Preliminary Delineation of Waters of the United States, Including Wetlands, for the

MARTINEZ BAY TRAIL PROJECT PHASE II

CONTRA COSTA COUNTY, CALIFORNIA

SBI
Swaim Biological Inc.

Prepared for Kimley-Horn and Associates

Preliminary Delineation of Waters of the United States, Including Wetlands, for the

Martinez Bay Trail Project Phase II

PREPARED BY:

Swaim Biological, Inc.

PREPARED FOR:

Kimley-Horn and Associates

Marcy Kamerath
D: 510.250.2106
Marcy.Kamerath@kimley-horn.com

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Acronyms and Abbreviations

ACOE	U.S. Army Corps of Engineers
BCDC	Bay Conservation and Development Commission
BMP	best management practice
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
EBRPD	East Bay Regional Parks District
ercon	erosion-control mat
FACU	Facultative Upland
FACW	Facultative Wetland
GPS	Global Positioning Satellites
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OBL	Obligate
OHWM	ordinary high water mark
PJD	Preliminary Jurisdictional Determination
ROW	right-of-way
RPW	Relatively Permanent Waters
TNW	Traditional Navigable Waters
UPRR	Union Pacific Railroad
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator coordinate system
WETS	Climate Analysis for Wetlands

Martinez Bay Trail Project Phase II, Preliminary Delineation of Waters of the United States, Including Wetlands

Summary

Aquatic resources within the study area consist of an isolated swale; three unnamed intermittent drainages that merge into a single drainage, and then into a wetland tributary; an abutting wet meadow; seasonal wetlands abutting the wetland tributary; a saltgrass flat seasonal wetland, and riparian overstory. Except for the isolated swale these features are tributary to the Carquinez Straits, a Traditional Navigable Waters (TNW) (U.S. Army Corps of Engineers, Sacramento District, 2018).

The Aquatic Resources Delineation Area (ARDA) encompasses 6.68 acres and includes the project footprint plus a 50-foot buffer. A total of 1.327 acre/1873 linear feet of potentially jurisdictional waters and wetlands were identified within the study area, allocated by federal/state agency jurisdiction as shown in Table 1- Summary of Wetlands and Other Waters in the Delineation Area.

Table 1. Summary of Wetlands and Other Waters in the Delineation Area

Aquatic Resource Type	Aquatic Resource* Size (acre) Required for all resources	Aquatic Resource Size* (linear feet) Required for only stream channels
Federal- Corps- Waters	0.161	1165
Federal- Corps- Wetlands	0.842	--
State- CDFW and RWQCB- Waters	0.589	1873
State- RWQCB- Wetlands	0.738	--
State- CDFW- Riparian	1.074	--
State- BCDC- *Shoreline Band	0.656	320
Total	**1.327**	**1873**

*Numbers reflect jurisdictional overlap/areas already calculated as part of the total. Maximum acreage is State waters + State wetlands = 1.327 acre/1873 linear feet.

This delineation of waters and wetlands has been conducted in accordance with the 2008 “A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States"

and per the guidance of the 1987 "Corps of Engineers Wetland Delineation Manual" and the 2008 “Arid West Regional Supplement (Version 2.0)”.

Introduction

In May 2003, an Initial Study/Mitigated Negative Declaration (City of Martinez 2003) was prepared and adopted by the City of Martinez (City) for approval of the Martinez Bay Trail Phase II Project (hereafter referred to as the Original Project). The Original Project was proposed as part of the larger San Francisco Bay Trail (SFBT) which is being developed by the Association of Bay Area Governments in conjunction with local agencies. The Original Project was intended to begin at the East Bay Regional Park District (EBRPD) Nejedly Staging area and to provide a link to the SFBT at the EBRPD Martinez Regional Shoreline parking lot. The Original Project was approved in 2003, a Joint Aquatic Resources Permit Application was completed, and permits were obtained for the Project in 2003-2004. Approximately 700 feet of the first phase of the trail from the Nejedly Staging Area to the Union Pacific Railroad (UPRR) right-of-way was subsequently built. The remainder of the Project was put on hold until an easement was granted by UPRR for the EBRPD to construct the remainder of the Phase II Project. A restated and Amended MOU was agreed to on May 3, 2016 after the original Memorandum of Understanding (MOU) between UPRR and EBRPD was signed in 1993.

The proposed trail dimensions are consistent with the Original Project and will be approximately 10 feet of pavement with 2-foot aggregate base shoulders. No expansion of any existing facilities is proposed, and work will be within the scope of the Original Project. As in the Original Project, the proposed Project includes improvements to construct approximately 3,100 feet of trail including the addition of a crossing of the UPRR alignment at Berrellesa Street. The proposed Project would result in paving of an approximately 700-foot portion of trail from the Nejedly Stating Area to the UPRR right-of-way that is currently constructed with aggregate base. This section of trail was originally approved to be paved but was instead constructed with aggregate base and is now partly overgrown with upland ruderal vegetation. The Addendum also found that the mitigation that has already been implemented to offset impacts on wetlands was completed and is considered to be appropriate to offset the lost wetland habitat.

Contact Information

Project Applicant

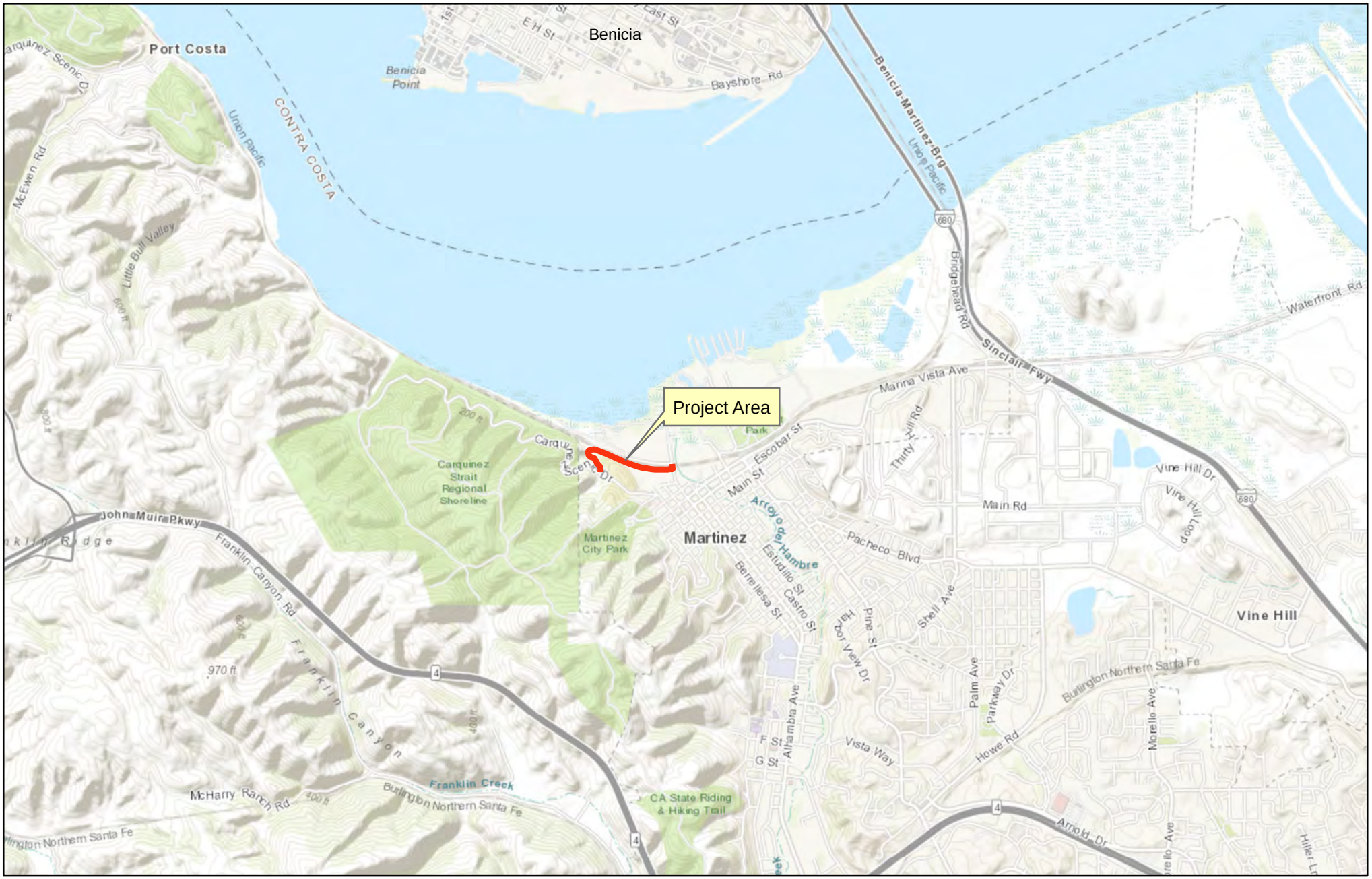
Kimley-Horn and Associates
Marcy Kamerath
D: 510.250.2106
Marcy.Kamerath@kimley-horn.com

