCE, CASE B1				
DESIGN SPEED (MPH)	APPROACHING GRADE	CALCULATED TIME GAP (S)	DESIGN VEHICLE	RECOMMENDED SIGHT DISTANCE (FT)
55	5%	10.5	SINGLE UNIT TRUCK	850

SOURCE:AASHTO GREEN BOOK, 2011

PLAN
N.T.S.

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PROJECT	ORICK MILL SITE	BY	RGB	FIGURE 4
CLIENT	SAVE THE REDWOODS LEAGUE	DATE	8/17/17	
LOCATION	ORICK, CA	CHECK	RLD	JOB NO. 7787.23
	SIGHT DISTANCE SUMMARY- CASE B2	SCALE	NTS	

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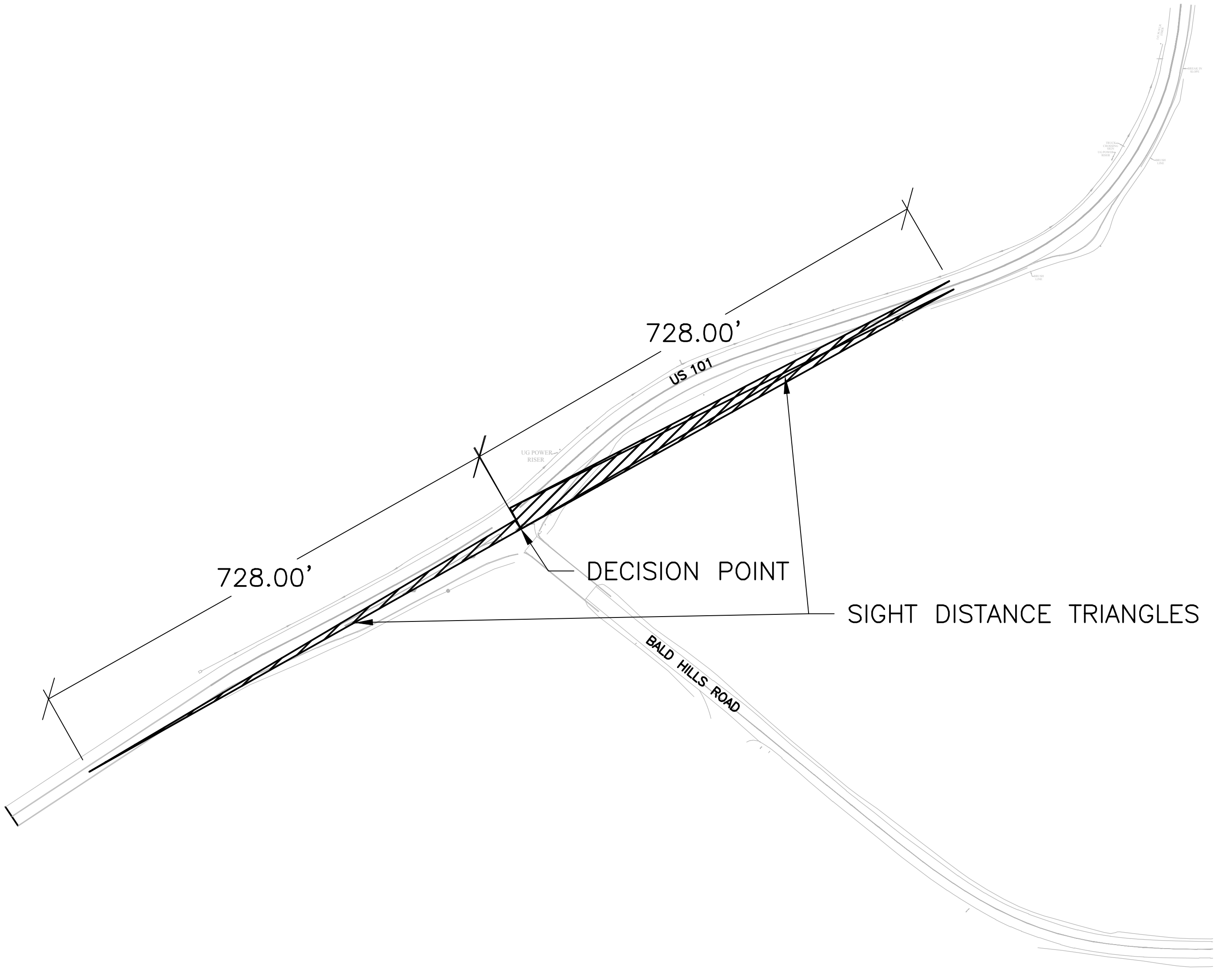
HIGHWAY101 BALD HILLS ROAD INTERSECTION
CASE B2: RIGHT TURN FROM MINOR ROAD



