



Wetland Habitat Mitigation & Monitoring Plan

Life Plan Humboldt

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3 April 2023

→ **The Power of Commitment**



Prepared for:

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1. Introduction

This document supports the Project's permitting and construction planning as deemed appropriate. This report is subject to, and must be read in conjunction with, the limitations set out in **Section 10, Scope and Limitations**, and the assumptions and qualifications contained throughout the report.

1.1 Site Location and Project Description

The Project includes the development of an aging in place life plan community consisting of multiple residential units and other amenities. The Project site located within Section 6, Township 06 North, Range 01 East, and Section 31, Township 07 North, Range 01 East, Arcata North USGS 7.5 Minute Quadrangle, Humboldt Base and Meridian, in Humboldt County, California. The site is comprised of one parcel approximately 14.7 acres and includes Assessor Parcel Numbers (APNs) 510-133-013 and 508-251-060 on Hiller Road, McKinleyville, California (**Appendix A, Figure 1**).

The Project site consists of the two APNs and contains an open pasture and eucalyptus grove bordered by the McKinleyville shopping center and undeveloped property to the north, commercial development to the east, residential development to the south, and a church and active pastureland to the west. The property is a generally flat to gently sloped with a wetland swale that dissects the site in a southeast to north westerly direction.

1.2 Purpose

This Wetland Habitat Mitigation and Monitoring Plan (WHMMP) has been prepared on behalf of Life Plan Humboldt aging in place life plan community project (hereafter "Project") for the U.S. Army Corps of Engineers (USACE) and North Coast Regional Water Quality Control Board (NCRWQCB, or "Regional Board") to satisfy water quality permit requirements. It is anticipated that the Project will impact regulated jurisdictional wetlands. The Project will thus require permits from the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), and a corresponding Water Quality Certification from the North Coast Regional Water Quality Control Board (NCRWQCB) under Section 401 of the CWA. As part of the Section 404 permitting process, the USACE will review the Project under NEPA and Section 106 of the National Historic Preservation Act.

Wetlands and other regulated waters impacted by the Project will require compensatory mitigation in coordination with the USACE and Regional Board, which will occur onsite, and the project is self-mitigating.

The purpose of the WHMMP is to provide detailed methods for creation and monitoring the success of wetlands and riparian habitat to compensate for impacts to USACE jurisdictional three-parameter wetlands resulting from Project implementation in compliance with the Project's Initial Study/Mitigated Negative Declaration (IS/MND) prepared under the California Environmental Quality Act (CEQA).

This WHMMP is patterned on Regulatory Program Regulation (33 CFR) guidance published by the USACE (2015), along with guidance from the Regional Board Clean Water Act Section 401 Water Quality Certification application (*Wetland Mitigation Checklist*) and the McKinleyville Community Plan. This WHMMP provides information on impacts to and creation of both three-parameter and one-parameter wetlands as required by the above mentioned respective agencies. This WHMMP provides mitigation and monitoring details for wetlands and riparian habitat as discussed in the accordance with anticipated Project permit requirements, including the following elements:

1. Baseline information on location and extent of existing wetlands.
2. Identification of wetland creation sites.
3. Proposed mitigation and implementation thereof.
4. Ecological performance standards for wetland creation sites.
5. Monitoring protocols and reporting responsibilities.

6. Corrective actions if performance standards are not met.
7. Responsible parties for actions identified in this WHMMP.

2. Baseline Information

2.1 Studies within the Project Area

An Aquatic Resources Delineation (GHD 2023) was prepared to assess baseline environmental conditions within the Project Area and is included as **Appendix C**. This study evaluated the extent of existing aquatic resources within the Project Area and will be used to inform the mitigation design for wetland creation. The existing vegetative, soil, and hydrological conditions have helped guide what vegetation assemblages the Project will aim to re-establish post-construction that are suitable for the soil types and hydrologic conditions observed in the Project area.

GHD performed the Aquatic Resources Delineation (GHD 2023) within the Project Area in January 2023 during the winter wet season when accumulated precipitation was at or above average. A WETS table showing climate data for the Arcata Eureka Airport, CA, Station was referenced to confirm precipitation was within the limits of normal (NRCS 2023a). Aerial photography, NRCS Soil Survey for Humboldt County, Central Part, California (NRCS 2023b), the National Wetland Inventory (NWI 2023), and the FEMA National Flood Hazard Layer (FEMA 2023) were referenced prior to conducting fieldwork (GHD 2023). Wetland indicators for vegetation, soils, and hydrology were recorded in the field and are described below in **Section 3.2**.

The following sections present the location, function, and value of existing wetlands in the Project Area that are anticipated to be affected by implementation of the Project. Additionally, existing resources (i.e. wetland habitat, upland habitat surrounding wetlands) will be summarized, as they have informed the mitigation design for wetland creation.

2.2 Jurisdictional Areas

Existing Jurisdictional Wetlands Within the Project Area

A wetland delineation was completed in 2023 (**Appendix C**) to determine the extent of wetlands and other waters within the Project Area based on hydrophytic vegetation, hydric soils, and wetland hydrology using methods and indicators outlined in the *USACE Wetland Delineation Manual* (USACE 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (USACE 2010). Three-parameter wetlands are defined as areas that meet all three criteria for wetlands as described by the 1987 Manual and may be jurisdictional to USACE and NCRWQCB. One-parameter wetlands are defined under the McKinleyville Community Plan Section 3422 as areas satisfying at least one of the following three criteria: (1) the presence of at least periodic predominance of hydrophytic vegetation; (2) predominately hydric soils; (3) periodic inundation for seven consecutive days.

One three-parameter wetland area (Wetland 1) was mapped within the Project Area totalling 0.55 acres and is likely to be USACE and NCRWQCB jurisdictional, subject to agency determination. Two one-parameter wetland areas (Wetland 2 and Wetland 3) totalling 0.02 acres were mapped within the Project Area subject to regulation under the McKinleyville Community Plan (**Table 2.2-1, Delineated Wetlands Within the Project area**), and are not subject to USACE or NCRWQCB jurisdiction. .

Table 2.2-1 Delineated Wetlands Within the Project Area

Wetland ID	Wetland Type	Jurisdictional Entity	Total Delineated (square feet / acres)
Wetland 1	PEM1B Three-Parameter Wetland	USACE/NCRWQCB/ McKinleyville Community Plan	23,940 / 0.55
Wetland 2	One-Parameter Wetland	McKinleyville Community Plan	724 / 0.017
Wetland 3	One-Parameter Wetland	McKinleyville Community Plan	171 / 0.004

Approximately 14.13 acres of the Project Area were determined to be upland areas and did not meet any of the three parameters to be considered wetland. Some upland sample plots were dominated by invasive facultative pasture crops but lacked indicators for wetland hydrology and soils (GHD 2023). The sample points at locations where vegetation did not pass the prevalence index or FAC-neutral test and were not accompanied by indicators of wetland hydrology or hydric soils were not determined to consist of hydrophytic vegetation for the purposes of determining one-parameter wetlands under the McKinleyville Community Plan.

2.3 Existing Habitat Value and Function

The Project Area is within the Mill Creek-Mad River watershed (HUC12: 180101020408) and is primarily comprised of upland pasture dominated by non-native grasses dissected by a wetland swale running northwest through the property. A non-native eucalyptus grove comprises the northeast section of the Project Area and is expanding into the adjacent pastureland. Wetlands within the Project Area have likely been degraded over time by cattle grazing, surrounding development, and the introduction of non-native invasive species.

Three-Parameter Wetlands

For the purposes of this WHMMP, three-parameter wetlands are defined as areas that meet all three parameters (i.e. hydrophytic vegetation, hydric soils, and wetland hydrology) for wetland determination as defined in the USACE Wetland Delineation Manual (USACE 1987). One contiguous three-parameter wetland (Wetland 1) was mapped within the Project Area totalling 0.55 acres and likely jurisdictional to USACE and NCRWQCB (**Appendix A, Figure 2**).

Wetland 1 consists of an open wetland swale, mostly free of rooted woody vegetation and is classified according to the Cowardin system as a palustrine emergent persistent wetland with a seasonally saturated water regime (PEM1B) (FGDC 2013). The vegetation was primarily characterized by creeping bentgrass (*Agrostis stolonifera*, FAC, invasive non-native), common velvetgrass (*Holcus lanatus*, FAC, invasive non-native), and common rush (*Juncus effusus*, FACW, native). Sample points within Wetland 1 passed the dominance test for hydrophytic vegetation.

Soil in Wetland 1 consisted mostly of loams with a thick dark 10YR 2/1 upper horizon (0 to 16 inches) underlain by a depleted 10YR 4/1 lower horizon (4 or 6 to 14 inches) with 25% 10YR 6/8 distinct redoximorphic concentrations within the matrix. Soils within Wetland 1 satisfied the criteria for hydric soil indicator Thick Dark Surface (A12).

Observations of hydrology within Wetland 1 consisted primarily of the presence of surface water, saturation within 12 inches of the soil surface, and the presence of reduced iron within 12 inches of the soil surface verified by a positive

reaction to alpha, alpha-dipyridyl ($\alpha\alpha$ -dip). Sample points within Wetland 1 met primary wetland hydrology indicators Surface Water (A1), Saturation (A3), and Presence of Reduced Iron (C4), as well as secondary indicators Geomorphic Position (D2) and passing the FAC-Neutral Test (D5).