Delineation Preparer

Swaim Biological, Inc.
4435 First Street, PMB 312
Livermore, CA 94551
(707) 583-3736
Natasha Dvorak and Chris Swaim

Site Description and Location

The proposed Project is located in the City of Martinez in Contra Costa County, California, beginning at EBRPD property at the Nejedly Staging area, extending northerly toward the UPRR right-of-way, then proceeding easterly to Berrellesa Street. At Berrellesa Street the proposed trail crosses the UPRR right-of-way between milepost 31.10 and milepost 31.38 within UPRR’s Martinez Subdivision. The balance of the trail then continues north following the easterly right-of-way of Berrellesa Street before terminating at the existing EBRPD Martinez Regional Shoreline parking lot at Granger’s Wharf (Figure 1). Segment 1 begins at the Nejedly Staging area at Carquinez Scenic Drive and extends northwesterly for approximately 800 feet to its terminus approximately 100 feet south of the existing UPRR alignment. Proposed work in this segment includes removal of upland and ruderal vegetation covering the existing gravel trail and resurfacing the trail with asphalt. Vegetation clearing and maintenance will also be required to clear the existing



East Bay Regional Park District
Martinez Bay Trail Project Phase II

Figure 1 - Project Location
May 2020

rock lined ditches adjacent to the trail. Minor bridge maintenance will be performed to repair a gap between the existing trail and abutment.

Segment 2 is approximately 1,900 feet in length and roughly parallel to the UPRR alignment. This portion of the proposed Project will include trail construction, grading, tree and vegetation removal, and fill of less than 0.5-acre of jurisdictional wetlands. The Original Project MND required mitigation for this loss through the creation of 3,000 to 4,000 square feet (0.06 to 0.09 acres) of wetland habitat and enhancement of 27,000 square feet (0.62 acres) of existing wetland habitat. This mitigation effort was completed prior to October 2007 and was implemented at the Martinez Regional Shoreline.

Driving Directions

Driving directions from the U.S. Army Corps of Engineers' Sacramento District Office located at 1325 J Street, Sacramento, CA 95814 are as follows:

Get on I-80 W. (45 mi)
Use the right 2 lanes to take exit 40 for I-680 toward Benicia/San Jose. (15 mi)
Take exit 56 for Marina Vista Rd. toward Waterfront Rd. Turn left on Marina Vista Ave. (1.8 mi)
Turn right onto Talbart St. (500 feet)
Turn left onto Carquinez Scenic Drive. (2 mi)
Make a left turn into the Nejedly Staging Area, Martinez, CA 94553. (1.7 mi)

Precipitation and Growing Season

Per the nearest Climate Analysis for Wetlands (WETS) station with sufficient data (the Martinez Water Plant at elevation 40 feet) and based on 50 years of annual rainfall totals (AgAcis, 2020), the average annual rainfall in the ARDA is 19.28 inches. 2019 was the last year to measure average at 19.86 inches, with 2017 being much higher (29.5 inches) and 2013 and 2015 being much lower (7.87 and 5.77 inches, respectively). The growing season was identified as ranging from 315 to 334 days. WETS data is provided in Appendix F.

Vegetation

Vegetation within the study area was assessed to the level required for classification under California's expression of the National Vegetation Classification based on *A Manual of California Vegetation, Second Edition* (2009) and the California Natural Community List (CDFW, 2020). During the May 2020 delineation, 13 vegetation communities were observed in the ARDA. Appendix B provides a list of plants observed in the delineation area, including their wetland indicator status per the National Wetland Plant List v3.4 (Lichvar, et al., 2018).

Developed

Developed land in the footprints of Segments 2 and 3 include paved portions of Berrellesa Street, UPRR tracks, and compacted gravel within the UPRR right-of-way. Developed land in the outer edges of the ARDA includes asphalt-paved Berrellesa Street and Carquinez Scenic Drive. Areas within the UPRR right-of-way show signs of herbicide application, and vegetation in this area is largely absent.

Ruderal

Ruderal vegetation occurs in Segment 2. Regular treatment of this area with herbicides to maintain the UPRR right-of-way has resulted a generally depauperate and weakly growing assemblage of plants interspersed with bare ground. Ruderal vegetation in the ARDA is dominated by non-native grasses, including ripgut brome (*Bromus diandrus*) and foxtail brome (*Bromus madritensis*), with some native gumplant (*Grindelia stricta*).

Eucalyptus Grove

Eucalyptus grove habitat occurs in the upper portion of the ARDA between the Nejedly Staging Area and the pedestrian bridge. The Eucalyptus grove alliance is dominated by an overstory of Eucalyptus trees. The accumulation of leaf litters and allelopathic chemicals in these groves inhibit other plant growth, resulting in a sparse understory. Understory vegetation in the Eucalyptus grove in the ARDA is similar to and contiguous with the Wild Oats and Annual Brome Grassland. It is dominated by non-native grasses and forbs, including wild oats (*Avena* sp.), ripgut brome, bull thistle (*Cirsium vulgare*), and black mustard (*Brassica nigra*). These species are ranked as moderately invasive (Cal-IPC 2020).

Wild Oats and Annual Brome Grassland

Wild Oats and Annual Brome grassland occurs within openings in Eucalyptus grove habitats in the northern portion of the ARDA. This alliance also characterizes portions of the understory of the Eucalyptus grove and Coast Live Oak Woodland and Forest alliances. Non-native grasses dominate this alliance, including wild oats, ripgut brome, soft brome (*Bromus hordeaceus*), and foxtail brome. Other non-natives are also common in the herbaceous layer, such as black mustard, California burclover (*Medicago polymorpha*), cutleaf geranium (*Geranium dissectum*), and English plantain (*Plantago lanceolata*).

Creeping Ryegrass Turf

One patch of Creeping Ryegrass Turf occurs in the ARDA. It is located immediately north of the pedestrian bridge, spans the grassy slope, and briefly follows the riparian corridor. This area is a mesic transitional zone situated between scrub habitat on the western hillside and Coast Live Oak Woodland and Forest along the intermittent creek to the south and east. Creeping Ryegrass Turf in the ARDA is dominated by the native wild rye species *Elymus* (=*Leymus*) *triticoides*. Other native grasses and forbs also occur in the herbaceous layer, such as native brome (*Bromus* sp.), Italian ryegrass (*Festuca perennis*) rushes (*Juncus* sp.), and mugwort (*Artemesia douglasiana*). Non-natives also occur in the herbaceous layer, including wild oats (*Avena fatua*), poison hemlock (*Conium maculatum*) and teasel (*Dipsacus* sp.). Poison hemlock and teasel are both ranked as moderately invasive (Cal-IPC 2020). Relatively low cover of coyote brush (*Baccharis pilularis*) was also present in this habitat in the ARDA.