RECOMMENDED INTERSECTION SIGHT DISTANCE, CASE B2				
DESIGN SPEED (MPH)	APPROACHING GRADE	CALCULATED TIME GAP (S)	DESIGN VEHICLE	RECOMMENDED SIGHT DISTANCE (FT)
55	5%	9.0	SINGLE UNIT TRUCK	728

SOURCE: AASHTO GREEN BOOK, 2011

PLAN
N.T.S.

Aug 17,2017–5:05pm
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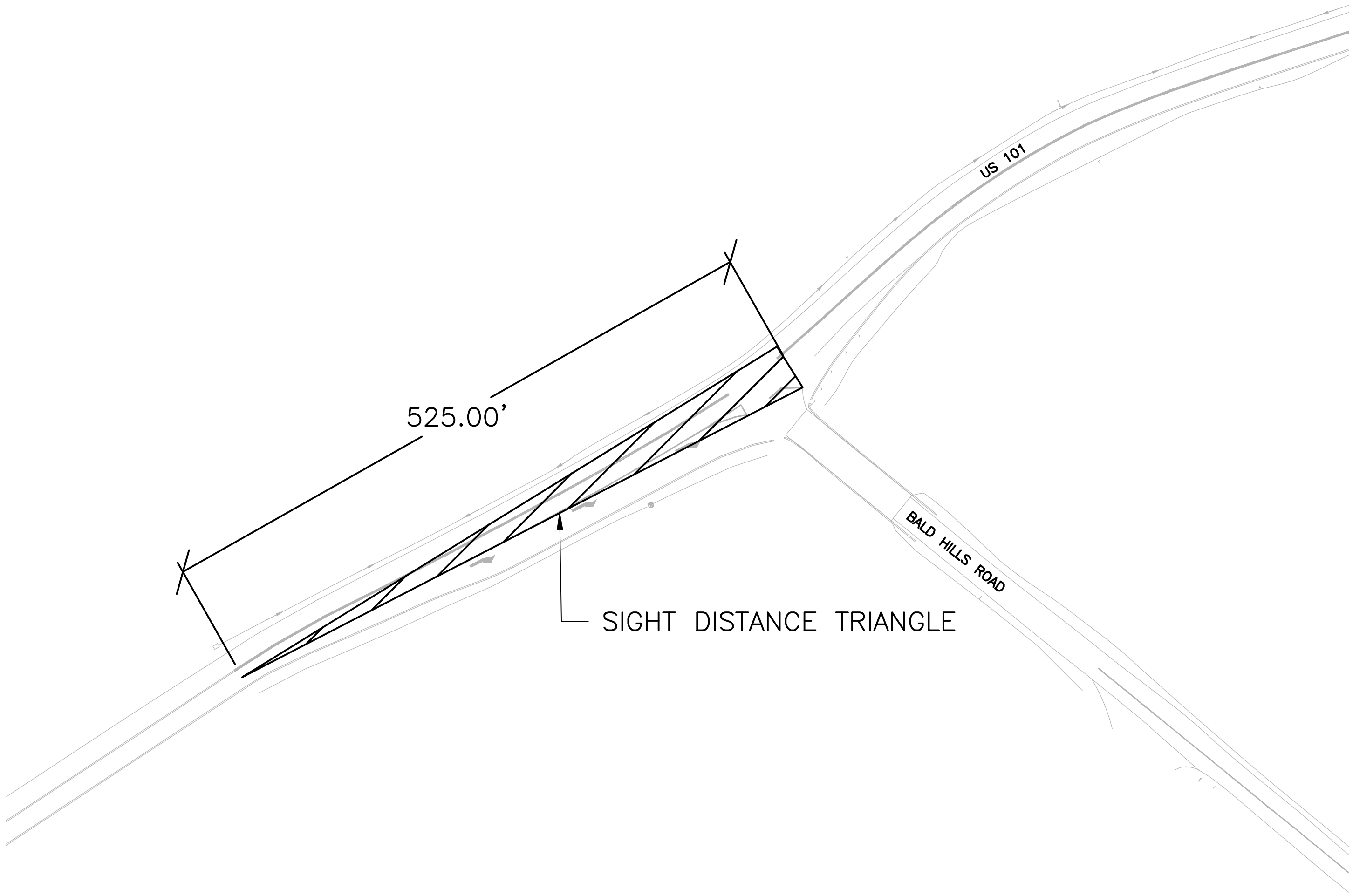
PROJECT	ORICK MILL SITE	BY	RGB	FIGURE 5
CLIENT	SAVE THE REDWOODS LEAGUE	DATE	8/17/17	
LOCATION	ORICK, CA	CHECK	RLD	JOB NO. 7787.23
	SIGHT DISTANCE SUMMARY- CASE F	SCALE	NTS	

