4576 Paradise Drive

Tiburon, California

Delineation of Wetlands and Other Waters

Prepared for:
Eric Crandall
4576 Paradise Drive
Tiburon, California 94920

Prepared by:
MIG
2055 Junction Avenue
Suite 205
San Jose, CA 95131
(650) 327-0429

September 2022

1. Introduction

The purpose of this delineation is to identify the extent and distribution of wetlands and other waters occurring at 4576 Paradise Drive in Tiburon, Marin County, California (APN 038-142-02) under conditions existing at the time of the August 2022 survey. The size of the parcel is approximately 9.12 acres (Figures 1 to 3).

Within the parcel, two ephemeral drainages and one swale were identified in a biological constraints analysis prepared for the parcel by MIG in August 2022. To determine if these drainages and swale are potential waters of the U.S. and/or state, a formal technical delineation was completed in accordance with the U.S. Army Corps of Engineers (USACE) methodology. The USACE methodology includes collection of technical data on soils, vegetation, and hydrology, which are used to identify wetlands and other waters. The USACE methodology is accepted by both federal and state regulatory agencies.

The climate in the region is coastal Mediterranean, with most rain falling in the winter and spring. Mild cool temperatures are common in the winter. Hot to mild temperatures are common in the summer. Climate conditions in the project area include a 30-year average of approximately 43.8 inches of annual precipitation with an average minimum daily temperature of 48ºF and an average maximum daily temperature of 71ºF (Deters 2022).

The site is underlain by one soil type, Los Osos-Bonnydoon complex, 15 to 30 percent slopes (NRCS 2022a) (Figure 4). The Bonnydoon series consists of shallow, somewhat excessively drained soils that formed in material weathered from sandstone and shale. Bonnydoon soils are on uplands and have slopes of 5 to 85%. This soil map unit is classified as “well-drained” and is not listed as hydric in Marin County on the National Hydric Soils List (NRCS 2022b). A detailed description of this soil type can be found in Appendix A.

The U.S. Fish and Wildlife Service’s National Wetlands Inventory (NWI) map of the parcel is depicted in Figure 5. The NWI identified two temporarily flooded intermittent riverine systems within the parcel (R4SBA) (NWI 2022). NWI maps are based on interpretation of aerial photography, limited verification of mapped units, and/or classification of wetland types using the classification system developed by Cowardin et al. (1979). These data are available for general reference purposes and do not necessarily correspond to the presence or absence of jurisdictional waters.

2. Survey Methods

Before the delineation surveys were conducted, topographic maps and aerial photos of the study area were obtained and reviewed from several sources, such as the U.S. Geological Survey (USGS) (Figure 3), Natural Resources Conservation Service (NRCS) (Figure 4), NWI (Figure 5), and Google Earth software (Google Inc. 2022).

On August 25, 2022, MIG Senior Biologist David Gallagher performed a technical delineation of

wetlands and other waters in the parcel, in accordance with the *Corps of Engineers 1987 Wetlands Delineation Manual* (Corps Manual; Environmental Laboratory 1987). Additionally, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West (Version 2.0)* (Regional Supplement) (USACE 2008a) and *A Field Guide to the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b) were followed to document site conditions relative to hydrophytic vegetation, hydric soils, and wetland hydrology. Mr. Gallagher performed preliminary mapping of the extent and distribution of wetlands and other waters of the U.S. that may be subject to regulation under Section 404 of the Clean Water Act (CWA); and waters of the state that may be subject to regulation under the Porter Cologne Water Quality Control Act, which is administered by the Regional Water Quality Control Board (RWQCB). Mr. Gallagher also surveyed for aquatic and riparian habitat that may be subject to regulation under Sections 1600-1607 of the California Fish and Game Code, which is administered by California Department of Fish and Wildlife (CDFW).

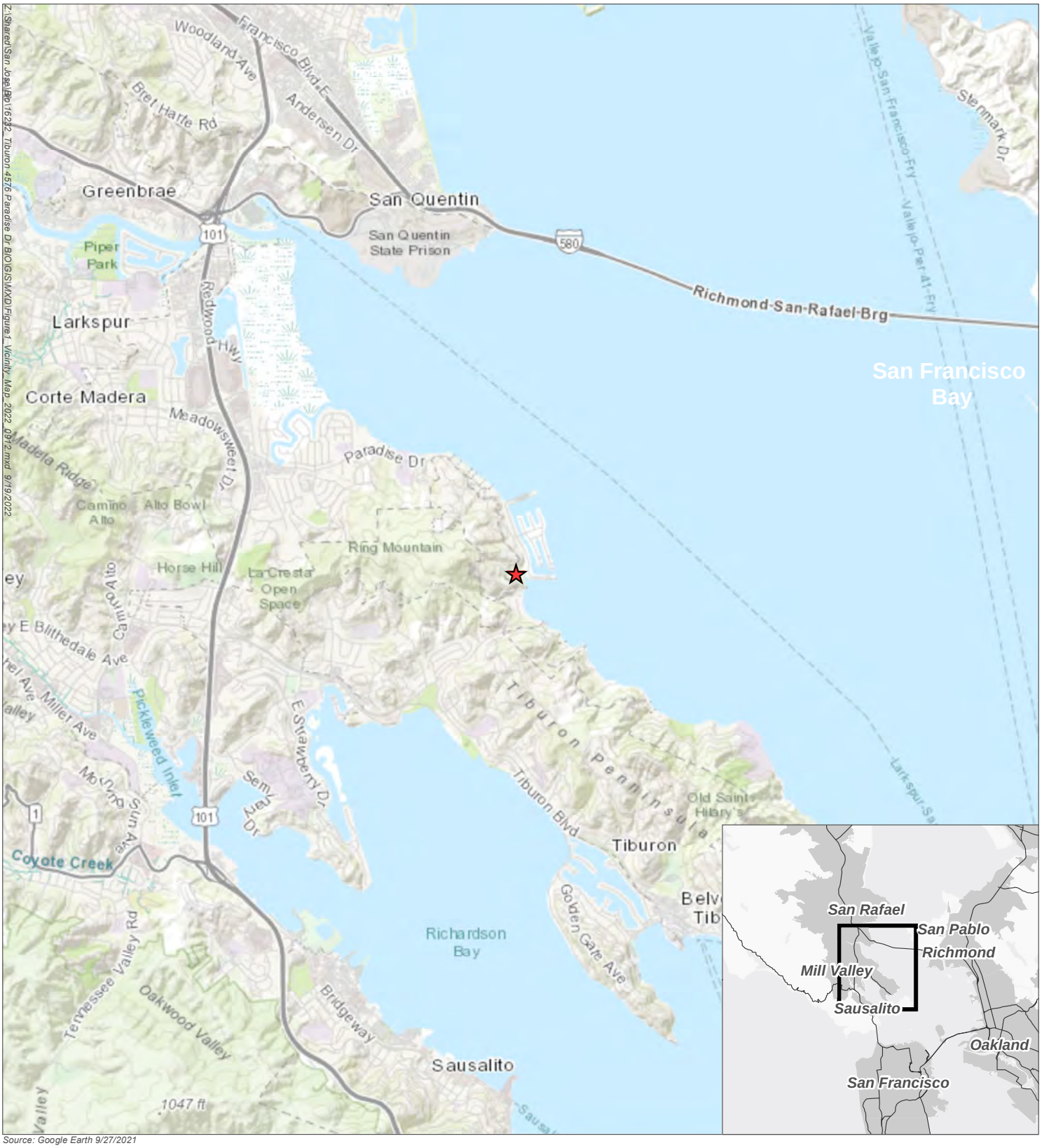
2.1 Identification of Jurisdictional Waters