One-Parameter Wetlands

For the purposes of this WHMMP, one-parameter wetlands are defined as areas that meet one or two parameters (i.e. hydrophytic vegetation, hydric soils, and wetland hydrology) for wetland determination as defined in the USACE Wetland Delineation Manual (USACE 1987). Two separate one-parameter wetlands (Wetland 2 and Wetland 3) were mapped within the Project Area totaling 0.02 acres and are likely regulated under the McKinleyville Community Plan (**Appendix A, Figure 2**).

Wetland 2 met two wetland parameters, is comprised of 724 sqft, and is located at the at the northeast end of Wetland 1. Dominant vegetation within Wetland 2 consisted primarily of slough sedge (*Carex obnupta*, OBL, native), California blackberry (*Rubus ursinus*, FACU, native), and coastal willow (*Salix hookeriana*, FACW, native). Sample points within Wetland 2 passed the dominance test for hydrophytic vegetation.

Soils within Wetland 2 consisted of loams with a 10YR 2/1 upper horizon from 0-10 inches underlain by a 10YR 3/2 horizon from 10-13 inches with 5% 10YR 5/8 distinct redoximorphic features and a 2.5Y 5/4 depleted horizon from 13-20 inches with 30% 7.5 YR 5/8 distinct redoximorphic features. The 10YR 3/2 horizon from 10-13 inches had chroma too high to meet the Thick Dark Surface (A12) hydric soil indicator observed in adjacent wetlands within the PSB. Sample points within Wetland 2 did not meet any hydric soil indicators.

Observations of hydrology within Wetland 2 included of the presence of a water table at 15 inches from the soil surface, and saturated soil at 10 inches from the soil surface. inches of the soil surface. Application of $\alpha\alpha$ -dip tested negative throughout the soil profile. Sample points within Wetland 2 met primary wetland hydrology indicator Saturation (A3), as well as secondary indicator Geomorphic Position (D2).

Wetland 3 met two wetland parameters, is comprised of 171 sqft, and is located in a depression at the lower end of a shallow upland swale along the southern edge of the eucalyptus grove. There was evidence of mixed soil horizons in Wetland 3 indicating some level of mechanical disturbance or excavation likely causing the depression.

Dominant vegetation within Wetland 3 consisted primarily of blue gum eucalyptus (*Eucalyptus globulus*, UPL, invasive non-native), and sweet vernal grass (*Anthoxanthum odoratum*, FACU, invasive non-native). Sample points within Wetland 3 did not pass the dominance test or prevalence index for hydrophytic vegetation and lacked any other indicators for hydrophytic vegetation.

Soils within Wetland 3 consisted of loams with a 10YR 2/1 upper horizon from 0-10 inches directly underlain by a 10YR 4/1 depleted horizon form 10-16 inches with 5% 5 YR 5/8 distinct redoximorphic features. Sample points within Wetland 3 met hydric soil indicator Thick Dark Surface (A12).

Observations of hydrology within Wetland 3 included of the presence of a water table at 4 inches from the soil surface, and saturated soil at 1 inch from the soil surface. Application of $\alpha\alpha$ -dip tested positive at 12 inches from the soil surface. The sample point within Wetland 3 met primary wetland hydrology indicators High Water Table (A2), Saturation (A3), Algal Mat or Crust (B4), Presence of Reduced Iron (C4), as well as secondary indicators Water-Stained Leaves (B9) and Geomorphic Position (D2).

Other Waters

Other waters such as streams, lakes, and watercourses were not observed within the Project Area (GHD 2023). A roadside ditch along the south side of Hiller Rd. was determined to be an upland ditch dominated by upland vegetation including California blackberry (*Rubus ursinus*, FACU, native), salal (*Gaultheria shallon*, FACU, native), evergreen huckleberry (*Vaccinium ovatum*, FACU, native), red alder (*Alnus rubra*, FAC, native), reed fescue (*Festuca arundinacea*, FAC, invasive non-native) and bentgrass (*Agrostis stolonifera*, FAC, invasive non-native). The ditch does not meet the definition of Waters of the U.S. and/or Waters of the State and is not regulated by the McKinleyville Community Plan. The ditch drains into a 36-inch concrete culvert and flows into a roadside ditch north of Hiller Rd.

Upland Habitat

Uplands within the Project Area consists primarily of a eucalyptus grove and non-native pastureland. Dominant vegetation in upland areas were comprised of blue gum eucalyptus (*Eucalyptus globulus*, UPL, invasive non-native), California blackberry (*Rubus ursinus*, FACU, native), rattlesnake grass (*Briza maxima*, UPL, invasive non-native), sweet vernal grass (*Anthoxanthum odoratum*, FACU, invasive non-native), orchard grass (*Dactylis glomerata*, FACU, invasive non-native), evergreen huckleberry (*Vaccinium ovatum*, FACU, native), salal (*Gaultheria shallon*, FACU, native), bent grass (*Agrostis stolonifera*, FAC, invasive non-native), common velvetgrass (*Holcus lanatus*, FAC, invasive non-native), reed fescue (*Festuca arundinacea*, FAC, invasive non-native), red alder (*Alnus rubra*, FAC, native), and coastal willow (*Salix hookeriana*, FACW, native).

Soils in upland areas consisted mostly of loams with an upper horizon of 10YR 3/3 from 0 to 10 inches with no redoximorphic features, and a lower horizon from 10 to 18 inches of 10YR 3/4 with no redoximorphic features. Upland sample points in closer proximity to wetland areas had soils consisting of darker loams with an upper horizon of 10YR 2/2 from 0-19 inches, and a lower horizon of 10YR 4/3 with 30% redoximorphic features from 19-30 inches.

Hydrology observed in upland areas generally lacked the presence of surface water, high water table, soil saturation within 12 inches of the soil surface and had negative reactions to α-dip.

2.4 Project Impacts to Jurisdictional Wetlands

Impacts to Jurisdictional Wetlands within the Project Area

Based on the current design, the Project would permanently impact 17,870 sqft of delineated three-parameter wetlands and 895 sqft of one-parameter wetland areas. (**Table 2.4-1 – Impacts to Jurisdictional Wetlands, Appendix A, Figure 3a-3b**). Permanent fill of wetland areas would occur during construction of Project-related facilities within the Project Area (**Appendix A, Figure 3a-3b**). The filling of wetlands would be mitigated (including wetland setbacks of 50 feet) at approximately 1.5:1 ratio, which would be achieved by providing new wetlands (creation) onsite within the Project Area. The 1.5:1 mitigation ratio would create a significant ecological uplift with regard to the extent and quality of existing wetlands that will be filled, which are mostly non-native pasture grass and herb species.

Table 2.4-1 Impacts to Jurisdictional Wetlands

Wetland ID and Type	Type of Impact (Permanent / Temporary)	Jurisdictional Entity	Current Estimated Impacts (square feet / acres)	Mitigation Area at 1.5:1 (square feet / acres)
Wetland 1: PEM1B Three-Parameter Wetland	Permanent (fill)	USACE/NCRWQCB/ McKinleyville Community Plan	17,870 / 0.41	26,805 / 0.62
Wetland 2: One-Parameter Wetland	Permanent (fill)	McKinleyville Community Plan	724 / 0.017	1,086 / 0.025
Wetland 3: One-Parameter Wetland	Permanent (fill)	McKinleyville Community Plan	171 / 0.004	257 / 0.006
				Total Mitigation Area Required: 28,148 / 0.65

Wetland Type Conversions to Jurisdictional Wetlands within the Project Area

Additionally, the Project seeks to convert 6,070sqft of delineated three-parameter palustrine emergent persistent wetlands with a seasonally saturated water regime (PEM1B) (**Table 2.4-2 – Approximate Impacts to Jurisdictional Wetlands, Appendix A, Figure 3a-3b**). The conversion area is entirely within the proposed mitigation site and would

be subject to the same success criteria as created wetlands. The conversion area seeks to enhance the value and function of existing wetlands by excavating the bottom pool of the wetland to approximately 1.0 ft below the wet season water table converting the water regime from seasonally saturated to seasonally flooded creating higher quantities of aquatic habitat for a longer duration of time throughout the season.

Table 2.4-2 Wetland Type Conversions of Jurisdictional Wetlands

Wetland ID and Type	Type of Conversion	Jurisdictional Entity	Conversion Area (square feet / acres)
Wetland 1: PEM1B Three-Parameter Wetland	PEM1B three-parameter wetland to PEM1C three-parameter wetland	USACE/NCRWQCB	6,070 / 0.139

3. Mitigation Plan

3.1 Mitigation Objectives

The overarching goal of the WHMMP is to ensure that potential impacts to aquatic resources resulting from Project implementation are successfully compensated as required by Project permits. The following compensatory mitigation objectives have been created for this WHMMP based off objectives detailed in the *USACE Regional Compensatory Mitigation and Monitoring Guidelines* (USACE 2015), *Implementation Guidance for the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (SWRCB 2020), and the *McKinleyville Community Plan* (2017b) to guide the development of wetland and riparian habitat creation and monitoring methods and success criteria.