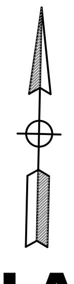
HIGHWAY101 BALD HILLS ROAD INTERSECTION
CASE F: LEFT TURN FROM MAJOR ROAD (FROM STOP)



RECOMMENDED INTERSECTION SIGHT DISTANCE, CASE F

DESIGN SPEED (MPH)	APPROACHING GRADE	CALCULATED TIME GAP (S)	DESIGN VEHICLE	RECOMMENDED SIGHT DISTANCE (FT)
55	< 3%	6.5	SINGLE UNIT TRUCK	525

SOURCE:AASHTO GREEN BOOK, 2011



PLAN
N.T.S.

Aug 17,2017–5:07pm
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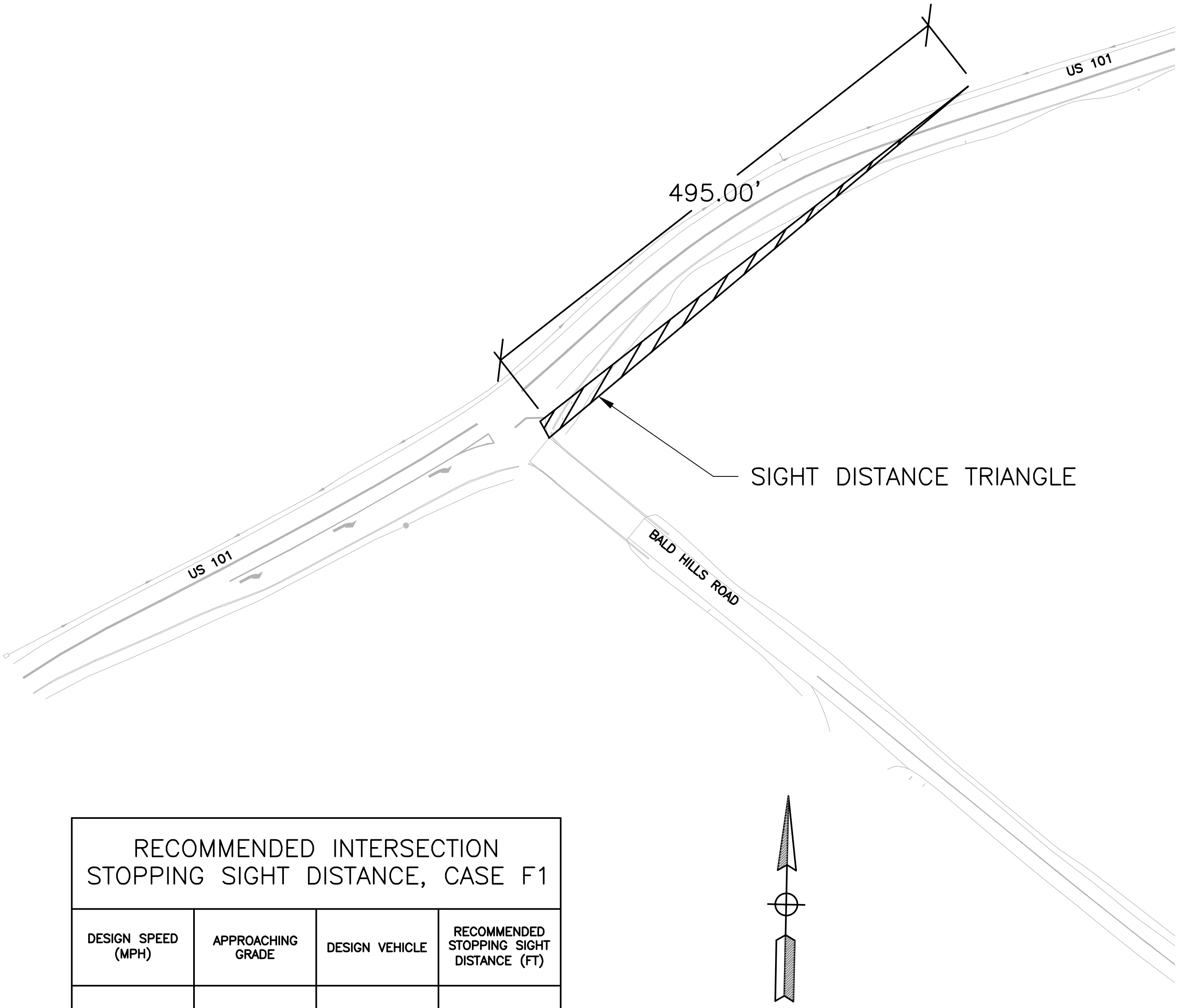
PROJECT	ORICK MILL SITE	BY	RGB	FIGURE 6
CLIENT	SAVE THE REDWOODS LEAGUE	DATE	8/17/17	
LOCATION	ORICK, CA	CHECK	RLD	JOB NO. 7787.23
	SIGHT DISTANCE SUMMARY- CASE F1	SCALE	NTS	

HIGHWAY101 BALD HILLS ROAD INTERSECTION
CASE F1: LEFT TURN FROM MAJOR ROAD (CONSIDERING CURVE EFFECT)



RECOMMENDED INTERSECTION STOPPING SIGHT DISTANCE, CASE F1			
DESIGN SPEED (MPH)	APPROACHING GRADE	DESIGN VEHICLE	RECOMMENDED STOPPING SIGHT DISTANCE (FT)
55	< 3%	SINGLE UNIT TRUCK	495

SOURCE: AASHTO GREEN BOOK, 2011

PLAN
N.T.S.