The vegetation, soils, and hydrology in the project area were mapped according to the Routine Determination Method outlined in the Corps Manual (Environmental Laboratory 1987), using updated data forms, vegetation sampling methods, and hydric soil and hydrology indicators developed for the Regional Supplement (USACE 2008a). This three-parameter approach to identifying wetlands is based on the presence of a prevalence or dominance of hydrophytic vegetation, hydric soils, and wetland hydrology.

In addition to applying these survey methods, Mr. Gallagher compiled this report in accordance with guidance provided in *Updated Map and Drawing Standards for the South Pacific Division Regulatory Program* (USACE 2016a) and *Information Requested for Verification of Corps Jurisdiction* (USACE 2016b). These documents list the information that must be submitted as part of a request for a jurisdictional determination, including:

- Vicinity map (Figure 1)
- Parcel or study area map (Figure 2)
- USGS quadrangle sheet (Figure 3)
- Soils map (Figure 4)
- National Wetlands Inventory map (Figure 5)
- Vegetation communities map (Figure 6)
- Delineation map (Figure 7)
- Current soil survey report (Appendix A)
- Plant species observed (Appendix B)
- Arid West Wetland Determination Data Forms (Appendix C)
- Written rationale for sample point choice (Section 3.2)
- Color photos (Appendix D)
- Aquatic resources table (Appendix E)

During the survey, the parcel was examined for topographic features, drainages, alterations to hydrology or vegetation, and recent significant disturbance. A determination was then made as



Source: Google Earth 9/27/2021

0 0.75 1.5 3 Miles

N

Project Location

Figure 1 Project Vicinity

4576 Paradise Drive Delineation of Wetlands and Other Waters

Source: Google Earth 9/27/2021

0 0.075 0.15 0.3 Miles

N

Parcel Boundary

Figure 2 Parcel Map

4576 Paradise Drive Delineation of Wetlands and Other Waters

Source: Google Earth 9/27/2021

0 0.25 0.5 1 Miles

Parcel Boundary

Figure 3 USGS Topo Map

4576 Paradise Drive Delineation of Wetlands and Other Waters

Source: Google Earth 9/27/2021; USDA 2022

NRCS Soils

- Henneke stony clay loam, 15 to 50 percent slopes
- Los Osos-Bonnydoon complex, 15 to 30 percent slopes
- Los Osos-Bonnydoon complex, 30 to 50 percent slopes
- Tocaloma-Saurin association, very steep
- Xerorthents-Urban land complex, 0 to 9 percent slopes
- Water
- Parcel Boundary

Figure 4 Soil Map

4576 Paradise Drive Delineation of Wetlands and Other Waters

Source: Google Earth 9/27/2021; NWI 2022

Wetland Type

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Pond
- Riverine
- Parcel Boundary

Figure 5 National Wetlands Inventory Map

4576 Paradise Drive Delineation of Wetlands and Other Waters

to whether normal environmental conditions were present at the time of the field survey. In the field, the techniques used to identify wetlands included observing the vegetation growing near the soil sample points and characterizing the current surface and subsurface hydrologic features present near the sample points through both observation of indicators and direct observation of hydrology. Features meeting wetland vegetation, soil, and hydrology criteria were then mapped in the field. Geospatial data were collected using a tablet with an Arrow 100 sub-meter GPS receiver and a geo-spatial mobile-device application.

2.2 Identification of Section 404 Jurisdictional Wetlands

Where wetland field characteristics were present, Mr. Gallagher examined vegetation, soils, and hydrology using the Routine Determination Method outlined in the Corps Manual (Environmental Laboratory 1987) and the updated data forms, vegetation sampling methods, and hydric soil and hydrology indicators developed for the Regional Supplement (USACE 2008a).

Hydrophytic Vegetation. Plants that can grow in soils that are saturated or inundated for long periods of time, which contain little or no oxygen when wetted, are considered adapted to those soils and are called hydrophytic. There are different levels of adaptation, as summarized in Table 2. Some plants can only grow in soils saturated with water (and depleted of oxygen), some are mostly found in this condition, and some are found equally in wet soils and in dry soils. Plants observed at each of the sample study areas were identified to species, where possible, using *The Jepson Manual, Vascular Plans of California, Second Edition* (Baldwin et al. 2012). The wetland indicator status of each species was obtained from the *Arid West 2020 Regional Wetland Plant List* (USACE 2020). Wetland indicator species are designated according to their frequency of occurrence in wetlands. For instance, a species with a presumed frequency of occurrence of 67 to 99 percent in wetlands is designated a facultative wetland indicator species. The wetland indicator groups, indicator symbol, and the frequency of occurrence of species, provided as a percentage, within wetlands are shown in Table 1.