The following objectives will guide the creation of wetlands:

- The acreage of three-parameter wetlands created onsite will be greater than the area of wetlands permanently impacted by Project construction by a ratio of 1.5:1 or greater.
- Three-parameter wetlands created onsite will be dominated by native wetland species and have low target invasive plant cover.
- Three-parameter wetlands created will show an improvement in quality compared to baseline conditions of existing wetlands.

Please see **Appendix A, Figure 3** for a map depicting areas proposed for wetland creation.

3.2 Mitigation Ratio and Credits

The proposed mitigation ratio for the filling of wetlands within the Project Area is 1.5:1. The ratio was selected to offset all anticipated impacts to aquatic resources within the Project Area, increase the total area of wetland habitat available within the Project Area and provide ecological uplift. Ecological uplift relates to increasing the quality of impacted wetlands by creation wetlands and establishing native wetland vegetation and habitat while increasing the function by increasing the duration of saturated conditions within the created wetlands by altering the wetland hydrologic regime.

For compensatory mitigation of permanently impacted wetlands, the mitigation is onsite, in-kind and adjacent to the same wetland type (palustrine emergent) that is being established. The proposed compensatory mitigation site will create a larger quantity and higher quality three-parameter wetlands along the edges of the existing wetland swale at the northwest corner of the Project Area (**Appendix A, Figure 3a-3b**).

Current grading calculations anticipate approximately 17,840 sqft of permanent impacts to USACE/NCRWQCB jurisdictional three-parameter wetlands and 895 sqft of one-parameter wetlands regulated under the McKinleyville Community Plan. Impacts to both three-parameter wetlands and one-parameter wetlands will be mitigated for in the creation of three-parameter wetland areas at a 1.5:1 ratio.

The proposed mitigation area is 28,750 sqft, approximately 600 sqft larger than the total mitigation area required at a 1.5:1 ratio, and will increase the likelihood of achieving success criteria. Mitigation will be achieved by creating new onsite three parameter wetlands detailed in **Table 3.2-1** below.

Table 3.2-1 Summary of Proposed Mitigation Areas

Current Use/Existing Habitat	Proposed Mitigation Habitat	Proposed Action	Location (Latitude/Longitude)
Upland pasture habitat (28,750 sqft)	Three-parameter PEM1C wetland habitat.	Create three-parameter PEM1C wetlands by excavating below the high water table and planting native wetland vegetation.	40.941795,-124.105720
Three-parameter PEM1B wetland habitat (6,070 sqft)	Three-parameter PEM1C wetland habitat	Create three-parameter PEM1C wetlands by excavating below the high water table and planting native wetland vegetation	40.941395, -124.105482

3.3 Wetland Creation

Project-related development will require filling wetlands. Based on the current conceptual plan, approximately 17,870 sqft of three-parameter wetlands and 895 sqft of one-parameter wetlands will be filled (**Appendix A, Figure 3a-3b**). The filling of wetlands will be mitigated for at a 1.5:1 ratio, which will be achieved by creating approximately 28,750 sqft of new three-parameter wetlands and will include mitigation areas for impacts to both one and three-parameter wetland areas. New wetland areas will be created in upland areas adjacent to existing wetland areas located in the northwest section of the Project Area. Proposed wetland creation consists of the expansion of existing wetland areas at the bottom of the wetland swale by excavating uplands adjacent to the swale and replanting of the excavated areas with native wetland plant species. The proposed hydrologic design results in a consistent and relatively simple management of natural processes, leading to a high likelihood of success.

On-site and in-kind creation of palustrine emergent wetland habitat with native wetland plant species is proposed to compensate for the impact to wetlands during Project construction. The conceptual design of the wetland creation site is described below.

3.4 Wetland Creation Site Selection

The proposed wetland creation site expands existing wetlands within the Project Area (**Appendix A, Figure 3a-3b**). The location was chosen based on topography and water table data obtained from groundwater sampling points in those areas. The wetland creation site is directly adjacent to, and will become integrated with, the larger palustrine emergent three-parameter wetland swale that comprises Wetland 1 (**Appendix A, Figure 2**).

In order to ensure successful design and implementation of created three-parameter wetlands, the proposed ground surface elevation will be excavated to approximately 1.0 ft below the average wet season water table at the lowest point of the created wetland. Design criteria was modelled after juxtaposed wetlands in the Project Area, both topographically and through groundwater sampling of upland areas. The mitigation sites are currently set at or below the elevation of the adjacent wetlands in the Project. Current drainage patterns at the mitigation sites are surface overflow and groundwater conveyance from the surrounding slopes to the north and west sections of the Project Area,

which drain generally northwest toward Hiller Rd. The wetland mitigation sites are situated at the bottom slope of the wetland swale and will be fed primarily through groundwater discharge in winter, promoting success of establishment.

Groundwater Sampling

In addition to groundwater observations made during the wetland delineation (GHD 2023), five additional groundwater sampling points were taken within the proposed mitigation areas on March 3, 2023. The groundwater monitoring points were located in mapped uplands within the proposed wetland creation area to determine the approximate depth to groundwater during the wet season. This information will be used to guide the wetland creation design by confirming the approximate depth at which created wetlands need to be excavated to achieve adequate hydrology for wetland success (groundwater with 12 inches of the surface for 14 consecutive days).

Sampling occurred on March 3, 2023 after significant precipitation events including low elevation snowfall within the Project Area. Precipitation was above average according to the WETS table for Arcata/Eureka Airport in McKinleyville CA and groundwater depth may have been abnormally high at the time of sampling (**Appendix B**). The sampling results detailed below suggest there will be adequate groundwater in wetland mitigation areas to achieve wetland hydrology success criteria. Observed depth to groundwater for each groundwater monitoring point is recorded below in **Table 3.4-1**.

Table 3.4-1 Groundwater Sampling Points

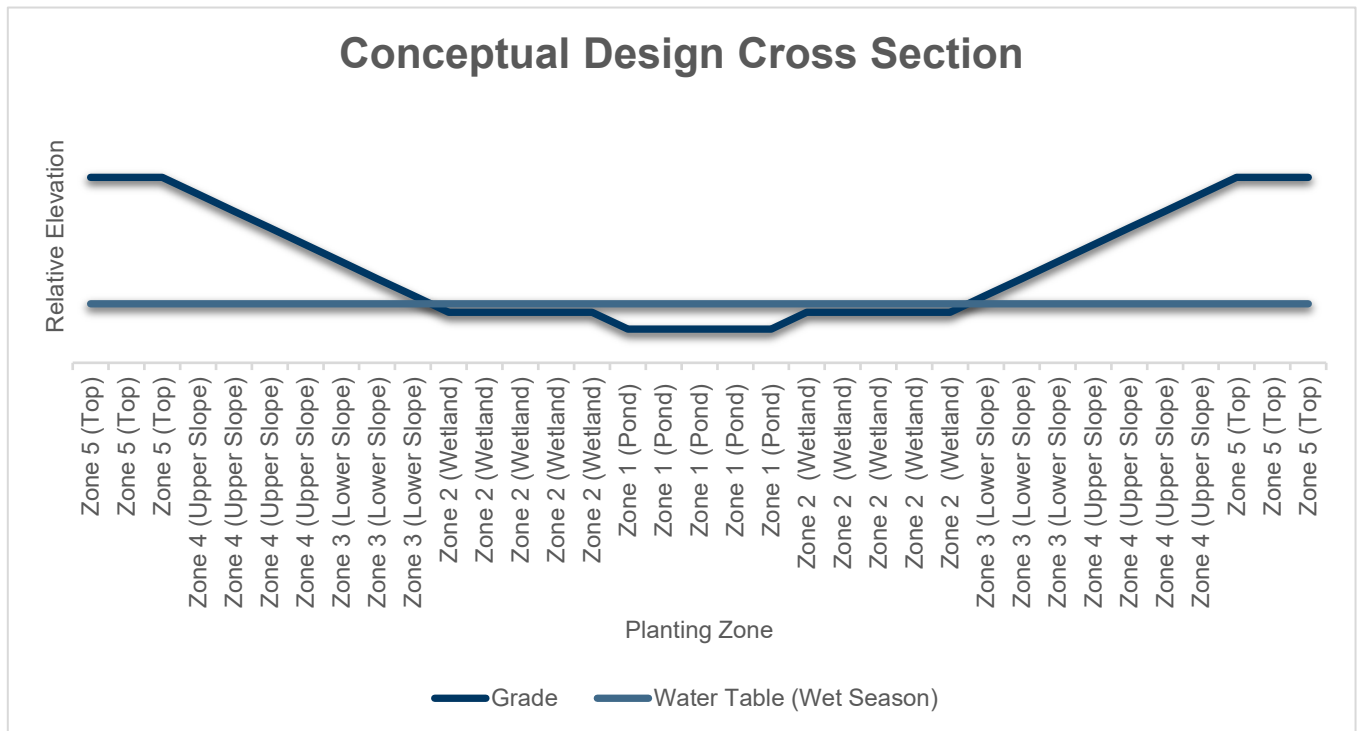
Groundwater Sampling Point	Depth to Groundwater (in)	Location (Latitude/ Longitude)
1	4	40.941184, -124.106099
2	12	40.941932, -124.106188
3	11	40.941876, -124.105706
4	6	40.941753, -124.105551
5	6	40.941916, -124.105223

3.5 Wetland Creation Conceptual Design

Wetland Mitigation Site 1-Three-parameter wetland habitat and pond

Wetland Mitigation Site 1 will be excavated to a depth of approximately 1.0 ft below the average wet season water table at the pond bottom, at the average wet season water table at the wetland habitat bottom, with sides at a 3:1 slope to the top of slope at the existing ground level. A conceptual design for Wetland Mitigation Site 1 is detailed in the figure below:

Figure 3.5-A: Wetland Mitigation Site 1, Three-Parameter Wetland Habitat and Pond Conceptual Design



Wetland Mitigation Planting Zones

Planting zones at the wetland mitigation sites have been separated into five planting zones as depicted above in **Figure 3.5-A**. The following steps will be taken to revegetate the mitigation wetland:

1. Hydromulch Zone 3 to Zone 4 (toe of slope up to top of the existing grade) with wetland edge seed mix (**Table 3.5-3**)
2. Plant Zone 1 to Zone 3 (bottom and halfway up the sides) with plugs (**Table 3.5-1**)
3. Scarify Zone 5 around the edge of the wetland (10-15 feet from edge) and plant ReGreen at 35 lbs./acre and native grass seed at 25 lbs./acre.