Aug 18,2017-2:50pm
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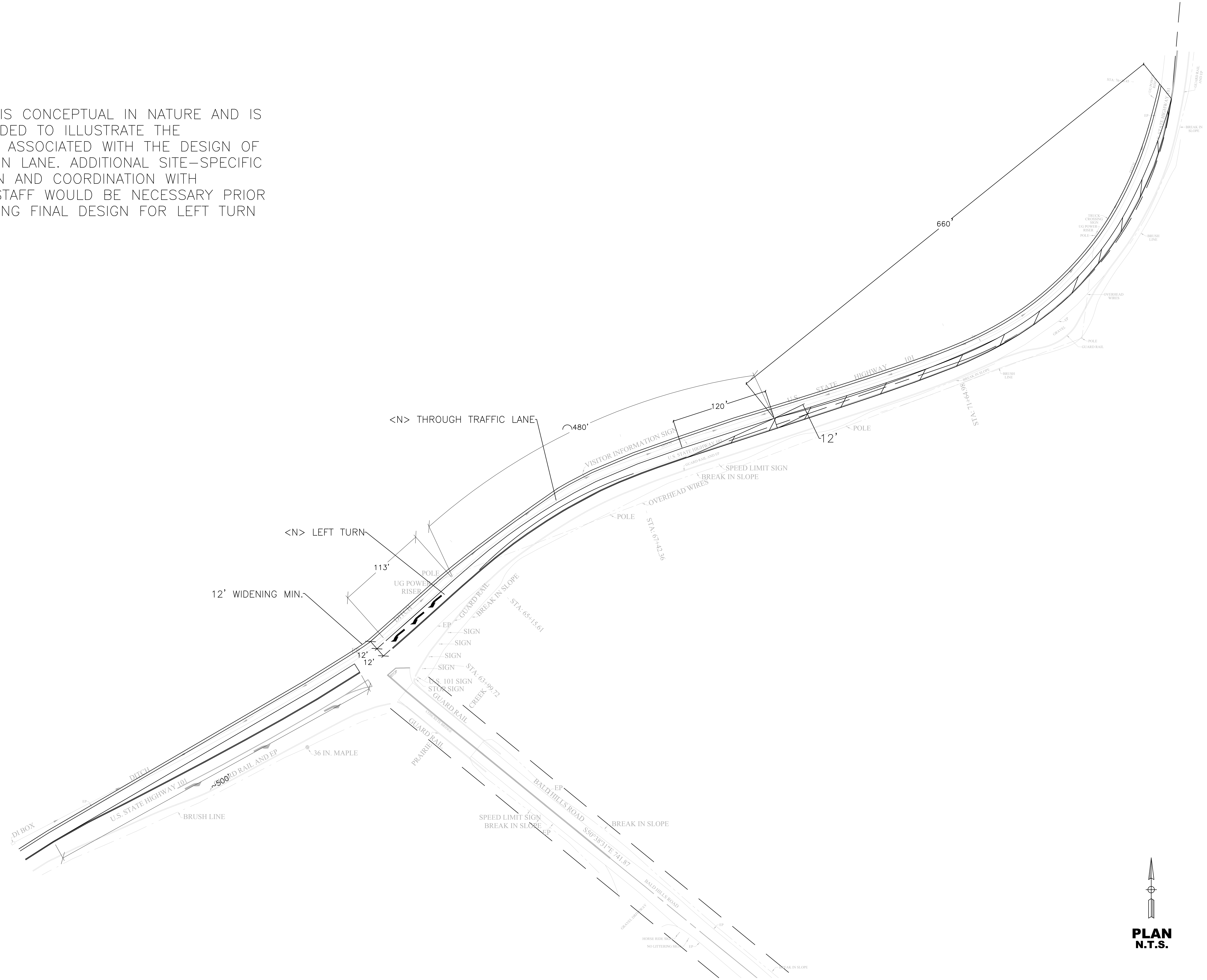
APPENDIX 5

Proposed Left Turn Lane – Conceptual Design

NOTE:

THIS PLAN IS CONCEPTUAL IN NATURE AND IS ONLY INTENDED TO ILLUSTRATE THE DIMENSIONS ASSOCIATED WITH THE DESIGN OF A LEFT TURN LANE. ADDITIONAL SITE–SPECIFIC INFORMATION AND COORDINATION WITH CALTRANS STAFF WOULD BE NECESSARY PRIOR TO PREPARING FINAL DESIGN FOR LEFT TURN LANE.



PLAN
N.T.S.

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NO.	HISTORY / REVISION	BY	CHK.	DATE

ORICK MILL SITE
HIGHWAY101 & BALD HILLS ROAD INTERSECTION
CONCEPTUAL LEFT TURN LANE DESIGN

SAVE THE REDWOODS LEAGUE
ORICK, CA

DRAWN	RGB
CHECK	RLD
APPROVED	RLD
DATE	6/30/17
JOB NUMBER	7787.23
FIGURE	8

Aug 18,2017-11:46am
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