Table 1. Wetland Indicator Status Categories for Vascular Plants

Indicator Category	Symbol	Frequency (Percent) of Occurrence in Wetlands[1]
Obligate	OBL	>99 (Almost always is a hydrophyte, rarely in uplands)
Facultative wetland	FACW	67 – 99 (Usually a hydrophyte but occasionally found in uplands)
Facultative	FAC	34 – 66 (Commonly occurs as either a hydrophyte or non-hydrophyte)
Facultative upland	FACU	1 – 33 (Occasionally is a hydrophyte, but usually occurs in uplands)
Upland[2]	UPL	<1% (Rarely is a hydrophyte, almost always in uplands)
Not included[2]	NI	Considered to be an upland species

Obligate and facultative wetland indicator species are hydrophytes that occur “in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically

[1]Based on information contained in the Corps Manual.
[2]Plant species that are not listed in the *Arid West 2020 Regional Wetland Plant List* (USACE 2020) are considered UPL species

saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987). Facultative indicator species may be considered wetland indicators when found growing in hydric soils that experience periodic saturation. Plant species that are not on the regional list of wetland indicator species are considered upland species. A complete list of the vascular plants observed in the parcel including their current indicator statuses, is provided in Appendix B.

Hydric Soils. Up to 12 inches of the soil profile were examined for hydric soil indicators. The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as one formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper 12 inches of soil (NRCS 2010). Hydric soils include soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. In general, evidence of a hydric soil includes characteristics such as organic soils (histosols), reducing soil conditions, gleyed soils, soils with bright mottles and/or low matrix chroma, soils listed as hydric by the U.S. Department of Agriculture (USDA) on the National Hydric Soils List (NRCS 2022b), and iron and manganese concretions. Reducing soil conditions can also include circumstances where there is evidence of frequent ponding for long or very long duration. A long duration is defined as a period of inundation for a single event that ranges from 7 days to a month and very long is greater than one month (Environmental Laboratory 1987).

Munsell Soil Notations (Munsell 2009) were recorded for the soil matrix of each soil sample. The Munsell color system is based on three color properties: hue, value, and chroma. A brief description of each component of the system is described below, in the order they are used in describing soil color (i.e., hue/value/chroma):

1. **Hue.** The Munsell Soil Color Chart is divided into five principal hues: yellow (Y), green (G), purple (P), blue (B), and red (R), along with intermediate hues such as yellow-red (YR) and green-yellow (GY). Example of commonly encountered hue numbers include 2.5YR, 10YR, and 5Y.
2. **Value.** *Value* refers to lightness, ranging from white to grey to black. Common numerical values for value in the Munsell Soil Color Chart range from 2 for saturated soils to 8 for faded or light colors. Hydric soils often show low-value colors when soils have accumulated sufficient organic material to indicate development under wetland conditions but can show high-value colors when iron depletion has occurred, removing color value from the soil matrix. Value numbers are commonly reported as 8/, 2.5/, and 6/.
3. **Chroma.** *Chroma* describes the purity of the color, from "true" or "pure" colors to "pastel" or "washed out" colors. Chromas commonly range from 1 to 8 but can be higher for gleys. Soil matrix chroma values that are 1 or less, or 2 or less when mottling is present, are typical of soils that have developed under anaerobic conditions. Chroma numbers are listed, for example, as /1, /5, and /8.

The NRCS Web Soil Survey (NRCS 2022a) was consulted to determine which soil types have been mapped in the parcel (Figure 4). Detailed descriptions of these soil types are provided in

Appendix A.

Wetland Hydrology. Wetland hydrology is defined as an area that is inundated either permanently or periodically at mean water depths less than 6.6 feet, or where the soil is saturated at the surface at some time during the growing season of the prevalent vegetation. The period of inundation or soil saturation varies according to the hydrologic/soil moisture regime and occurs in both tidal and non-tidal situations.

Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Wetland hydrology indicators provide evidence that the study area has a continuing wetland hydrologic regime. Primary indicators might include visual observation of surface water (A1), high water table (A2), soil saturation (B1), water-stained leaves (B9), and hydrogen sulfide odor (C1). Secondary indicators might include riverine drift deposits (B3), drainage patterns (B10), and passing score for the FAC-neutral test (D5). Each of the sample points was examined for positive field indicators (primary and secondary) of wetland hydrology, following the guidance provided in the Regional Supplement.

Potential jurisdictional wetlands were identified within the parcel.

2.3 Identification of Section 404 Jurisdictional Other Waters

"Other waters" includes lakes, slough channels, seasonal ponds, tributary waters, non-wetland linear drainages, and salt ponds. Such areas are identified by the (seasonal or perennial) presence of standing or running water and generally lack hydrophytic vegetation. In non-tidal or muted tidal waters USACE jurisdiction extends to the ordinary high water mark (OHWM) which is defined in 33 CFR Part 328.3 as "the 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 the soil, destruction of terrestrial vegetation or the presence of litter and debris." In tidal waters, USACE jurisdiction extends to the landward extent of vegetation associated with salt or brackish water or the high tide line (HTL) (see 33 CFR, Part 328.4). The HTL is defined in 33 CFR, Part 328.3 as "the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The HTL may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gauges, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm."

Potential jurisdictional "other waters" were identified within the parcel.

2.4 Identification of Waters of the State

The Porter-Cologne Water Quality Control Act (PWQCA) broadly defines waters of the state as "any surface water or groundwater, including saline waters, within the boundaries of the state." Because PWQCA applies to any water, whereas the CWA applies only to certain waters,

California's jurisdictional reach overlaps and may exceed the boundaries of waters of the U.S. For example, Water Quality Order No. 2004-0004-DWQ states that "shallow" waters of the state include headwaters, wetlands, and riparian areas. Where forested habitat occurs, the outer canopy of any riparian trees rooted within top of bank (TOB) may be considered jurisdictional as these trees can provide allochthonous[3] input to the channel below.