As the Project design progresses, the plans and specifications for the following details will be included:

1. Planting schedule
2. Piezometer locations
3. Grading plan details

The excavated area will be planted with the following species found in **Table 3.5-1** using container stock. The proposed planting list for wetland creation was based on the dominant native species composition present in adjacent wetland habitats as described in the wetland delineation report (GHD 2023), as well as the addition of other native wetland species observed on-site in lesser amounts. Hydroseeding will be used in conjunction with broadcast seeding along the edges of the mitigation sites. Hydromulch will be applied in a single application at a rate of 2,500 lbs/acre after broadcasting of seed mixes. The mulch will consist of natural sterile fiber, be free of synthetic materials (i.e. plastic), and contain no more than seven percent ash or 250 parts per million of boron. Hydroseeding will be done in October-November at the beginning of the rainy season for optimal seed germination.

Table 3.5-1 and **3.5-2** below detail the suggested planting list and Wetland Indicator Status as defined by the USACE 2020 Western Valleys, Mountain, and Coasts (WMVC) designation. The planting zones coincide with those depicted in **Figure 3.5-A: Wetland Mitigation Site 1, Three-Parameter Wetland Habitat and Pond Conceptual Design**.

Table 3.5-1 Planting Treatments for Wetland Mitigation Planting Zones

Scientific name	Common name	Lifeform	WMVC Indicator Status	Unit	Spacing	# per acre
Zone 1: Planting List for Pool Bottom (Lowest Ponding Area)						
<i>Carex obnupta</i>	Slough sedge	Perennial sedge	OBL	plug	3 ft	970
<i>Eleocharis macrostachya</i>	Spike rush	Perennial sedge	OBL	Plant band	3ft	970
<i>Oenanthe sarmentosa</i>	Water parsley	Perennial herb	OBL	plug	3ft	970
Zone 2: Planting List for Wetland Bottom (Edge of Pond to Toe of Slope)						
<i>Carex obnupta</i>	Slough sedge	Perennial sedge	OBL	plug	3 ft	970
<i>Juncus effusus</i> var. <i>pacifica</i>	Pacific rush	Perennial rush	FACW	plug	3 ft	970
Zone 3: Planting List for Lower Sides and Edges (Toe of Slope to Lower 50% of Slope)						
<i>Carex obnupta</i>	Slough sedge	Perennial sedge	OBL	plug	3 ft	970
<i>Salix hookeriana</i>	Coastal Willow	Shrub	FACW	Cutting	15 ft -north and west side only	80
<i>Spiraea douglasii</i>	Rose spirea	Shrub	FACW	1-gal	15 ft	80
Native grass seed-single species or mix	Recommended genera include: <i>Bromus</i> , <i>Elymus</i> , <i>Festuca</i> , etc.	Grass	FACU/UPL	lb	95% cover	25 lbs
Hydro-mulch	mulch	N/A	N/A	lb	95% cover	2,500 lbs
Zone 4: Planting List for Upper Sides and Edges (Upper 50% of Slope to Top of Slope)						
<i>Ribes sanguineum</i>	Flowering currant	Shrub	FACU	5-gallon	15 ft	80
<i>Salix hookeriana</i>	Coastal Willow	Shrub	FACW	Cutting	15ft – north and west side only	80
<i>Salix sitchensis</i>	Sitka Willow	Shrub	FACW	Cutting	15 ft- north and west side only	80
<i>Symphyotrichum chilense</i>	Pacific aster	Perennial herb	FAC	plug	3 ft	970
Native grass seed-single species or mix	Recommended genera include: <i>Bromus</i> , <i>Elymus</i> , <i>Festuca</i> , etc.	Grass	FACU/UPL	lb	95% cover	25 lbs
Hydro-mulch	mulch	N/A	N/A	lb	95% cover	2,500 lbs

Scientific name	Common name	Lifeform	WMVC Indicator Status	Unit	Spacing	# per acre
Zone 5: Planting List for Top of Slope (Top of Slope to 15 feet)						
<i>Alnus rubra</i>	Red alder	Tree	FAC	1-gal	20 ft	25
<i>Pinus contorta</i> ssp. <i>Contorta</i>	Beach pine	Tree	FAC	5-gal	20 ft	25
Native grass seed-single species or mix	Recommended genera include: <i>Bromus</i> , <i>Elymus</i> , <i>Festuca</i> , etc.	Grass seed	FACU/UPL	lb	95% cover	25 lbs
ReGreen©	Sterile grass mixture	N/A	N/A	lb	95% cover	35lbs
Hydro-mulch	mulch	N/A	N/A	lb	95% cover	2,500 lbs

Table 3.5-2 USACE Wetland Indicator Status Definitions for WMVC

Indicator Status	Abbreviation	Definitions
Obligate	OBL	Almost always occur in wetlands.
Facultative Wetland	FACW	Usually occur in wetlands, but may occur in non-wetlands.
Facultative	FAC	Occur in wetlands and non-wetlands.
Facultative Upland	FACU	Usually occur in non-wetlands, but may occur in wetlands.
Upland	UPL	Almost never occur in wetlands.

Seed Mixes and Mulch

The seed mix in **Table 3.5-3** is recommended for Planting Zones 3-5 along the wetland edge. The seed mix in **Table 3.5-3** is recommended for upland slopes along the wetland edge. Immediately following grading, a weed free straw will be applied at approximately 2,500 pounds per acre to promote seed germination and erosion control. Woody vegetation removed from the within the limits of grading will be chipped into mulch, placed in small temporary piles and reapplied around the container plantings.

Table 3.5-3 Wetland Edge Seed Mix

Scientific name	Common name	Lifeform	Pounds of Pure Live Seed/Acre
Grass Seed			
<i>Bromus carinatus</i>	California brome	Perennial grass	8.3
<i>Elymus glaucus</i>	Blue wildrye	Perennial grass	8.3
<i>Festuca microstachys</i>	Small fescue	Perennial grass	8.3

4. Mitigation Maintenance Plan

4.1 Revegetation and Post-Planting Maintenance

Revegetation will occur in fall and winter months following earth work and will be timed with hydrologic conditions to maximize plant survival. Irrigation is not planned but may occur based on the installer (contractor) procedures. Each planting will be watered the day of planting, regardless of soil moisture at the time of planting.

The Applicant shall inspect all deliveries of the container plantings prior to installation to ensure (1) accurate quantities, (2) correct species, (3) vigor (root growth and overall health), and (4) that all plant material is visibly free of pests and diseases.

Wetland revegetation will focus on appropriate native species, as described in **Section 3.5**. Following initial construction, the mitigation area is expected to be self-maintaining and dynamic into the long-term future. The wetlands will be self-sustaining and no watering or maintenance activities such as mowing, or pruning would be needed to maintain the wetlands. The planting lists do not include any particularly aggressive species and were chosen based on the baseline information gathered from previous studies (GHD 2023).

Planting holes will be no deeper than the container and twice as wide. Each tree and shrub planted will receive one to two packets of mycorrhizae. Trees and shrubs planted will be protected from deer browsing with anti-browse cages, excluding and will be mulched around the base post-planting.

Weeds will be removed at the base of each plant while plants are becoming established. Weeding will occur in the spring of each year after the first year of establishment (beginning the second spring). Weeds within a 3x3 foot area around the base of each planted tree and shrub will be pulled by hand, collected, and disposed of at an acceptable off-site location.

4.2 Invasive Species Controls

Over the course of the monitoring period, invasive species encroachment will be assessed. Invasive non-native plants can inhibit successful establishment of native species, and therefore reduce the value of the created wetland habitats. Invasive species that will be targeted for removal include those with Cal-IPC moderate to high ratings. Species with a Cal-IPC rating of limited may also be targeted for removal but will not be considered in success criteria assessments as their ecological impacts are considered minor. Removal methods will primarily include hand removal with brush cutters and removal of the entire root mass.