Coast Live Oak Woodland and Forest

The overstory of the Coast Live Oak woodland and forest in the ARDA is dominated by coast live oak (*Quercus agrifolia*), with co-occurring California bay (*Umbellularia californica*), California walnut (*Juglans californica*), and willow (*Salix* sp.). The understory is sparsely vegetated to bare, and becomes more densely vegetated near the pedestrian bridge and east. Isolated stands of poison oak and Himalayan blackberry (*Rubus*

armeniacus) occur within wild oats and brome grassland. The understory supports woody shrubs and vines, including poison oak, California blackberry (*Rubus ursinus*), elderberry (*Sambucus* sp.), and plum (*Prunus* sp.). The herbaceous layer includes open areas of non-native grasses and densely vegetated areas supporting a variety of forbs, including fennel (*Foeniculum vulgare*), thimbleberry (*Rubus parviflorus*), soap plant (*Chlorogalum pomeridianum*), and snowberry (*Symphoricarpos* sp.). Fennel is ranked as moderately invasive by Cal-IPC, and Himalayan blackberry is ranked as highly invasive (Cal-IPC 2020). Anthropogenic disturbance is also evident, with trash scattered beneath the trees in several areas.

California Sagebrush Scrub

California sagebrush scrub habitat does not occur in the Project footprint, but occurs on the hillside forming the western border. Coyote brush and sagebrush (*Artemesia californica*) dominate the shrub layer in this location. Native grasses and forbs occur at this location, including golden yarrow (*Eriophyllum confertiflorum*), common yarrow (*Achillea millefolium*), native brome, *Lonicera*, toyon (*Heteromeles arbutifolia*), and coyote mint (*Monardella villosa*). Non-native grasses and forbs also occur in the herbaceous layer, including teasel, Smilo grass (*Stipa miliacea*), and honeysuckle (*Lonicera* sp.).

Arroyo Willow Thicket

One patch of arroyo willow thicket occurs in the ARDA. This thicket is narrow in extent, and is bordered by mature oak woodlands to the south and the UPRR right-of-way to the north. Mature willows are dominant in this habitat, and occur intermixed with dense stands of California blackberry. Coyote brush, poison oak, fennel (*Foeniculum vulgare*) and plants associated with adjacent freshwater marsh habitat (described below) occur in the understory.

Freshwater and Brackish Marsh

Five alliances of freshwater and brackish marsh were identified in the ARDA: Yerba Mansa Alkaline Wet Meadow, Smartweed Cocklebur Patch, Cattail Marsh, Hardstem and California Bulrush Marsh, and Saltgrass Flats. Two of these are considered Sensitive Natural Communities: Yerba Mansa Alkaline Wet Meadow and Hardstem and California Bulrush Marshes, which are designated by CDFW as S2 and S3 communities, respectively.

Yerba Mansa Alkaline Wet Meadow

This alliance has rarity listing of S2 which indicates it is fairly rare and threatened. This habitat type occurred in only one location in the ARDA, in a ponded segment of the low flow channel. Early growth of *Anemopsis californica* at approximately 30% cover was observed in this location during the aquatic resources delineation, with the remain cover composed of cocklebur, algal matting, mud, or water.

Smartweed Cocklebur Patches

CNPS describes the Smartweed Cocklebur Patches community as *Polygonum lapathifolium* and/or *Xanthium strumarium* or other knotweed species being dominant or co-dominant in the herbaceous layer with *Bidens frondosa, Cuscuta pentagona, Echinochloa spp., Eleocharis macrostachya, Euthamia occidentalis, Helianthus annuus, Phyla nodiflora* and *Polygonum* spp. Membership rules require greater than 50% relative cover in the herbaceous layer. It has a rarity listing of S5 which indicates it is a fairly secure vegetation community. Common cocklebur (*Xanthium strumarium)* occurs particularly in disturbed areas such as seasonally flooded streamsides and alluvial flats. Within the ARDA, Smartweed Cocklebur Patches occur in the open herbaceous areas downstream as a stand-alone species or in conjunction with *Juncus, Carex, Cyperus, Elymus, Rumex, Distichlis,* and *Grindelia*, among others.

Cattail Marshes

CNPS describes the Cattail Marshes community as *Typha angustifolia, Typha domingensis* or *Typha latifolia* being dominant or co-dominant in the herbaceous layer with *Agrostis stolonifera, Argentina egedii, Cyperus spp., Distichlis spicata, Echinochloa crus-galli, Eleocharis macrostachya, Equisetum telmateia, Juncus spp., Lemna minuta, Lepidium latifolium, Oenanthe sarmentosa, Persicaria lapathifolia, Persicaria punctata, Phragmites australis, Schoenoplectus americanus, Schoenoplectus californicus, Typha ×glauca* and *Xanthium strumarium*. Emergent trees may be present at low cover, including *Salix* spp. It has a rarity listing of S5 which indicates it is a fairly secure vegetation community. Membership rules require greater than 50% relative cover in the herbaceous layer. Within the ARDA this community is comprised of the non-native narrowleaf cattail (*Typha angustifolia*), and tends to occur in the open herbaceous areas downstream as exclusive patches.

Hardstem and California Bulrush Marsh

This alliance is considered a Sensitive Natural Community and has a rarity listing of S3,which indicates it is moderately rare and threatened. It occurs primarily as an understory community beneath the arroyo willow thicket, becoming most prominent at the downstream end.

Salt Grass Flats

CNPS describes the Salt Grass Flats community as *Distichlis spicata, Juncus acutus* and/or *Juncus cooperi* being dominant or co-dominant in the herbaceous layer with *Agrostis viridis, Ambrosia chamissonis, Anemopsis californica, Atriplex prostrata, Batis maritima, Bromus diandrus, Cotula coronopifolia, Eleocharis palustris, Frankenia salina, Hordeum brachyantherum, Hordeum murinum, Jaumea carnosa, Juncus acutus, Juncus arcticus, Juncus cooperi, Lepidium latifolium, Leymus triticoides, Limonium californicum, Muhlenbergia asperifolia, Parapholis strigosa, Pascopyrum smithii, Poa secunda, Puccinellia nuttalliana, Sarcocornia pacifica, Sporobolus airoides* or *Triglochin maritima*. Emergent shrubs may be present at low cover. It has a rarity listing of S4 which indicates it is not an at-risk vegetation community. Membership rules vary between requiring greater than 30% or 50% relative cover in the herbaceous layer. Within the ARDA this community comprises the seasonal wetland at the downstream terminus of the low-flow channel.

Hydrology

The ARDA traverses two watersheds in northwestern Contra Costa County. Located at the base of the easternmost Franklin Hills, the proposed project begins at the Nejedly Staging Area in the Carquinez Drainages Watershed and ends approximately 0.5-mile downhill (northeast) at the junction of the Union Pacific Railroad (UPRR) tracks and Berellesa Street in the Alhambra Creek Watershed (Figure 2- Hydrology; Appendix A Delineation Maps). Site elevation ranges from 50 feet above sea level (ASL) at the Nejedly Staging Area to less than 10 feet ASL along the tracks. Slopes and canyons throughout the area typically drain relatively rapidly after storm events (EBRPD, 1993). Prior to construction of the UPRR track (pre-1939), the bayside slopes and canyons in Franklin Hills, including the ARDA, discharged in an alluvial, braided fashion directly into the marshes buffering Carquinez Strait. The opposite (southwestern) side of the Franklin Hills drains in part to the Alhambra Creek Watershed via Franklin Creek before joining with Alhambra Creek and finally the Carquinez Strait. Alhambra Creek is located on the other side of Berrellesa Street where the proposed project ends.