Potential waters of the state were identified within the parcel.

2.5 Identification of CDFW Jurisdiction

Ephemeral and intermittent streams, rivers, creeks, dry washes, sloughs, blue line streams on USGS maps, and watercourses with subsurface flows fall under California Department of Fish and Wildlife (CDFW) jurisdiction. Canals, aqueducts, irrigation ditches, and other means of water conveyance may also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife. A stream is defined in Title 14, California Code of Regulations §1.72, as "a body of water that follows at least periodically or intermittently through a bed or channel having banks and that supports fish and other aquatic life. Jurisdiction does not include tidal areas such as tidal sloughs unless there is freshwater input. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." Using this definition, CDFW extends its jurisdiction to encompass riparian habitats that function as a part of a watercourse. California Fish and Game Code §2786 defines riparian habitat as "lands which contain habitat which grows close to, and which depends upon soil moisture from a nearby freshwater source."

The lateral extent of a stream and associated riparian habitat that would fall under the jurisdiction of CDFW can be measured in several ways, depending on the situation and the type of fish or wildlife at risk. At a minimum, CDFW would claim jurisdiction over a stream's bed and bank. Where riparian habitat is present, the outer edge of riparian vegetation is generally used as the line of demarcation between riparian and upland habitats.

CDFW jurisdictional habitats were identified within the parcel.

3. Survey Results and Discussion

A total of nine sample points (SP1 to SP5 and OHWM1a/b to OHWM 4a/b) were examined to identify jurisdictional features (Appendix C; Figure 7). In the parcel, 0.54 acres and 1,103 linear feet of ephemeral streams up to TOB, 0.027 acres of seasonal wetlands, and 0.51 acres of riparian habitat outside of TOB (*Arroyo Willow Thickets*) potentially regulated by USACE, RWQCB, and CDFW were identified. The results of the August 2022 delineation are described below and summarized in Table 2.

The parcel is located within the Central Coast/San Francisco Bay Area Subregions of the

[3]Allochthonous is a term used describe nutrients and carbon that come from outside the aquatic system.

Central Western Californian Region, both of which are contained within the larger California Floristic Province (Baldwin et al. 2012). Where applicable, vegetation communities were mapped using CDFW's Vegetation Classification and Mapping Program's (VegCAMP) currently accepted list of vegetation alliances and associations (CDFW 2022). Five natural communities and land cover types were identified in the parcel: (1) Rural-residential (2) *Coast Live Oak Woodland and Forest Alliance*, (3) *Eucalyptus – Tree of Heaven – Black Locust Groves Semi-natural Alliance*, (4) *Coyote Brush Scrub Alliance*, and (5) *Arroyo Willow Thickets Alliance* (Figure 6).

Table 2. Summary of Potentially Jurisdictional Waters and Habitats within the Parcel

Potentially Jurisdictional Waters	Acres[1]
USACE Jurisdictional Total	0.25
Ephemeral Streams (ES1 & ES2) (up to OHWM)	0.22
Seasonal Wetlands (SW1 & SW2)	0.027
RWQCB Jurisdiction Total	0.54
Ephemeral Stream (ES1 & ES2) (up to TOB)	0.51
Seasonal Wetlands (SW1 & SW2)	0.027
CDFW Jurisdiction Total	1.05
Ephemeral Stream (ES1 & ES2) (up to TOB)	0.51
Seasonal Wetlands (SW1 & SW2)	0.027
Arroyo Willow Thickets (riparian habitat) – outside TOB	0.51

[1]Note: Values are approximate due to rounding.

3.1 Precipitation Data

The survey took place during the dry season. Total estimated precipitation at the project area from February 2022 to July 2022 was 3.7 inches, which was approximately 20% of 30-year average (1986-2015) for the same period, which was *drier than normal* to *normal* conditions (Deters 2022). The region was experiencing an *extreme* to *moderate drought* as estimated by the Palmer Drought Severity Index (PDSI). The *drier than normal* to *normal* conditions were considered when assessing the biotic habitats present in the parcel. The boundaries of waters remained clear owing to the presence of hydrology indicators and hydrophytic vegetation.

3.2 Rationale for Sample Point Choice

OHWM1a/b and OHWM2a/b were selected to delineate the OHWM in the lower and upper reaches of ephemeral drainage ES1 (Figure 7; Photos 1 and 2 in Appendix D). Most of ES1 is within the rural-residential land cover and no riparian habitat is present beyond the channel at its outlet, which is within the *Willow Thickets Alliance* (Figure 7). Geomorphic field indicators of the OHWM included exposed root hairs and roots below an intact soil layer, break in bank slope, natural line impressed on the bank, and drift (organic and non-organic debris). Vegetative field indicators of the OHWM included vegetation stripped from active areas of the channel, vegetation below OHWM that starts to thicken above OHWM due to lack of disturbance from

Source: Google Earth 9/27/2021

- Parcel Boundary
- Coast Live Oak Woodland and Forest Alliance
- Coyote Brush Scrub Alliance
- Eucalyptus-Tree of Heaven- Black Locust Groves Semi-Natural Alliance
- Seasonal Wetland
- Rural-residential
- Willow Thickets Alliance
- Swale
- Ephemeral Stream

Figure 6 Vegetation Communities Map

4576 Paradise Drive Delineation of Wetlands and Other Waters

Figure 7 Preliminary Identification of Waters of the U.S./State

4576 Paradise Drive Delineation of Wetlands and Other Waters

moderate events, and areas above the OHWM fully vegetated due to lack of disturbance by moderate events.