Invasive species observed in the Project Area (GHD 2023a) that are listed in the Cal-IPC inventory are detailed in **Table 4.2-1 below**.

Table 4.2-1 Cal-IPC Rated Species Observed within the Project Area

Scientific Name	Common Name	Lifeform	Cal-IPC Rating
<i>Agrostis stolonifera</i>	Creeping bentgrass	Grass	Limited
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	Grass	Limited
<i>Briza maxima</i>	Rattlesnake grass	Grass	Limited
<i>Cortaderia selloana</i>	Pampasgrass	Grass	High
<i>Cirsium vulgare</i>	Bull thistle	Herb	Moderate
<i>Cytisus scoparius</i>	Scotch broom	Shrub	High
<i>Dactylis glomerata</i>	Orchard grass	Grass	Limited
<i>Eucalyptus globulus</i>	Blue gum	Tree	Limited
<i>Festuca arundinacea</i>	Reed fescue	Grass	Moderate

Scientific Name	Common Name	Lifeform	Cal-IPC Rating
<i>Geranium dissectum</i>	Cutleaf geranium	Herb	Limited
<i>Holcus lanatus</i>	Common velvetgrass	Grass	Moderate
<i>Hypochaeris radicata</i>	Rough cat's ear	Herb	Moderate
<i>Leucanthemum vulgare</i>	Ox-eye daisy	Herb	Moderate
<i>Ranunculus repens</i>	Creeping buttercup	Herb	Limited
<i>Rumex acetosella</i>	Sheep sorrel	Herb	Moderate
<i>Rumex crispus</i>	Curly dock	Herb	Limited
<i>Rubus armeniacus</i>	Himalayan blackberry	Shrub	High
Footnotes: Cal-IPC Rating Definitions			
<i>*High</i>	<i>These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.</i>		
<i>*Medium</i>	<i>These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.</i>		
<i>*Limited</i>	<i>These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.</i>		

5. Mitigation Monitoring Plan

5.1 Monitoring Plan

Life Plan Humboldt or its qualified designee will maintain the Project mitigation sites over the course of the five-year monitoring period and will maintain them in such a way to meet success criteria, including the treatment of invasive plant species by hand or handheld equipment such as weed whackers. All maintenance activities within the designated monitoring areas will be documented and included in the annual monitoring report. If monitoring and/or observations yield a deficiency or adverse conditions among planted vegetation, then supplemental planting would occur. Similarly, if a particular species is not doing well at the sites, a suitable replacement species can be supplemented for original plant species.

Monitoring will occur annually to document overall site conditions, and should include an assessment of:

- mitigation site plantings overall vigor and health, and recommendations for corrective action if a site is observed to be failing.
- photo documentation at each established photo point.
- notable encroachment of non-native species into a mitigation area.
- removal of non-native species from mitigation areas.
- disturbance around or within the mitigation sites (i.e., browsing of plants, trampling, or other disturbance).
- .
- any other pertinent information regarding the overall success of the mitigation areas.

An annual monitoring report will be submitted to NCRWQCB summarizing each monitoring event, to be submitted at the end of the calendar year in the year following mitigation site planting.

Monitoring in Year 1, Year 3, and Year 5 will include additional environmental data collection that will support the analysis of performance criteria set forth for each mitigation site, as described in **Section 7**. The additional environmental data collection will include:

- vegetation sampling according to methods outlined in this document for all wetland mitigation sites.
- hydrology monitoring according to methods outlined in this document for all wetland mitigation sites.

All data collection from these monitoring years will be analysed and compared to the performance criteria set forth for that habitat type in that year. Following monitoring, Life Plan Humboldt will submit to the Regional Board, the County and USACE one report summarizing (1) vegetation and hydrology monitoring methods, (2) results, and (3) any necessary adaptive management, such as targeted replanting, removal of invasive species, or future considerations for design adjustment, to better achieve Project objectives.

Reporting will include captioned photographs (including those taken at established photo points) and mapping results, if needed. Reporting will also highlight how the Project area has changed since as-built construction, including all information outlined to be included in each annual monitoring report. The Site Monitoring Report will be submitted to the Regional Board, County and USACE by the end of year.

In Year 5, a wetland delineation will confirm the area of wetlands created. The report should make a thorough analysis of whether the mitigation is successful and if on-going monitoring is required. A separate wetland delineation report will be prepared to document the results of the wetland delineation effort.

Annual reports will be prepared and submitted to the Regional Board, County and USACE no later than December 31 of each year, for a total of five reports over the monitoring period. Reports will include observations made during site monitoring, including descriptions of conditions on site, identified issues, outlined remedial measures implemented or needed, and photographs of the mitigation area(s).

5.2 Monitoring Methodology

Annual monitoring of created wetlands within the mitigation area will be conducted per the monitoring schedule detailed in **Table 5.4.1** to evaluate progress toward success and performance criteria summarized in **Table 7.1-1**.

Vegetation Monitoring Methodology

Vegetation sampling will use quadrats (1m²) located randomly along transects within the created wetland area. The location of the first quadrat will be randomized relative to the beginning of the baseline, with quadrats at set distances thereafter. All plant species present within each quadrat will be identified and their absolute percent cover noted, along with total absolute vegetative cover and bare soil within each quadrat. The number of quadrats sampled will be sufficient to achieve an adequate sample size. Relative percent cover of native species will be calculated post-site visit using absolute cover.

Target invasive plant cover will be calculated from the data collected, as described above. Each year of data collection, the absolute cover of CAL-IPC medium to high ranked invasive species will be compared. The timing of monitoring visits will be flexible for annual variation in weather conditions and will likely take place in June, July, or August.

The most current wetland indicator plant list will be used to determine the ranking of species present in the mitigation areas during monitoring. Wetland species are defined as those rated with the indicator status FAC, FACW, or OBL by the most current wetland indicator plant list: *National USACE 2020 Wetland Plant List* (USACE 2020).

Some flexibility to account for annual variation in weather conditions is acceptable but vegetative monitoring should be conducted in June, July, or August.

Data sheets with results from each quadrat sampled during each site visit will be included as an appendix submitted with each annual report, and an analysis of results compared to the performance criteria summarized in **Table 7.1-1**.

Soil Monitoring Methodology

Hydric soil indicators may take more time develop than what is within the anticipated timeframe for monitoring activities. Hydric soils will be assumed if wetland hydrology and hydrophytic vegetation are present.

Hydrology/Groundwater Monitoring Methodology

Wetland mitigation site elevations shall be within ranges that maintain suitable groundwater wetland hydrology, as defined by the USACE. The U.S. Army Corps of Engineers (2005) provides a technical standard for monitoring hydrology. This standard requires 14 or more consecutive days of flooding or ponding, or a water table within 12 inches of the soil surface, during the growing season at a minimum frequency of five years in ten (50 percent or higher probability) (National Research Council 1995).

Piezometers will be installed post-construction to monitor groundwater elevations. Groundwater will be monitored once 50 percent of the average annual rainfall has been met, for four (4) consecutive weeks (Day 0, 7, 14, and 21), or until success criteria has been met (a minimum of three monitoring events or two weeks), after the 50 percent of average annual rainfall. A WETs table for the Arcata Airport Station in McKinleyville, CA will be referenced to determine if rainfall averages are normal for the given year.

A staff gauge will be installed at the site of the pond.

Post-construction hydrology monitoring at the site will be implemented to monitor groundwater levels. Hydrology will be monitored in Year 1, Year 3, and Year 5.

Photo Monitoring Stations

Permanent photo-documentation points will be established within the project site. A minimum of one photopoint is required for each monitored created wetland unit. Photopoint locations will be included on a map that will accompany monitoring reports.

Photographs will be taken annually during the monitoring period. Photographs will be taken from each monitoring point and cardinal directions recorded for repeatability. Photos will be taken with a digital camera with a moderate wide angle lens. The make and model of camera and type and focal length of lens will be noted in monitoring documentation. Photographs will be taken from about five feet in height, ideally from a tripod with the height noted, consistent from year to year.

5.3 Reference Sites

All existing wetlands on-site will be impacted by the proposed Project or converted to other types of wetlands. There will be no suitable on-site reference area for which to compare the created wetlands. Baseline conditions were characterized in the LPH Aquatic Resource Delineation (GHD 2023) and success will largely be determined with the criteria listed in **Section 7**.

5.4 Timeline and Monitoring Schedule

Construction is anticipated to occur within one or two construction seasons in 2024 or 2025. Mitigation monitoring will commence the year following construction.

Table 5.4-1 Annual Monitoring and Reporting Schedule

Monitoring Year	Summary of Conditions On-site	Vegetation Sampling	Hydrology Sampling	Report
Year 1	X	X	X	Baseline summary of conditions on-site in each mitigation area. Results from hydrology and vegetation monitoring.
Year 2	X	--	--	Baseline summary of conditions on-site in each mitigation area.
Year 3	X	X	X	Baseline summary of conditions on-site in each mitigation area. Results from hydrology and vegetation monitoring.
Year 4	X	--	--	Baseline summary of conditions on-site in each mitigation area.
Year 5	X	X	X	Baseline summary of conditions on-site in each mitigation area. Results from hydrology and vegetation monitoring, and analysis of success of mitigation sites.
Year 5 Wetland Delineation				Perform wetland delineation per USACE protocols in Year 5 and submit separate wetland delineation report documenting findings.