Most or all of the aquatic resources in the ARDA are hydrologically fed by the drainages originating in the Carquinez Drainages Watershed. Two of these drainages (IS-1 and IS-2) are included as unnamed creeks in the Contra Costa County Department of Conservation and Development hydrology GIS dataset, but the remainder are not named or mapped in national, state, or county stream datasets. Three of them are mapped by EBRPD on their Carquinez Strait Regional Shoreline Park map, including one drainage in the ARDA (IS-1). This appears to be consistent with intermittent stream lines on topographical maps. One of the unmapped drainages (IS-3)

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Martinez, CA
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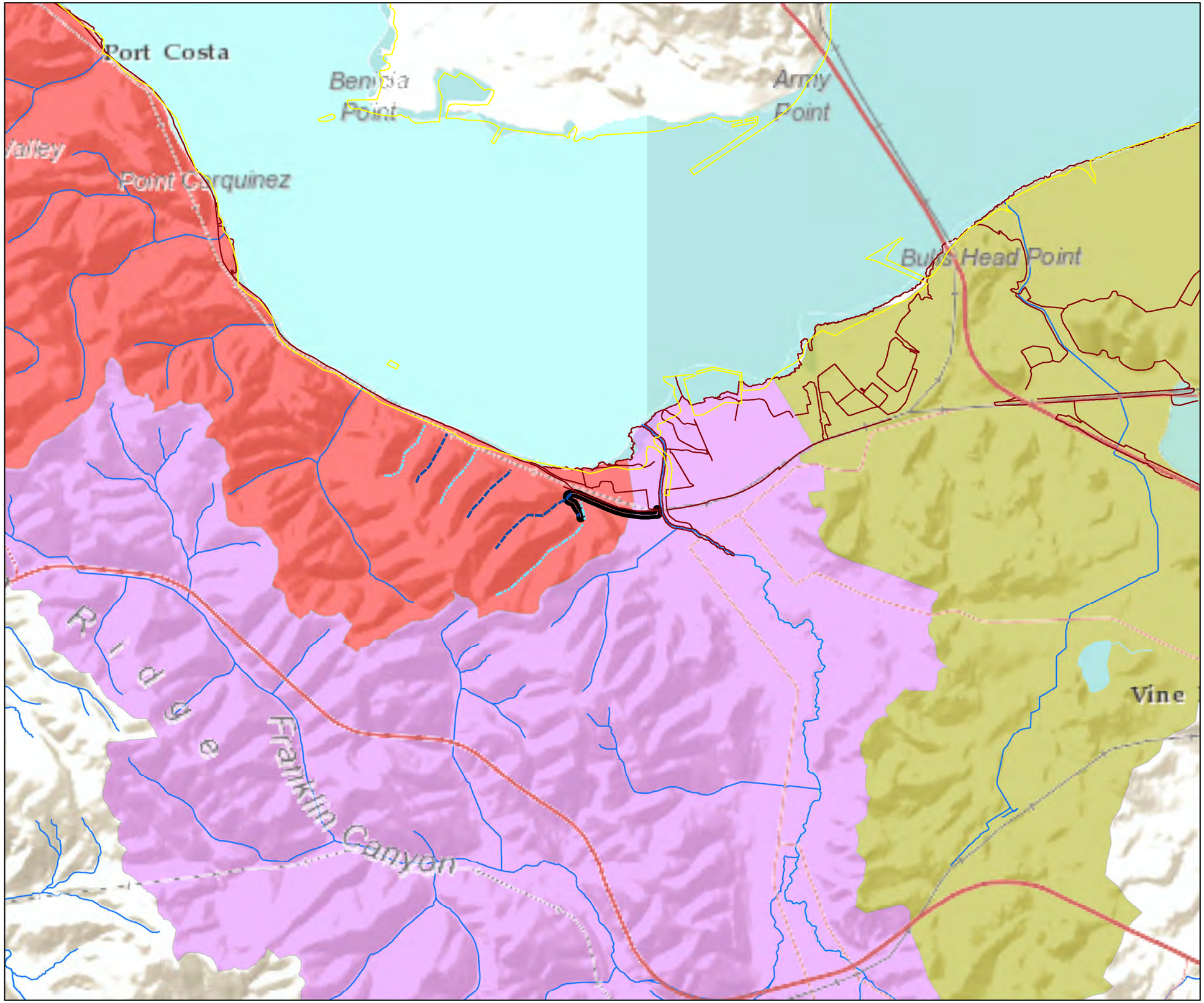
Figure 2 - Watershed/Hydrology
Martinez Bay Trail Project



Legend

- Aquatic Resources Delineation Area
- Water Bodies (DCD)

Franklin Hills Drainages

- EBRPD
- Unmapped
- HYD CDD Creeks/Drainages
- BCDC Contra Costa shoreline
- NOAA USA medium shoreline

Watersheds (PWD)

- Alhambra Creek
- Carquinez Straits Drainages
- Peyton Slough

N

0 0.25 0.5 1 Miles

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983
Vertical Datum: NAVD88, U.S. Feet

1 in = 2,083 ft

Created on May 26, 2020

crossed by the Phase I pedestrian bridge, shortly before being joined by the second longer drainage (IS-1 + IS-2) mapped by EBRPD that originates far uphill from the Nejedly Staging Area. After the confluence (IS-4) it wraps around the eastern base of the slopes, rather than empty into the Bay marsh as all of the bayside Franklin Hills drainages once did before the railroad tracks truncated the natural hydrological system. Now the velocity of the funneled water has transformed what was once a likely ephemeral drainage to the bay (EBRPD, 1993) into a relatively deep low-flow channel parallel to the UPRR tracks, that includes a riparian floodplain and overstory canopy for some of its reach. This feature conveys flows around the base of the hills and into at least one storm drain inlet (DI) (Appendix A). Extra flow volume and/or road runoff and sheet flow from the steep hillsides continues to supply water to the feature downstream of the inlet, but eventually it transitions into a saltgrass-flat seasonal wetland. Other culverts and drains may be present but were not observed. This is the human-altered system that moves water through the ARDA, underneath and around the UPRR tracks presumably to outlets in Alhambra Creek and/or shoreline marshes.

From the Nejedly Staging Area, two drainages (IS-1 and IS-2) pass under Carquinez Scenic Drive and straddle the Martinez Bay Trail on the downhill (north) side of the road. The drainage to the left (west) (IS-2) extends approximately 100 feet farther downhill before ending abruptly where it is crossed by the trail (see Appendix A, point **A**). A buried culvert under the trail may be present at this location, since there is a rockpile on the other side of the trail in a straight trajectory to the drainage on the right (east) (IS-1) (point **B**) that appears to have been placed there to prevent erosion. That drainage (IS-1) continues until its confluence with another drainage (IS-3) crossed by the pedestrian bridge (point **C**), shortly after which the previously-discussed DI is located (point **D**). What remains of the flow and/or additional UPRR runoff and hillside sheet flow continues to the east (IS-4, WT-1).

The drainages in the upper ARDA are an overstory of coast live oak (*Quercus agrifolia*) and California bay laurel (*Umbellularia californica*). The short drainage (IS-2) has only an overstory of coast live oak, and a dense thicket understory of poison oak (*Toxicodendron diversilobum*), coyote brush (*Baccharis pilularis*), poison hemlock (*Conium maculatum*), Himalayan blackberry (*Rubus armeniacus*), wild teasel (*Dipsacus sativus*), *Juncus*, and various native and non-native forbs and grasses. An early-growth *Fritillaria* or *Lilium* was observed at the transition from riparian Coast Live Oak Woodland and Forest to Wild Oats and Annual Brome Grassland. A channel was implied by topography but was not fully visible due to the presence of dense vegetation and poison oak.