OHWM3a/b and OHWM4a/b were selected to delineate the OHWM in the lower and upper reaches of ephemeral drainage ES2 (Figure 7; Photos 3 and 4 in Appendix D). The banks and channel of ES2 within the *Eucalyptus – Tree of Heaven – Black Locust Groves Semi-natural Alliance* were generally devoid of understory vegetation due to a thick layer of bark litter and the shading of the mature eucalyptus trees. The channel was generally sparsely vegetated except near OHWM3. No riparian habitat is present beyond the channel except near its outlet, which is adjacent to the *Willow Thickets Alliance* (Figure 7). Geomorphic field indicators of the OHWM included exposed root hairs and roots below an intact soil layer, break in bank slope, and drift (organic and non-organic debris). Vegetative field indicators of the OHWM included vegetation stripped from active areas of the channel, vegetation below OHWM that starts to thicken above OHWM due to lack of disturbance from moderate events, and areas above the OHWM fully vegetated due to lack of disturbance by moderate events.

SP1 was selected to examine the section of ephemeral drainage ES1 dominated by hydrophytic vegetation (Figure 7; Appendix C). Vegetation present included Italian rye grass (*Festuca perennis*; FAC), rabbitsfoot grass (*Polypogon monspeliensis*; FACW), slender rush (*Juncus tenuis*; FACW), and tall flatsedge (*Cyperus eragrostis*; FACW). Hydric soil indictors observed included redox depressions in the matrix and pore linings. Hydrological indicators, including drainage patterns and the FAC-Neutral Test were observed.

SP2 was selected to examine the section of ephemeral drainage ES1 where hydrophytic vegetation is intermixed with upland vegetation downstream of SP1 (Figure 7; Appendix C). Vegetation present included little rattlesnake grass (*Briza minor*), Italian rye grass, and ripgut brome (*Bromus diandrus*; UPL). Hydric soil indicators observed included redox depressions but did not meet the threshold for classification of a hydric soil. Hydrological indicators, drainage patterns and sediment deposits were observed.

SP3 was selected to examine the upland area adjacent to ES1 (Figure 7; Appendix C). Vegetation present included little rattlesnake grass and slender oat (*Avena barbata*; UPL). No hydric soil or hydrological indicators were observed at this sample point.

SP4 was selected to examine the swale below culvert C1 (Figure 7; Appendix C). Vegetation present included little rattlesnake grass and slender oat. No hydric soil or hydrological indicators were observed at this sample point.

SP5 was selected to investigate where ephemeral drainage ES2 empties onto the beach just above the HTL (Figure 7; Appendix C). Vegetation present included Italian thistle (*Carduus pycnocephalus*; UPL), pennyroyal (*Mentha pulegium*; OBL), and spiny sowthistle (*Sonchus asper*; FAC). Hydric soils were not observed but the substrate was composed of rocky material and sand (riverwash) likely transported by movement of water in the stream. Hydrological indicators observed included drainage patterns, the FAC-Neutral Test, and sediment deposits.

3.3 Project Area Conditions and Observations

This preliminary delineation assumes that normal circumstances prevailed at the time of the August 2022 delineation, and the results are based upon the conditions present. The survey was performed using the "Routine Method of Determination" using three parameters, as outlined in the Regional Supplement.

The parcel is situated on a moderately sloping hillside with several swales. Some of these swales may convey flows during or immediately after rain events due to their low topographic positions. However, these swales did not have a well-defined bed, bank, and channel, indicating ephemeral and low volume flow patterns. However, they were mapped to illustrate possible flow patterns within the parcel (Figure 7; Photo 5 in Appendix D).

Culvert C1 likely collects runoff from Paradise Drive and residential development upslope of the parcel into the swales just downslope of the culvert as well as down the dirt access road into the ephemeral drainage ES1 (Figure 7). Culverts C2, C3, and C4 likely collect runoff from Paradise Drive, up-slope residential development, and surrounding open space areas west of the parcel.

The HTL was delineated to indicate the jurisdictional limit of tidal waters in the parcel. The HTL was identified in the field by the wrack line, presence of hydrophytic vegetation, elevation, and limits of bank erosion. The wrack consisted of organic and non-organic materials, crustacean shells, and litter (Figure 7; Photo 8 in Appendix D). In some areas along the shoreline, the HTL corresponded to the limit of coastal marsh vegetation (Photo 9 in Appendix D). Vegetation included coastal gumweed (*Grindelia stricta*; FACW), cordgrass (*Spartina* sp.; OBL), fat hen (*Atriplex prostrata*; FACW), perennial pepperweed (*Lepidium latifolium*; FAC), pickleweed (*Salicornia pacifica*; OBL), and saltgrass (*Distichlis spicata*; FAC). The HTL was not delineated along the southern section of the shoreline due to the presence of vertical cliffs.

3.4 Photo Points

Photo point labels, coordinates, and rationale for the photos are include in Table 3. Photos are included in Appendix D.

Table 3. Coordinates and Rationale for Photo Points

Label	Latitude	Longitude	Rationale
Photo 1	37.909090°	-122.476945°	OHWM1
Photo 2	37.909295°	-122.477961°	OHWM2
Photo 3	37.908269°	-122.477023°	OHWM3
Photo 4	37.908650°	-122.478451°	OHWM4
Photo 5	37.909796°	-122.477258°	Swale topography
Photo 6	37.908342°	-122.477243°	Ephemeral drainage ES2, SW2, and *Arroyo Willow Thickets*
Photo 7	37.909244°	-122.477883°	Ephemeral drainage ES1 and SW1
Photo 8	37.908321°	-122.476750°	HTL
Photo 9	37.909087°	-122.476787°	Coastal salt marsh

3.5 Identification of Section 404 Potentially Jurisdictional Waters

Approximately 0.22 acres (ES1 and ES2) and 1,103 linear feet (0.05 aces and 328 feet for ES1 and 0.17 acres and 775 feet for ES2) of Section 404 other waters (ephemeral stream) were mapped in the parcel up to the OHWM (Figure 7; Photos 6 and 7, Appendix D).

Ephemeral Stream (ES1 and ES2). Both ephemeral streams flow in a west to east direction and empty into San Francisco Bay. No water was observed in the streams at the time of the delineation, but evidence of recurrent water flow through the stream was observed in the form of a defined bed and bank. Ephemeral streams only flow during or immediately after rain events and both streams receive runoff from swales and sheet flow from surrounding upland areas Sections of the ephemeral streams may retain moisture longer than the surrounding upland areas and some areas may be mesic, especially in spring.