6. Adaptive Management Plan

Adaptive management is a tool used to cope with the inherent changes and instability fundamental to natural resources and the ecological processes that encompass them. It is a process derived from a collection of practical methods based in research and monitoring. As a philosophy, it holds that conservation and restoration programs should be designed in ways that accumulate knowledge as quickly and accurately as possible so that the management plan can be adapted promptly to better management efforts. This approach allows managers to learn by experience within site specific environments and apply lessons learned to remedy deficiencies using a controlled and scientific approach.

Adaptive management procedures will be recommended on a case-by-case basis, to address any issues identified at the sites during monitoring or maintenance activities. Adaptive management actions could include one or more of the following activities (not exclusive) if success criteria are not met:

- Adjusted weeding method to reduce weeds around the planted wetland or upland to decrease competition from non-native grasses and forbs;
- Supplemental planting for areas that have deficiencies in the seeding or planted material stock (may be in-kind, or if a particular species is not doing well at the site, a suitable replacement species can be supplemented for original plant species);
- Supplemental replacement (may be in-kind, or if a particular species is not doing well at the site, a suitable replacement species can be supplemented for original plant species);
- Supplemental watering (for non-performing plants that required supplemental planting);

- Additional erosion control; and/or
- Hydrologic modification or minor regrading.

Unpredictable natural changes could alter the mitigation area and consequently necessitate changing the goals, objectives, strategies, and actions set forth in this plan. These changed conditions include but are not limited to:

- Unusual weather patterns, such as extended drought or excessive rainfall;
- Change in species composition, such as through invasion of a new invasive plant or wildlife species to the site, increase in spread of existing non-native plants rated as limited in **Table 4.2-1**- which exhibit similar adverse characteristics of a plant ranked moderate or high in this particular habitat setting, or a change in the ranking of invasive plants;
- Change in the listing of species status species that could occur or have potential to occur in the habitat mitigation area; or;
- Erosion or deposition of sediments.

Adaptive management may be implemented if the mitigation ratios are not achieved after a period of five years, as detailed in submitted monitoring reports. If adaptive management is determined to be necessary, appropriate regulatory agencies will be consulted to propose any necessary remedial action. A meeting will then be scheduled with the appropriate resource agencies, depending on the specific issue(s), to discuss the best method(s) to address the issue.

7. Final Success Criteria/Performance Standards

7.1 Wetland Success Criteria

The wetland area that will be monitored for performance includes the bottom of the pool to the outer toe of the excavated slope and will coincide with Zone 1 and Zone 2 of the **Three-Parameter Wetland Habitat and Pond Conceptual Design**, detailed in **Section 3.5, Figure A**. The pond and wetland area will be the area targeted as the three-parameter wetland boundary by Year 5 (also see **Appendix A, Figure 3**).

The wetland mitigation will be considered successful when:

- The three-parameter wetland creation site hosts at least 70 percent relative cover of native wetland species (and no more than 15 percent absolute cover of target invasive species), supports wetland hydrology, and 28,148 sqft of three-parameter wetlands are created (to be assessed with a wetland delineation in Year 5).

Vegetation Success Criteria

The mitigation site will be considered successful if at least 70 percent relative cover of native wetland species and no more than 15 percent absolute cover of target invasive species are present at the conclusion of the 5-year monitoring period.

Soils Success Criteria

Hydric soil indicators may take more time develop than what is within the anticipated timeframe for monitoring activities. Hydric soils will be assumed if wetland hydrology and hydrophytic vegetation pers.

Hydrology Success Criteria

The mitigation site will be considered successful if two out of three wet season hydrology events meet wetland hydrology standards.

Annual monitoring of created wetlands will be conducted to evaluate achievement of vegetation and hydrology success criteria. The wetland mitigation site post-planting shall meet the following criteria described in **Table 7.1-1**.

Table 7.1-1 Performance Standards for Wetland Creation Sites

Year	Success Criteria Description
Year 1	50 percent ($\geq$) relative cover ¹ of native wetland species. No more than 25 percent absolute cover ² of target invasive plants.
Year 3	60 percent ($\geq$) relative cover of native wetland species. No more than 20 percent absolute cover of target invasive plants.
Year 5	70 percent ($\geq$) relative cover of native wetland species. No more than 15 percent absolute cover of target invasive plants. Wetland hydrology is met for two out of three monitoring events.
Years 1, 3, and 5	•Native wetland species consist of OBL/FACW/FAC species. •No large non-vegetated bare spots (greater than 25 percent) or erosional area.
1	Relative cover refers to a proportion of absolute cover of intended vegetation category (i.e., native cover) to total vegetative cover present.
2	Absolute cover is the proportion of ground surface covered by a particular category of vegetation.

If the success criteria for vegetation and hydrology in created wetlands are met by Year 5, and a wetland delineation confirms successful establishment of 28,148 sqft of three-parameter wetland, then the mitigation project will be considered successful, and monitoring will be complete at Year 5.

If at the end of Year 5, the performance standards have not been met, then additional monitoring and adaptive management will continue until performance criteria have been met. The prior year monitoring report will state whether the Project is on track to meet the success criteria or whether corrective actions will be necessary in order to meet the Year 5 success criteria. If all success criteria are met in earlier years, this will be demonstrated in the report, and monitoring will cease.

8. Site Protection Instrument

A site protection instrument (e.g., deed restriction) is required to protect the wetland mitigation site in perpetuity, per section 230.97(a) (Site protection) of the Procedures (2019), which states:

(4) Site protection instrument. A description of the legal arrangements and instrument, including site ownership, that will be used to ensure the long-term protection of the compensatory mitigation project site (see § 230.97(a)).

The applicant shall comply with the Project Deed Restriction. A copy of the signed, notarized, and filed Deed Restriction must be submitted to the Regional Water Board no less than 10-working days prior to Project

commencement. The Deed Restriction addresses the wetland mitigation site located at the northern end of the Project area.

9. Responsible Parties

It will be the responsibility of Life Plan Humboldt to monitor the areas identified in this Plan.

10. Scope and Limitations

This report: has been prepared by GHD for Life Plan Humboldt and may only be used and relied on by Life Plan Humboldt for the purpose agreed between GHD and Life Plan Humboldt .

GHD otherwise disclaims responsibility to any person other than Life Plan Humboldt arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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 conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

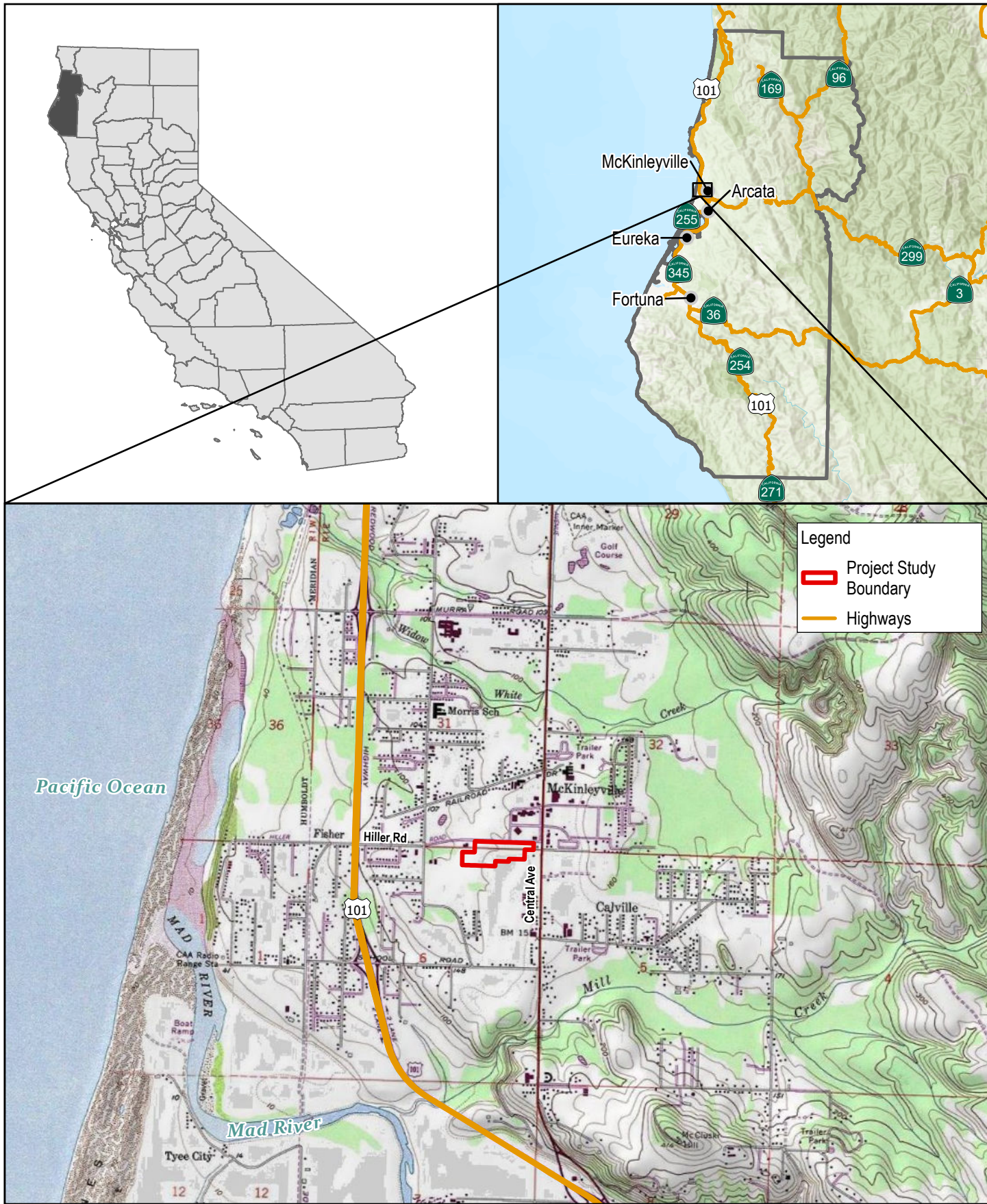
If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