The longer EBRPD-mapped drainage (IS-1) has an overstory of both coast live oak and California bay laurel, and lacks a shrub layer. The minimal herbaceous layer consists of *Juncus*, Italian thistle (*Carduus pycnocpehalus*), and sparse new grasses. The channel is unvegetated with a soil and dense leaf litter substrate; occasional boulders are present. The bed measures approximately 2 feet wide and the top of bank is approximately 5 feet wide. This reach of the feature was briefly explored to understand the hydrology of the ARDA as a whole, but was mostly outside of the delineation area.

The unmapped drainage that flows under the pedestrian bridge (IS-3) supports a dense overstory of coast live oak and California bay laurel upstream of the bridge, and a dense overstory of native coast live oak, bay laurel, willows (*Salix* spp.), black walnut (*Juglans hindsii*), elderberry (*Sambucus nigra*), and California buckeye (*Aesculus californica*), along with non-native *Prunus* sp., common fig (*Ficus carica*), and Canary Island date palm (*Phoenix canariensis*) downstream of the bridge. Coyote brush and poison oak are the dominant shrub layer, present along the outer riparian edges with poison hemlock and wild teasel. The herbaceous layer is dense and relatively diverse throughout, but dominated by an unidentified rhizomatous grass (no inflorescence present) thought to be *Glyceria*. Upstream of the bridge the drainage has a clearly defined channel bed and bank, while the sloping topography on all sides obscures the top-of-bank. Under the pedestrian bridge, the feature widens to two or three times its upstream width and continues to widen downstream. The channel bed fades until it reestablishes itself as the low-flow channel paralleling the UPRR tracks (IS-4). This interim area is hummocky (point **E**), and a clear demarcation between channel and upland is not present. In a former delineation this area was mapped

as a separate wetland. In this delineation the area is mapped as an adjacent wetland and it forms part of the Creeping Ryegrass Turfs vegetation community.

Once the drainage reaches the blockage formed by the railroad tracks it is joined by channelized flow from uphill/uptrack. This flow collects at the lowest point, forming the low flow channel (S-4, WT-1). A relatively expansive riparian floodplain is present upslope (south), wherein IS-1 soon joins via an indiscernible confluence. Drainage patterns in the vegetation indicate that flows are well-distributed and significant enough to flatten vegetation throughout the confluence, but lack enough volume or concentration to form a channel. The DI is located in the vicinity and probably serves to divert most of the flows underground and away from the site from this point on (point **D**).

The low flow channel narrows as it passes behind an UPRR control building (point **F**) and remains fairly narrow thereafter. The riparian canopy ends, and the steep slope uphill transitions to coastal scrub for approximately 215 feet. Coast live oak woodland resumes briefly again for approximately 150 feet, before the drainage permanently diverts from the Franklin Hills to continue east along the UPRR tracks (point **G**) until it fades into saltgrass flats. There is no tree overstory or shrub canopy for the remainder of its length. The low flow channel is characterized as a wetland tributary from this point on. The amount of open water versus emergent wetland vegetation changes many times, no doubt seasonally as well. Heavy algal matting and pools with Sierran treefrog breeding (*Pseudacris sierra*) and invertebrates suggest the features retain water for long periods of time. Emergent vegetation includes yerba mansa, rough cocklebur, narrrowleaf cattail, dock (*Rumex* sp.), saltgrass, *Bolboschoenus*, *Schoenoplectus*, *Juncus, Carex, Cyperus, Elymus,* and *Grindelia*, among others.

The low flow channel/wetland tributary terminates in a saltgrass flat seasonal wetland, approximately 215 feet before Berellesa Street. No surface water is present, and the saltgrass comprises 100% vegetative cover.

Soils

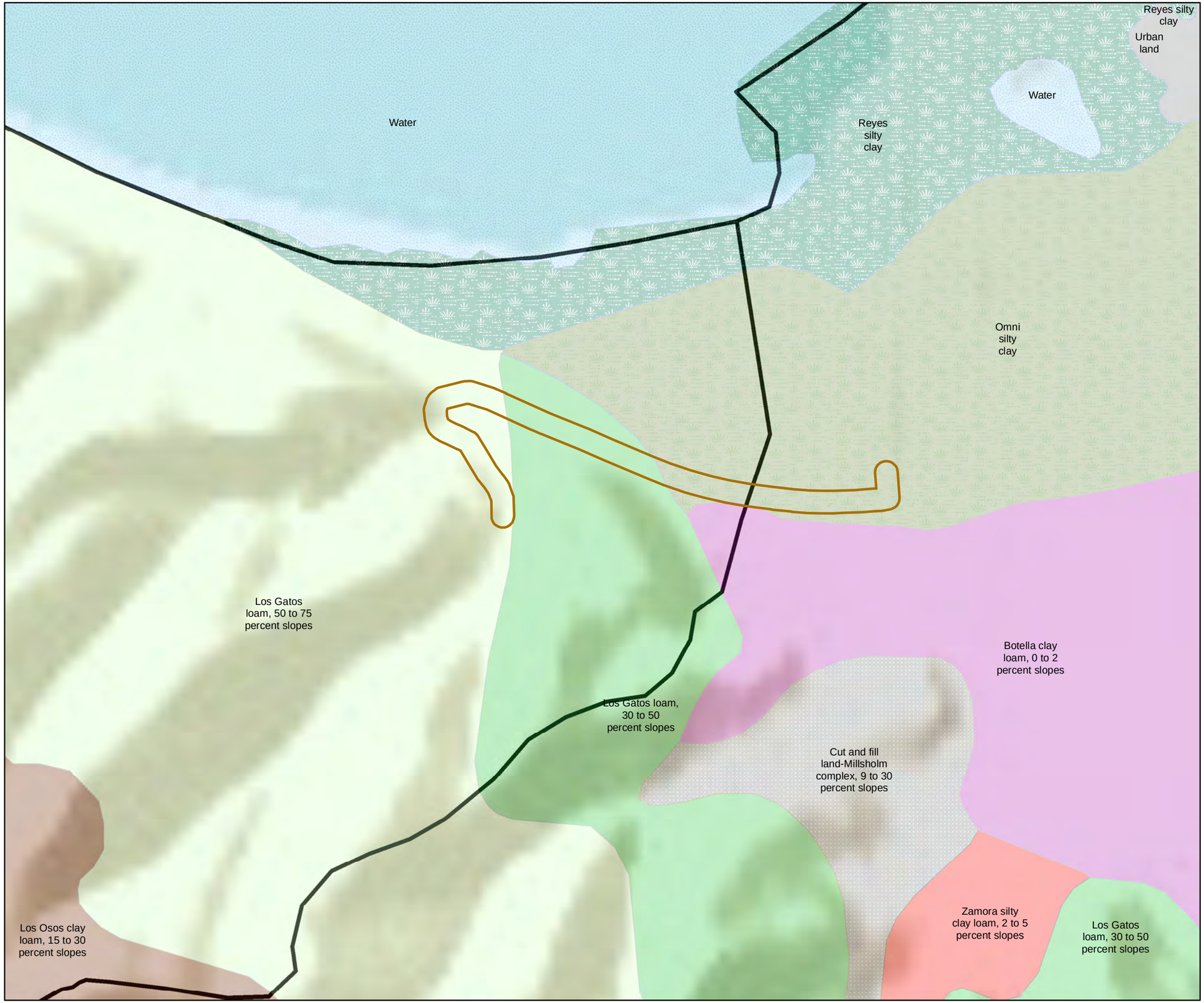
The NRCS Web Soil Survey (USDA, 2020) was consulted to determine the soil types occurring within the ARDA. **Table 2** lists the Soil Map Units in the Delineation Area. **Figure 3- Soils in the Delineation Area** provides a map of soil types overlaid on study area imagery. The NRCS Web Soil Survey is provided in **Appendix E**. Mapped soils within the study area are Los Gatos loam 30% to 50% slopes, Los Gatos loam 50% to 75% slopes, and Omni silty clay, as described below.