At the time of the survey, no evidence of tidal action was observed within both streams. At the confluence of the streams and San Francisco Bay, both channels are above the HTL due to significant difference in elevation. Therefore, it is likely that both streams are not subject to regular tidal action. However, storm surge along with a king tide may result in temporary tidal inundation of both streams.

3.6 Identification of Section 404 Potentially Jurisdictional Wetlands

Approximately 0.027 acres of Section 404 wetlands (seasonal wetlands, SW1 (0.023 acres) and SW2 (0.004 acres) were observed within the ephemeral streams: SW1 was located within the OHWM of ES1 and SW2 was located within the OHWM of SW2 (Figure 7; Photos 6 and 7, Appendix D).

Seasonal Wetland (SW1 and SW2). Seasonal wetlands are generally inundated by shallow water, or have high groundwater levels, for variable periods from winter to spring, but they may be completely dry for most of the summer and fall. Dominant vegetation can include strongly

hydrophytic vegetation when the wetland is inundated or saturated and non-hydrophytic, upland species after the wetland dries out.

3.7 Identification of Potentially Jurisdictional Waters of the State

The extent of Section 401 waters of the state (RWQCB jurisdiction) in the project area includes a total of 0.54 acres, including 0.25 acres within Section 404 jurisdiction as described above and an additional 0.29 acres of habitat up to the TOB of ES1 and ES2, including 0.20 acres of *Eucalyptus – Tree of Heaven – Black Locust Groves Semi-natural Alliance*, 0.053 acres of rural-residential, 0.029 acres of Arroyo Willow Thickets, and 0.013 acres of *Coast Live Oak Woodland and Forest Alliance* (Figure 7; Photos 6 and 7, Appendix D). Characteristics of waters of the U.S are described above in Sections 3.5 and 3.6. In the field, TOB was identified as the first distinct break in the bank slope above the active flood plain of the stream. The active floodplain is the area (e.g., bank or terrace) adjacent to and receiving frequent over-bank flow from the low-flow channel. The limits of the active flood plain were determined by evidence of scour along the stream banks, break in slope, a textural change in substrate (e.g., from cobble to a finer-grained matrix), and an increase in vegetative cover and maturity above the active flood plain. The current practice of the San Francisco RWQCB is to claim all areas up to the top of bank, but it may also claim riparian habitat that extends beyond the top of bank and areas within the 100-year flood plain.

3.8 Identification of CDFW Potentially Jurisdictional Habitats

The parcel contains two ephemeral streams with defined bed and bank topography along with associated riparian habitat, as defined by CDFW. Riparian habitat was mapped by the dripline of trees at the outer extent of riparian vegetation. Streambed features were mapped by the top of bank (which can extend beyond the OHWM that is used to measure the extent of waters of the U.S.). The extent of CDFW jurisdiction includes all waters of the state (0.54 acres) as described in Section 3.7 above and an additional 0.51 acres of *Arroyo Willow Thickets* that extend beyond the TOB of the ephemeral streams. The extent of riparian habitat beyond the TOB was determined by the outer dripline of riparian vegetation (Figure 7; Photo 6, Appendix D).

4. References

Baldwin, Goldman, Keil, Patterson, Ronatti, and Wilkin (eds.) 2012. The Jepson Manual: Vascular Plants of California. 2nd Edition. University of California Press, Berkeley, California.

[CDFW] California Department of Fish and Wildlife. 2022. VegCAMP Natural Communities Lists. Accessed August 2022 from https://www.wildlife.ca.gov/data/vegcamp/natural-communities.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. (Version 04DEC98).

Deters, J. 2022. Antecedent Precipitation Tool (Version 1.0). U.S. Army Corps of Engineers Regulatory Program.

Environmental Laboratory. 1987. U.S. Corps of Engineers Wetlands Delineation Manual. Department of the Army.

Google Inc. 2022. Google Earth Pro (Version 7.1.5.1557) [Software]. Available from earth.google.com.

Munsell. 2009. Soil Color Charts, Munsell Color X-rite. Grand Rapids, Michigan.

[NRCS] Natural Resources Conservation Service. 2010. Field Indicators of Hydric Soils in the U.S.: A Guide for Identifying and Delineating Hydric Soils (Version 7.0). U.S. Department of Agriculture. Prepared with the National Technical Committee for Hydric Soils.

[NRCS] Natural Resources Conservation Service. 2022a. Web Soil Survey. U.S. Department of Agriculture. Accessed September 022 from http://websoilsurvey.nrcs.usda.gov.

[NRCS] National Resource Conservation Service. 2022b. National Hydric Soils List. Accessed September 2022 from http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

[NWI] National Wetlands Inventory. 2022. Wetlands Mapper. U.S. Fish and Wildlife Service Accessed September 2022 from http://www.fws.gov/wetlands/Wetlands-Mapper.html.

[USACE] U.S. Army Corps of Engineers. 2008a. U.S. Army Corps of Engineers. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[USACE] U.S. Army Corps of Engineers. 2008b. A Field Guide to the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States. August 2008. U.S. Army Engineer Research and Development Center.

USACE] U.S. Army Corps of Engineers. 2016a. Updated Map and Drawing Standards for the South Pacific Division Regulatory Program.

[USACE] U.S. Army Corps of Engineers. 2016b. Information Needed for Verification of Corps Jurisdiction, San Francisco District. Revised April 2016. https://www.spn.usace.army.mil/Portals/68/docs/regulatory/2%20-%20Info%20Req.pdf

[USACE] U.S. Army Corps of Engineers 2020. National Wetland Plant List, version 3.5. Accessed August 2022 from http://wetland-plants.usace.army.mil/. U.S. Army Corps of Engineers Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, Hanover, NH.