11. References

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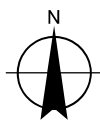
Appendix A

Figures



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Grid: WGS 1984 Web Mercator Auxiliary Sphere

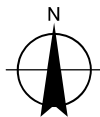
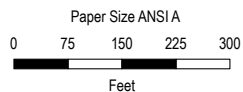
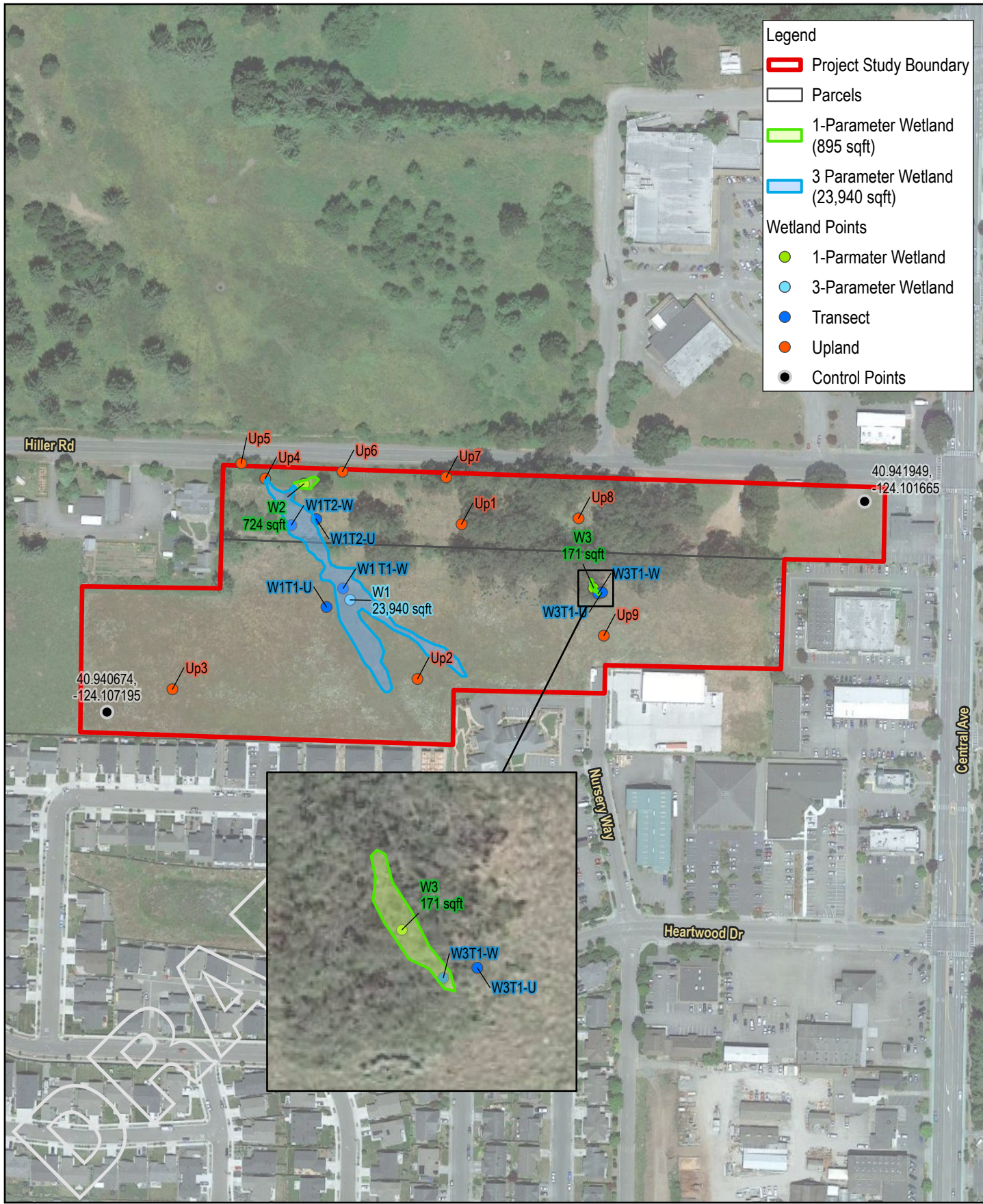


**Life Plan Humboldt
Wetland Delineation South Hiller Rd,
McKinleyville**

Project No. 12603187
Revision No. -
Date Feb 2023

Vicinity Map

FIGURE 1



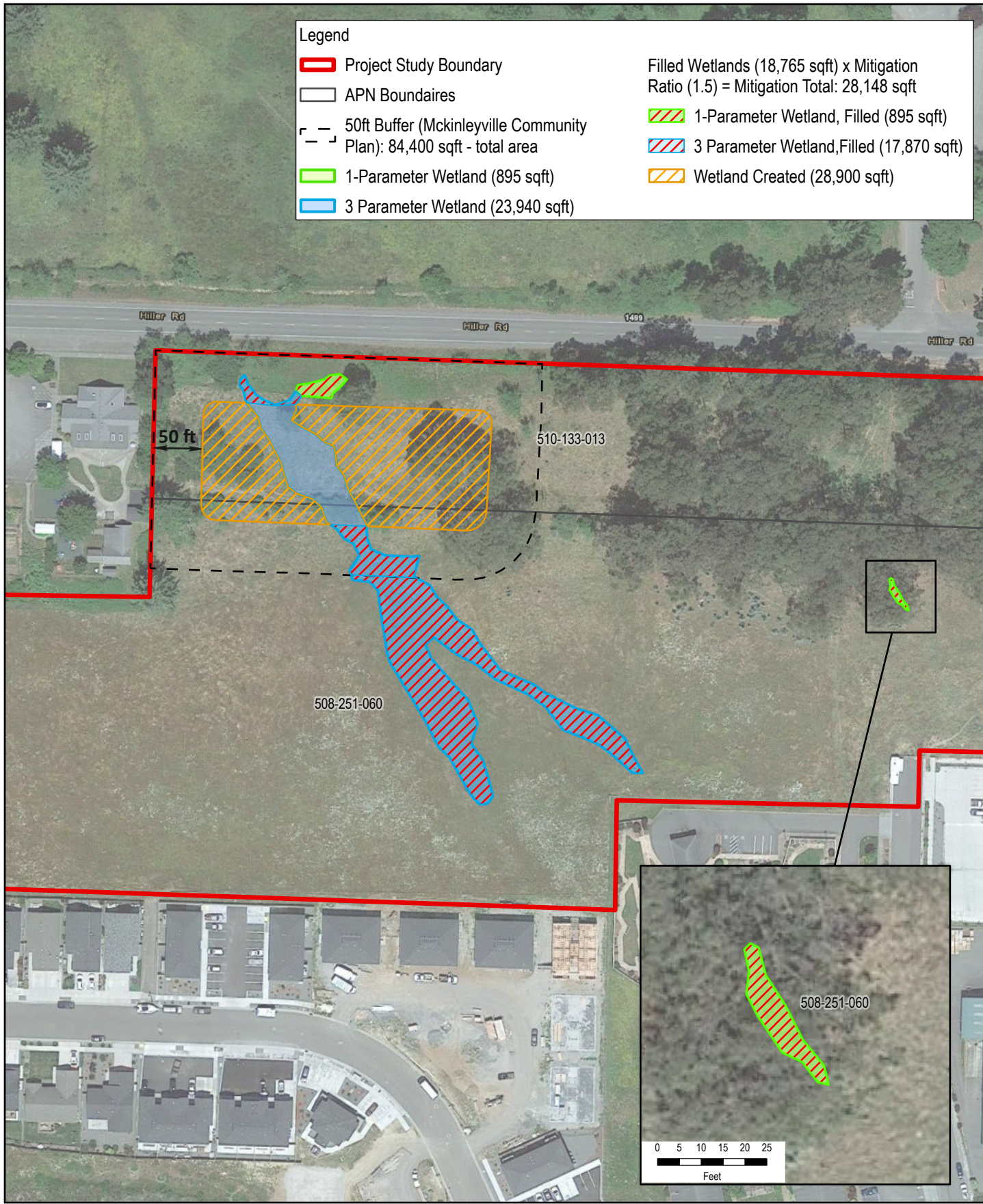
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Wetland Delineation South Hiller Rd,
McKinleyville