Table 2. Soil Map Units in the Web Soil Survey Area

Soil Map Unit	Soil Map Units in Web Soil Survey Area (Acres)
Los Gatos loam (LeF), 30 to 50 percent slopes	1.5
Los Gatos loam (LeG), 50 to 75 percent slopes	2.3
Omni silty clay (Ob)	2.3
Total	***6.1 acres***

Source: NRCS, 2020

East Bay Regional Park District
Martinez Bay Trail Project Phase II
Martinez, CA
May 2020
Figure 3 - Soils
Martinez Bay Trail Project



Legend

- Aquatic Resources Delineation Area
- Watersheds (PWD)
- Creeks Drainages (CDD)

Soils (USDA)

- Botella clay loam, 0 to 2 percent slopes
- Cut and fill land-Millsholm complex, 9 to 30 percent slopes
- Lodo clay loam, 30 to 50 percent slopes
- Lodo clay loam, 9 to 30 percent slopes
- Los Gatos loam, 30 to 50 percent slopes
- Los Gatos loam, 50 to 75 percent slopes
- Los Osos clay loam, 15 to 30 percent slopes
- Los Osos clay loam, 30 to 50 percent slopes
- Omni silty clay
- Reyes silty clay
- Urban land
- Water
- Zamora silty clay loam, 2 to 5 percent slopes

N

0 250 500 1,000 Feet

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983
Vertical Datum: NAVD88, U.S. Feet

1 in = 417 ft

Created on May 26, 2020

Los Gatos loam (LeF), 30 to 50 percent slopes

Los Gatos loam 30 to 50 percent slopes is mapped in 25% of the ARDA. In the NRCS map unit, Los Gatos loam 30 to 50 percent slopes occur between elevations of 500 and 2,000 feet in areas with a mean annual precipitation of 18 to 25 inches and a frost-free period of 260 to 300 days. Los Gatos loam and similar soils comprise 85 percent of the soil type, with minor components forming the remaining 15 percent. This soil is found on upland slopes and results from residuum weathered from sedimentary rock. Within the typical soil

profile depth of a routine wetland delineation (0 to 18 inches), the texture of the soil is loam and clay loam. The runoff potential is high and soils are well drained, with the water table more than 80 inches deep and at least 20 inches to reach lithic bedrock. Due to its high runoff potential, this soil type has no associated frequency of flooding or ponding. This soil type is not hydric, nor are any of its minor components. Minor soil components include Dibble, Los osos, Millsholm, and Vallecitos.

Los Gatos loam (LeF), 50 to 75 percent slopes

Los Gatos loam 50 to 75 percent slopes is mapped in 38% of the ARDA. In the NRCS map unit, Los Gatos loam 50 to 75 percent slopes occur between elevations of 500 and 2,000 feet in areas with a mean annual precipitation of 18 to 25 inches and a frost-free period of 260 to 300 days. Los Gatos loam and similar soils comprise 85 percent of the soil type, with minor components forming the remaining 15 percent. This soil is found on upland slopes and results from residuum weathered from sedimentary rock. Within the typical soil profile depth of a routine wetland delineation (0 to 18 inches), the texture of the soil is loam and clay loam. The runoff potential is high and soils are well drained, with the water table more than 80 inches deep and at least 20 inches to reach lithic bedrock. Due to its high runoff potential, this soil type has no associated frequency of flooding or ponding. Minor soil components include Gaviota, Millsholm, Los osos, and Rock outcrop.

Omni silty clay (Ob)

Omni silty clay is mapped in 37% of the ARDA. In the NRCS map unit, Omni silty clay occurs between elevations of 10 and 100 feet in areas with a mean annual precipitation of 14 to 16 inches and a frost-free period of 260 to 300 days. Omni silty clay and similar soils comprise 85 percent of the soil type, with minor components forming 10 percent. This soil is found on flood plains and results from alluvium derived from sedimentary rock. Within the typical soil profile depth of a routine wetland delineation (0 to 18 inches), the texture of the soil is silty clay and clay. The runoff potential is medium `and soils are poorly drained, with the water table about 30 to 48 inches deep and at least 80 inches to any restrictive bedrock feature. Due to its medium runoff potential, this soil type has a rare frequency of flooding and an occasional frequency of ponding. Soil salinity is moderately to strongly saline. Minor soil components are Reyes and Marcuse. This soil and all of its components are hydric.

Delineation Methods

Field preparation included a desktop review of current and historical satellite imagery available on Google Earth, a query of the National Wetland Inventory (NWI) database (USFWS, 2020), a query of the NRCS Web Soil Survey (NRCS, 2020a) and NRCS State Soil Data Access [SDA] Hydric Soils List (NRCS, 2020b), and familiarization with materials published by the Corps including updated National Wetland Plant Lists (Lichvar et al., 2018). Satellite imagery of the study area was reviewed for 1939, 1993, and from 2002 through 2018 to understand past hydrology, explore historical wetland features, and identify areas of current ponding. Standard texts were consulted during the course of the delineation (Hickman, 1993; Munz and Keck, 1973; Sawyer, et. al., 2009).

A delineation was conducted on May 12, 2020 by SBI biologists N. Dvorak and B. Sousa. Due to permit restrictions on UPRR property no wetland soil pits were dug, and features were delineated based on NRCS Web Soil Survey maps, vegetation, and hydrology. Some features exhibit characteristics of both waters and wetlands, and they were [otherwise] evaluated according to methods described in the Corps' 1987 Wetlands Delineation Manual

and 2008 Regional Supplement [for the] Arid West in addition to the 2008 A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. Global Positioning Satellite (GPS) coordinates were obtained in the field using a Trimble with sub-meter accuracy, and locations were also marked on printed aerials as determined visually in the field by the delineator.

Mapping data was geo-referenced relative to GPS coordinates, aerials marked up in the field, and best-available GIS satellite imagery of the study area to create the most feasible accurate map representation of ground conditions. Stream length and area measurements for aquatic resources were calculated from feature polygons using ArcGIS software.

Results

Aquatic resources within the study area consist of an isolated swale; three unnamed intermittent drainages (IS-1, IS-2, and IS-3) that merge into a single intermittent drainage (IS-4), and then into a wetland tributary (WT-1); an ephemeral ditch (ED-1); an abutting wet meadow (AW-1), seasonal wetlands abutting the wetland tributary (AW-2 and SW-1), and riparian overstory. Except for the isolated swale these features are tributary to the Carquinez Strait, a Traditional Navigable Waters (TNW) (U.S. Army Corps of Engineers, Sacramento District, 2018). A total of 0.161 acre/1165 linear feet of potentially jurisdictional waters and 0.842 acre/2624 linear feet of potentially jurisdictional wetlands occurs within the ARDA. Features are depicted on **Aquatic Resources Delineation Maps in Appendix A** and calculated in **Table 3- Waters of the U.S. and Wetlands in the Delineation Area**.