Appendix A: Soil Survey Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Marin County, California

4576 Paradise Drive Tiburon CA

August 30, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,820 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Marin County, California
Survey Area Data: Version 15, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 7, 2021—Mar 31, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
141	Los Osos-Bonnydoon complex, 15 to 30 percent slopes	9.1	100.0%
Totals for Area of Interest		**9.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Marin County, California

141—Los Osos-Bonnydoon complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hf2f
Elevation: 50 to 1,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 270 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Los osos and similar soils: 60 percent
Bonnydoon and similar soils: 20 percent
Minor components: 17 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Los Osos

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 18 inches: loam
H2 - 18 to 38 inches: clay
H3 - 38 to 42 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R015XC032CA - FINE LOAMY CLAYPAN
Hydric soil rating: No

Description of Bonnydoon

Setting

Landform: Hills

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from shale, or sandstone

Typical profile

H1 - 0 to 15 inches: gravelly loam
H2 - 15 to 19 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XC037CA - SHALLOW GRAVELLY LOAM
Hydric soil rating: No

Minor Components

Tocaloma

Percent of map unit: 2 percent
Hydric soil rating: No

Slumps

Percent of map unit: 2 percent
Hydric soil rating: No

Slopes less than 15 percent

Percent of map unit: 2 percent
Hydric soil rating: No

Yorkville

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, deep

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, shallow

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, gravelly

Percent of map unit: 2 percent
Hydric soil rating: No

Saurin

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix B: Plant Species Observed

Common Name	Scientific Name	Wetland Indicator Status[1]
Arroyo willow	*Salix lasiolepis*	FACW
Bird's foot trefoil	*Lotus corniculatus*	FAC
Blue gum	*Eucalyptus globulus*	NI
Blue wild rye	*Elymus glaucus*	FACU
Bog rush	*Juncus effusus*	FACW
Bristly ox-tongue	*Helminthotheca echioides*	FAC
California bay laurel	*Umbellularia californica*	FAC
California bee plant	*Scrophularia californica*	FAC
California sagebrush	*Artemisia californica*	NI
California wood fern	*Dryopteris arguta*	NI
Cape ivy	*Delairea odorata*	FAC
Cherry plum	*Prunus cerasifera*	NI
Coast live oak	*Quercus agrifolia*	NI
Coastal gumweed	*Grindelia stricta*	FACW
Common rush	*Juncus patens*	FACW
Common Pacific pea	*Lathyrus vestitus*	NI
Common velvetgrass	*Holcus lanatus*	FAC
Common verbena	*Verbena lasiostachys*	FAC
Common yarrow	*Achillea millefolium*	NI
Cordgrass	*Spartina* sp.	OBL
Cotoneaster	*Cotoneaster* sp.	NI
Coyote brush	*Baccharis pilularis*	NI
Curly dock	*Rumix crispus*	FAC
English ivy	*Hedera helix*	FACU
English plantain	*Plantago lanceolata*	FAC
Fat-hen	*Atriplex prostrata*	FACW
Field bindweed	*Convolvulus arvensis*	NI
Foxtail barley	*Hordeum murinum*	FACU
French broom	*Genista monspessulana*	UPL
Fremont cottonwood	*Populus fremontii*	NI
Fringed willowherb	*Epilobium ciliatum*	FACW
Giant reed	*Arundo donax*	FACW
Harding grass	*Phalaris aquatica*	FACU
Himalayan blackberry	*Rubus armeniacus*	FAC
Italian rye grass	*Festuca (Lolium) perennis*	FAC
Italian thistle	*Carduus pycnocephalus*	NI

Jersey cudweed	*Pseudognaphalium luteoalbum*	FACW
Ladies' tobacco	*Pseudognaphalium californicum*	NI
Little rattlesnake grass	*Briza minor*	FAC
Ngaio tree	*Myoporum laetum*	FACU
Monterey pine	*Pinus radiata*	NI
Olive	*Olea europaea*	NI
Pampass grass	*Cortaderia jubata*	FACU
Panic veldtgrass	*Ehrharta erecta*	NI
Pennyroyal	*Mentha pulegium*	OBL
Perennial pepperweed	*Lepidium latifolium*	FAC
Picklweed	*Salicornia pacifica*	OBL
Pink honeysuckle	*Lonicera hispidula*	FACU
Poison oak	*Toxicodendron diversilobum*	FAC
Rabbitsfoot grass	*Polypogon monspeliensis*	FACW
Ripgut brome	*Bromus diandrus*	NI
Saltgrass	*Distichlis spicata*	FAC
Scarlet pimpernel	*Lysimachia arvensis*	FAC
Silver wattle	*Acacia dealbata*	NI
Slender oat	*Avena barbata*	NI
Slender rush	*Juncus tenuis*	FACW
Soft brome	*Bromus hordeaceus*	FACU
Spiny sowthistle	*Sonchus asper*	FAC
Sticky monkeyflower	*Diplacus aurantiacus*	FACU
Tall flatsedge	*Cyperus eragrostis*	FACW
Toyon	*Heteromeles arbutifolia*	NI
Western sword fern	*Polystichum munitum*	FACU

NI – Not included in the *Arid West 2020 Regional Wetland Plant List* (USACE 2020)

Appendix C: Arid West Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4576 Paradise Drive-Tiburon City/County: Tiburon/Marin County Sampling Date: 2022-08-25

Applicant/Owner: Eric Crandall State: California Sampling Point: SP1

Investigator(s): DWG Section, Township, Range:

Landform (hillslope, terrace, etc.): Ephemeral Stream Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): C 14 Lat: 37.9091498 Long: -122.4775843 Datum: WGS 84

Soil Map Unit Name: Los Osos-Bonnydoon complex, 15 to 30 percent slopes NWI classification: R4SB7

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:

Wetland with drainage

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Lolium perenne	25	✔	FAC
2. Juncus tenuis	20	✔	FACW
3. Cyperus eragrostis	10		FACW
4. Polypogon monspeliensis	10		FACW
5.			
6.			
7.			
8.			
	65% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 35.0 % Cover of Biotic Crust _____

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	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	65 (A)		155 (B)

Prevalence Index = B/A = 2.4

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

✔ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 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: SP1

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 - 12	10YR 3/2	85	5YR 3/4	15	C	PL / M	Sandy Clay 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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✔ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ 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) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✔ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)

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 – Arid West Region

Project/Site: 4576 Paradise Drive-Tiburon City/County: Tiburon/Marin County Sampling Date: 2022-08-25