Project No. 12603187
Revision No. -
Date Feb 2023

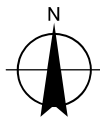
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Wetland Delineation

FIGURE 2



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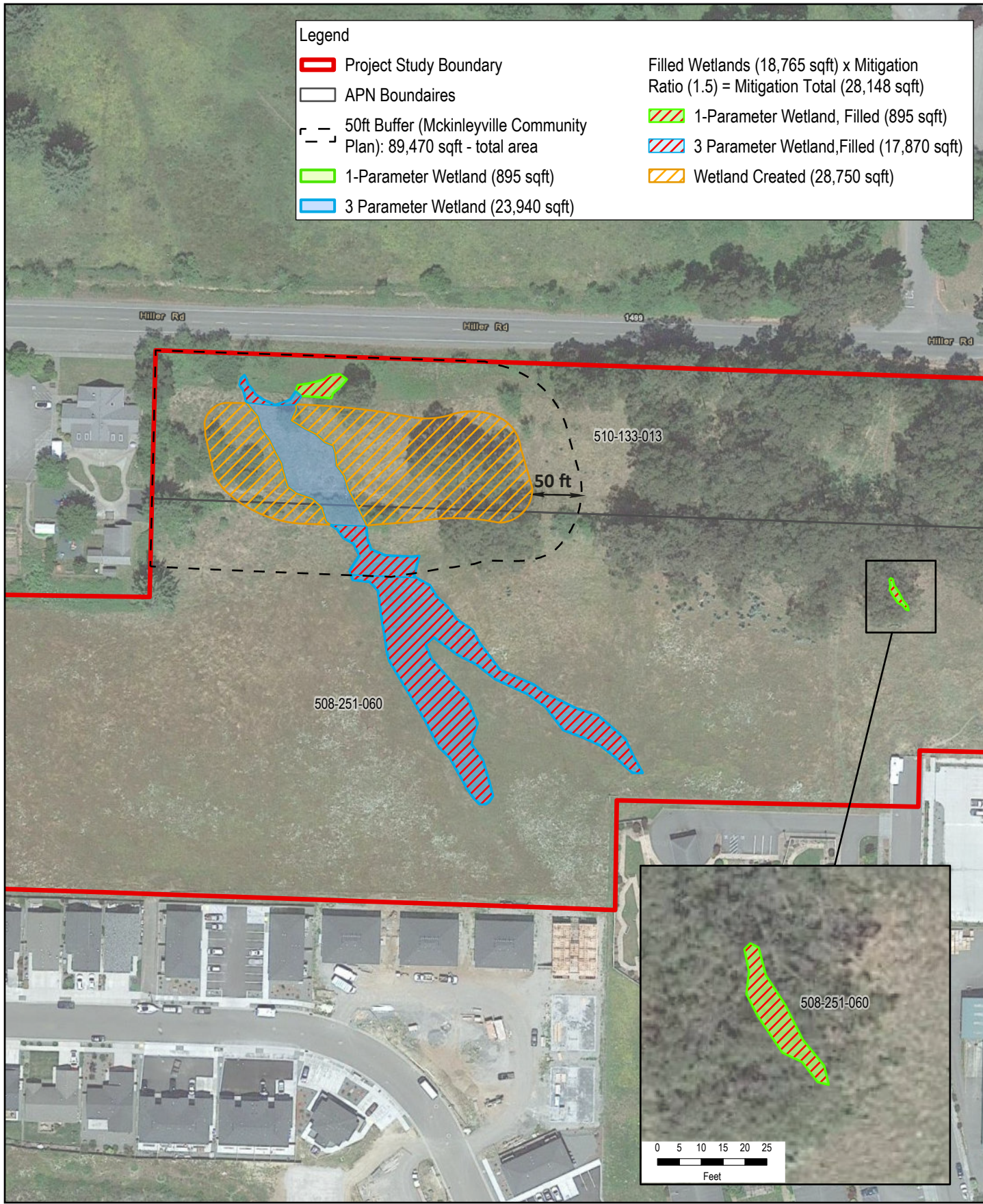
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Life Plan Humboldt
Wetland Delineation Mitigation
and Monitoring Plan

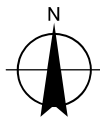
Wetland Mitigation Area
Alternative 1

Project No. 12603187
Revision No. -
Date Mar 2023

FIGURE 3A



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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Life Plan Humboldt
Wetland Delineation Mitigation
and Monitoring Plan

Wetland Mitigation Area
Alternative 2

Project No. 12603187
Revision No. -
Date Mar 2023

FIGURE 3B

Appendix B

**NRCS National Water and Climate Center
WETS Table**

[illegible]

Table 1: Annual average precipitation (mm) for the period 1958-2007													
Year	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1958	12.80	5.80	12.80	8.67	3.09	3.78	2.77	1.08	0.02	0.02	0.44	3.37	4.26
1959	8.67	3.09	3.78	2.77	1.08	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06
1960	3.09	3.78	2.77	1.08	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26
1961	3.78	2.77	1.08	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53
1962	2.77	1.08	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48
1963	2.77	1.08	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48
1964	1.08	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89
1965	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	56.54
1966	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	55.31
1967	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1968	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1969	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1970	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1971	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1972	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1973	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1974	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1975	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1976	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1977	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1978	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1979	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1980	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1981	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1982	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1983	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1984	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1985	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1986	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1987	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1988	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1989	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1990	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1991	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1992	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1993	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1994	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1995	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1996	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1997	0.02	0.02	0.44	3.37	4.26	7.76	2.43	43.06	39.26	49.53	52.48	38.89	43.48
1998	14.12	8.13	2.33	4.51	0.24	0.06	0.02	0.28	4.65	16.57			50.91
1999	5.80	12.28	9.94	2.42	2.31	0.06	0.01	0.25	0.01	1.53	8.32	3.66	46.59
2000	12.80	8.67	3.09	3.78	2.77	1.08	0.02	0.02	0.44	3.37	4.26	2.76	43.06
2001	3.92	4.53	2.21	3.07	0.99	1.00	0.17	0.23	0.41	1.78	9.54	11.41	39.26
2002	7.56	6.95	4.75	3.06	0.70	0.83	0.07	0.04	0.19	0.06	2.36	22.96	49.53
2003	7.81	3.78	5.63	12.92	1.45	0.11	0.04	0.58	0.55	0.56	6.08	12.97	52.48
2004	6.71	9.07	2.59	2.07	1.14	0.07	0.11	0.70	0.63	4.98	1.71	9.11	38.89
2005	5.54	2.16	6.13	6.55	4.86	4.10	0.10	0.14	0.17	3.42	9.38	13.99	56.54
2006	11.94	5.97	10.63	4.50	1.48	0.56	0.08	0.10	0.17	0.70	9.50	9.68	55.31
2007	2.63	13.11	3.66	3.71	0.95	0.67	0.86	0.12	1.03	5.73	3.23	7.78	43.48

2008	10.26	3.65	4.79	2.40	0.10	0.40	0.09	0.82	0.18	1.13	5.08	10.01	38.91
2009	2.06	6.78	6.78	1.38	3.86	0.31	0.19	0.14	0.63	2.45	4.34	5.08	34.00
2010	10.49	5.38	6.76	8.36	3.58	3.46	0.10	0.21	2.00	5.29	6.35	12.38	64.36
2011	2.69	4.66	12.57	5.07	1.72	1.31	0.25	M0.05	M0.37	5.16	4.64	3.31	41.80
2012	9.11	M2.12	12.65	5.66	1.08	2.41	0.76	0.08	0.10	3.55	6.93	11.06	55.51
2013	2.94	2.00	3.47	2.24	1.88	0.78	0.00	0.10	4.37	0.05	1.70	0.98	20.51
2014	2.16	7.90	8.85	1.84	1.05	0.73	T	0.00	3.23	5.74	5.11	9.96	46.57
2015	2.07	5.59	3.78	2.39	0.10	0.07	0.13	0.51	0.59	1.10	5.30	18.77	40.40
2016	12.30	2.93	10.48	3.27	0.64	0.11	0.59	0.02	T	12.03	7.20	8.22	57.79
2017	11.03	14.24	10.09	5.32	1.26	0.72	0.01	0.01	0.73	1.81	8.55	2.31	56.08
2018	9.19	2.97	8.35	5.34	0.97	0.48	0.02	0.02	0.32	0.89	5.68	5.40	39.63
2019	8.39	16.09	5.39	3.64	3.11	T	0.02	0.46	3.21	2.08	2.05	7.88	52.32
2020	9.26	1.01	2.80	2.11	5.66	0.53	MT	0.02	0.77	0.60	3.27	5.14	31.17
2021	6.81	6.15	4.29	0.67	0.33	1.93	0.11	0.01	1.68	5.40	3.79	6.73	37.90
2022	2.92	0.41	2.18	5.08	2.64	2.73	0.60	T	0.52	0.21	6.47	10.49	34.25
2023	6.39	6.47	M6.74										19.60

Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.

Data missing for all days in a month or year is blank.

Creation date: 2023-03-14

Appendix C

**Life Plan Humboldt Aquatic Resources
Delineation (Attached Separately)**