Table 3. Waters of the US and Wetlands in the ARDA

Aquatic Resource Name	Aquatic Resources Classification		Aquatic Resource Size (acre) Required for all resources	Aquatic Resource Size (linear feet) Required for only stream channels
	Cowardin	Location (lat/long)		
IS-1 Unnamed/EBRPD-mapped	R4SB	38.018632, -122.146846 38.019867, -122.146886	0.002 4' width used for this reach	24
IS-2 Unnamed/CDD mapped	R4SB	38.019198, -122.146846 38.019059, -122.147090	0.007 4' width used for this reach	79
IS-3 Unnamed/Unmapped	R4SB	38.019987, -122.148239 38.020268, -122.147815	0.092 10' width used for	408
ED-1 Unnamed/Unmapped Ditch	R4SBCx?	38.020522, -122.148056 38.020297, -122.147777	0.007 4' width used for this	79
IS-4 Unnamed Low Flow Channel continuation of IS1+IS2+IS3+ED1	R4SBCx?	38.020297, -122.147777 38.019364, -122.145562	0.053 4' width used for this reach	575
		Total Non-Wetland Waters of the US	**0.161**	**1165**
AW-1 Adjacent Wetland Creeping Ryegrass Turf	PFO3E	38.020123, -122.148-86 38.020291, -122.147875	0.052	--
AW-2 Adjacent Wetlands - Seasonal	PUS5E	38.019831, -122.146193 38.018984, -122.142880	0.540	--
WT-1 Wetland Tributary/Emergent Wetland	PEM1E	38.019790, -122.146087 38.018984, -122.142880	0.110	--
SW-1 Saltgrass Flat	PEM1E	38.018984, -122.142880 38.019552, -122.143125	0.140	--
		Total Wetlands	**0.842**	**--**

Cowardin wetland classification codes. Source: Cowardin et al, 1979: R4SBC: Riverine, Intermittent Streambed, Seasonally Flooded; R4SBCx: Riverine, Intermittent Streambed, Seasonally Flooded, Excavated?; PFO3: Palustrine, Forested Broad-Leaved Evergreen, Seasonally Flooded/Saturated; PUS5E: Palustrine, Unconsolidated Shore, Vegetated, Seasonally Flooded/Saturated; PEM1E: Palustrine, Emergent, Persistent, Seasonally Flooded/Saturated

Waters of the U.S.

Intermittent Stream 1 (IS-1)

IS-1 is an unnamed Franklin Hills tributary that historically drained to Carquinez Strait. It is mapped by EBRPD on its Carquinez Regional Shoreline Park Map, and appears to be marked as an intermittent drainage on topographical maps. It begins relatively far uphill from the Nejedly Staging Area and flows northeast to the Carquinez Strait. Stream hydrology was not explored for the full length of the feature, and no surface water was observed during the ARD. But based upon the relatively extensive tree overstory, combined with the possible mapping as an intermittent drainage on topographical maps and its inclusion on EBRPD maps, the feature was characterized in this report as having intermittent flow. Soils are mapped by the NRCS Web Soil Survey as Los Gatos loam (LeF) 30 to 50 percent slopes. This soil type is well drained, has a high runoff classification, and is not associated with ponding or flooding. The soil type is not hydric. Overstory trees were coast live oak (*Quercus agrifolia*) and California bay laurel (*Umbellularia californica*). California bay laurel is a facultative (FAC) wetland species, equally likely to occur in wetlands and nonwetlands. No shrubs were present, and few herbaceous species. IS-1 would likely be categorized as Cowardin code R4SBC: Riverine Intermittent Streambed.

Photo 1. IS-1 upstream from its confluence with IS-4 in the ARDA.

Intermittent Stream 2 (IS-2)

IS-2 is an unnamed Franklin Hills tributary to IS-1. Like IS-1, it originates uphill from the Nejedly Staging Area and follows a different course before passing under Carquinez Scenic Drive and merging shortly thereafter with IS-1. Within the ARDA it forms a small triangle of dense vegetation, bordered on the east by the existing graveled Martinez Bay Trail. Stream hydrology was not explored for the full length of the feature, and no surface water was observed during the ARD. But based upon the relatively extensive tree overstory and dense understory vegetation, along with it being a convex bowl-shaped feature, it was characterized in this report as having intermittent flow. As described in *Hydrology*, it appears to be culverted under the trail nearly all the way to IS-1. Soils are mapped by the NRCS Web Soil Survey as Los Gatos loam (LeF) 30 to 50 percent slopes. This soil type is well drained, has a high runoff classification, and is not associated with ponding or flooding. The soil type is not hydric. Overstory trees were coast live oak (*Quercus agrifolia*) and there was a dense understory of poison oak (FACU), coyote brush (NL), wild teasel (FAC), poison hemlock (FACW), native and non-native blackberry (FAC), and an assortment of grasses and forbs. Also observed was an unflowering *Fritillaria* or *Lilium* species, which could be the special-status Marin checker lily (*Fritillaria lanceolata* var. *tristulis*). IS-2 can be categorized as Cowardin code R4SB: Riverine Intermittent Streambed.

Photo 2. IS-2 in the ARDA. This feature occurs in a topographical depression and may be culverted beneath the existing graveled Martinez Bay Trail.

Intermittent Stream 3 (IS-3)

IS-3 is an unnamed and unmapped Franklin Hills tributary that historically drained to the Carquinez Strait. Like IS-1 and IS-2, it originates uphill from the ARDA but follows a different course before passing under the pedestrian bridge. Stream hydrology was not explored for the full length of the feature, but due to surface water in its lower reach it is categorized here as an intermittent stream. Farther downstream it is joined by ED-1 and the combined drainage of IS-1 and IS-2 to form IS-4. Soils are mapped by the NRCS Web Soil Survey as Los Gatos loam (LeG) 50 to 75 percent slopes. This soil type is well drained, has a very high runoff classification, and is not associated with ponding or flooding. The soil type is not hydric. Overstory trees were coast live oak, California bay laurel, black walnut (FAC riparian), elderberry (FACU), arroyo willow (FACW), red willow (*Salix laevigata*, FACW), and wild plum (*Prunus* sp.). Along the riparian margins are poison oak (FACU), coyote brush (NL), wild teasel (FAC), poison hemlock (FACW), native and non-native blackberry (FAC), and an assortment of grasses and forbs including the Creeping Ryegrass Turf (*Elymus triticoides*) adjacent wetland discussed below. IS-3 can be categorized as Cowardin code R4SB: Riverine Intermittent Streambed.

Photo 3. IS-3 viewed from the pedestrian bridge looking upstream.

Photo 4. Hummocky area where ED-1 meets IS-3.

Pedestrian Bridge Backfill

Minor bridge maintenance will be performed to repair a gap between the existing trail and abutment. The pedestrian bridge wingwall is currently located in the streambed at its downhill end. At its uphill end, flow appears to have eroded the soil away from both sides of the footing/wingwall, resulting in the need for maintenance.

Photo 5. Area requiring fill.

Photo 6. OHWM shown on the wingwall and channel bank.

Photo 7. Area requiring fill. The dominant vegetation is native *Elymus glaucus* (FACU).