Applicant/Owner: Eric Crandall State: California Sampling Point: SP2

Investigator(s): DWG Section, Township, Range:

Landform (hillslope, terrace, etc.): Ephemeral Stream Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): C 14 Lat: 37.9091872 Long: -122.4773295 Datum: WGS 84

Soil Map Unit Name: Los Osos-Bonnydoon complex, 15 to 30 percent slopes 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: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus diandrus	15	✔	UPL
2. Lolium perenne	10	✔	FAC
3. Briza minor	5		FAC
4.			
5.			
6.			
7.			
8.			
	30% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 70.0 % Cover of Biotic Crust _____

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	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	15	x 5 =	75
Column Totals:	30 (A)		120 (B)

Prevalence Index = B/A = 4.0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 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: SP2

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 - 12	10YR 3/1	99	5YR 5/6	1	C	M	Sandy Clay 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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ 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:

Does not meet redox dark surface since redox is less than 1%

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) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ✔ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✔ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

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 – Arid West Region

Project/Site: 4576 Paradise Drive-Tiburon City/County: Tiburon/Marin County Sampling Date: 2022-08-25

Applicant/Owner: Eric Crandall State: California Sampling Point: SP3

Investigator(s): DWG Section, Township, Range:

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Undulating Slope (%): 5

Subregion (LRR): C 14 Lat: 37.9093578 Long: -122.4776858 Datum: WGS 84

Soil Map Unit Name: Los Osos-Bonnydoon complex, 15 to 30 percent slopes 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: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Briza minor	50	✔	FAC
2. Avena barbata	30	✔	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	80% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20.0 % Cover of Biotic Crust _____

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	50	x 3 =	150
FACU species	0	x 4 =	0
UPL species	30	x 5 =	150
Column Totals:	80 (A)		300 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 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: SP3

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 - 12	10YR 5/4	100					Sandy Clay 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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ 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) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

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:

Upland grassland

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4576 Paradise Drive-Tiburon City/County: Tiburon/Marin County Sampling Date: 2022-08-25

Applicant/Owner: Eric Crandall State: California Sampling Point: SP4

Investigator(s): DWG Section, Township, Range:

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 7

Subregion (LRR): C 14 Lat: 37.9097359 Long: -122.4771285 Datum: WGS 84

Soil Map Unit Name: Los Osos-Bonnydoon complex, 15 to 30 percent slopes 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: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Briza minor	50	✔	FAC
2. Avena barbata	40	✔	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10.0 % Cover of Biotic Crust _____

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	50	x 3 =	150
FACU species	0	x 4 =	0
UPL species	40	x 5 =	200
Column Totals:	90 (A)		350 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 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: SP4

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 - 10	10YR 5/4	100					Sandy Clay 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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ 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) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✔ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

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:

Sample point in swale

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4576 Paradise Drive-Tiburon City/County: Tiburon/Marin County Sampling Date: 2022-08-25

Applicant/Owner: Eric Crandall State: California Sampling Point: SP5

Investigator(s): DWG Section, Township, Range:

Landform (hillslope, terrace, etc.): Ephemeral Stream Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): C 14 Lat: 37.9082845 Long: -122.4768189 Datum: WGS 84

Soil Map Unit Name: Los Osos-Bonnydoon complex, 15 to 30 perecent slopes NWI classification: R4SB7

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: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Mentha pulegium	25	✔	OBL
2. Carduus pycnocephalus	5		UPL
3. Sonchus asper	5		FAC
4.			
5.			
6.			
7.			
8.			
	35% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 65.0 % Cover of Biotic Crust _____

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	25	x 1 =	25
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column Totals:	35 (A)		65 (B)

Prevalence Index = B/A = 1.9

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

✔ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 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: SP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6								Very Rocky and Sandy, very little soil substrate
-								
-								
-								
-								
-								
-								
-								

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ✔ 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:

Riverwash material, assumed hydric

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) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ✔ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✔ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)

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:

SP1

SP2

SP3

SP4

SP5

Appendix D: Photographs

Photo 1. OHWM1 sampling point in ephemeral drainage ES1. OWHM indicators observed included exposed root hairs and roots below an intact soil layer and break in bank slope.

Photo 2. OHWM2 sampling point in ephemeral drainage ES1. OHWM indicators observed included break in bank slope and vegetation stripped from active areas of the channel.

Photo 3. OHWM3 sampling point in ephemeral drainage ES2. OHWM indicators observed included exposed root hairs and roots below an intact soil layer and break in bank. Notice that the drainage is less than 2 feet across at this point.

Photo 4. OHWM4 sampling point in ephemeral drainage ES2. OHWM indicators observed included exposed root hairs and roots below an intact soil layer and break in bank.

Photo 5. Swale downslope of culvert C1. Note the lack of a well-defined bed, bank, and channel indicating infrequent and low volume flows.

Photo 6. Ephemeral drainage ES2 and seasonal wetland SW2 with Arroyo *Willow Thickets Alliance* and San Francisco Bay in the background.

Photo 7. Ephemeral drainage ES2, seasonal wetland SW1 within the rural-residential land cover.

Photo 8. The HTL was delineated in the field using the limits of bank erosion and wrack line.

Photo 9. Coastal salt marsh within the parcel. The HTL corresponded to the limit of marsh vegetation.

Appendix E: Aquatic Resources Table

Waters Name	State	Cowardin Code	HGM Code	Measurement Type	Amount	Units	Water Type	Latitude	Longitude	Local Waterway
ES1	CA	R4SB3	Riverine	Area	0.05	Acres	A2TRIBINT	37.909244°	-122.477883°	San Francisco Bay
ES2	CA	R4SB3	Riverine	Area	0.17	Acres	A2TRIBINT	37.908342°	-122.477243°	San Francisco Bay
SW1	CA	R4SB7	Riverine	Area	0.023	Acres	A2TRIBINT	37.909149°	-122.477584°	San Francisco Bay
SW2	CA	R4SB7	Riverine	Area	0.004	Acers	A2TRIBINT	37.908284°	-122.476818°	San Francisco Bay