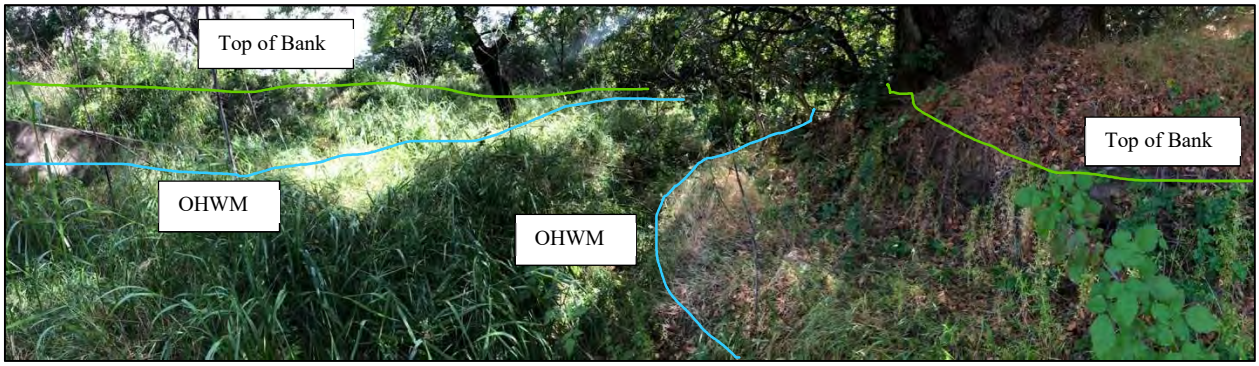


Photo 8. View from IS-3 bank next to pedestrian bridge, looking downstream. OHWM is shown and also scour marks are visible from high flows at top of bank.

Ephemeral Ditch 1 (ED-1)

ED-1 is an unnamed and unmapped roadside ditch that begins approximately 100 feet upstream from its confluence with IS-3. It begins abruptly, probably receiving both sheet flow from the adjacent steep hill and runoff from the UPRR ROW. It is unvegetated in its upper extent and lightly vegetated at its lower extent before entering the hummocky riparian zone and joining with IS-3. Soils are mapped by the NRCS Web Soil Survey as Los Gatos loam (LeG) 50 to 75 percent slopes, but adjusted for map scale are more likely to be Omni silty clay (Ob), a hydric soil. Hydrology indicators included saturation (A3), water marks (B1), sediment deposits (B2), surface soil cracks (B6), inundation visible on aerial imagery (B7), and water-stained leaves (B9). ED-1 can be categorized as Cowardin code R4SBCx: Riverine Intermittent Streambed Seasonally Flooded Excavated.

Photo 9. The start of ED-1 outside of (northwest of) the ARDA.

Photo 10. ED-1 as it enters the ARDA. There is no vegetation in the channel, which is filled with dry cracked mud, sticks, and dead leaves. The adjacent area to the left was not considered a wetland because it is primarily *Digitaria sanguinalis* (FACU) and upland grasses.

Photo 11. ED-1 as it continues into the ARDA. The markup depicts the topography and channel depth. The channel becomes vegetated in this section.

Intermittent Stream 4 (IS-4)

IS-4 is an unnamed and unmapped intermittent low-flow channel paralleling the UPRR tracks. It is formed by the confluence of IS-1, IS-2, IS-3, and ED-1, and probably due to the UPRR was routed away from Carquinez marshes and was directed instead along the base of the hills. A large drainage inlet (DI) was located here, and judging from the greatly-reduced low flow channel and riparian floodplain at this location it appears to drain the majority of the flow, routing it underground and away from the UPRR ROW either to Alhambra Creek or directly to the marshes on the northern bayside. Soils are mapped by the NRCS Web Soil Survey as Los Gatos loam (LeF) 30 to 50 percent slopes, but adjusted for map scale are more likely to be Omni silty clay (Ob), a hydric soil. Hydrology indicators included surface water (A1), saturation (A3), water-stained leaves (B9), and drainage patterns (B10). Vegetation varies from arroyo willow and blackberry thickets to *Hardstem and California Bulrush Marsh*, a CDFW-designated S3 SNC. This becomes the transition zone from IS-4 to WT-1. IS-4 can be categorized as Cowardin code R4SBC: Riverine Intermittent Streambed Seasonally Flooded, and the low-flow channel may have been excavated in the past.

Photo 12. IS-4 is the combined flow of ED-1, IS-1, IS-2, and IS-3. It is a low-flow channel within the riparian floodplain, paralleling the railroad tracks. The channel bed varies from vegetated to unvegetated. This photo shows a large (approximately 20' x 10') unvegetated saturated area where water pools beneath the blackberry and willow overstory.

Photo 13. IS-4 as it continues through the ARDA. The markup depicts the topography and channel depth, with the riparian floodplain shown in the right half of the photo, and the steep hill leading to the Alhambra Cemetery.

Photo 14. IS-4 as it continues through the ARDA, in an area where tules comprise emergent vegetation. The markup depicts the topography and channel depth, with the riparian floodplain show in the far right of the photo.

Wetlands

Wetlands were identified at 4 locations exhibiting vegetation and hydrology. As with all features in this ARDA, soil pits were not dug because of UPRRR permit restrictions. Soils are presumed where vegetation and hydrology are present. "Adjacent wetlands" are wetlands that abut or have a direct hydrological surface connection to other "waters of the United States" (i.e., IS-3) in a typical year. A "wetland tributary" is a linear stream feature that, usually in the absence of an overstory, exhibits a greater surface coverage in the channel by emergent vegetation than by open water.

Adjacent Wetland 1 (AW-1) Creeping Ryegrass Turf

AW-1 occurs on the north side of IS-3, beginning at the pedestrian-bridge landing where it fans out across the slope to the north and follows the downstream riparian channel. AW-1 is an *Elymus (=Leymus) triticoides* and *Elymus glaucus* Creeping Ryegrass Turf community, which is both a CDFW-designated Sensitive Natural Community (S3) and a facultative/facultative-upland wetland community. This community co-occurs with native and non-native upland and facultative wetland grasses, with *E. triticoides* comprising greater than 30% of the relative herbaceous cover. As a rhizomatous grass, the percent coverage varies in density but *Elymus* generally meets or exceeds 50% across the mapped area. The *Elymus (=Leymus) triticoides* forming the AW-1 SNC is facultative, meaning it is equally likely to occur in uplands or wetlands, and the *Elymus glaucus* is FACU. Another dominant co-occurring species is *Festuca perennis* (=*Lolium perenne*), also a FAC plant. Together these species make up the majority of the herbaceous vegetative cover. The area meets the Wetland Determination Data Form vegetation criteria by meeting the Dominance Test and the Prevalence Index.

Photo 15. Creeping Ryegrass Turf, comprised mostly of *Elymus triticoides* (FAC), *Elymus glaucus* (FACU), and *Festuca perenne* (FAC). The mapped community appears to receive hydrology from sheet flow from the adjacent steep hillside and stormwater high flows from IS-3, with much of it occurring as riparian understory.

AW-1 soils are mapped by the NRCS Web Soil Survey as Los Gatos loam (LeG) 50 to 75 percent slopes. This soil type is well drained, has a very high runoff classification, and is not associated with ponding or flooding. The soil type is not hydric. However, soils at the base of Franklin Hills are mapped as Omni silty clay (Ob), a hydric soil. AW-1 probably descends across soil types, with LeG at its uphill extent and Ob at its lowland extent.

AW-1 has no primary hydrology indicators. Secondary hydrology indicators were drift deposits (B3) and drainage patterns (B10). The hydrology influencing the Creeping Ryegrass Turf community as an adjacent wetland primarily relates to its position and density under the riparian canopy, following the northern riparian edge of IS-3 which is a hummocky feature of indeterminate bank boundary. It also appears to receive sheet flow from the northwesternmost hillslope, which has an assemblage of coastal scrub plants, ties into ED-1 at the base of the slope, and may have seep/groundwater influence. Creeping Ryegrass Turf was not observed elsewhere in the ARDA nor within any line-of-sight areas.

AW-1 can be categorized as Cowardin code PF03E: Palustrine[1] Forested Broad-Leaved Evergreen Seasonally Flooded/Saturated.

Adjacent Wetlands 2 (AW-2), Seasonal

AW-2 includes all wetlands on either side of IS-4, which is the intermittent low-flow channel that runs parallel to the railroad tracks. The channel itself averages 4 feet wide, with narrower and wider areas along its reach. The channel is bordered by a relatively narrow margin of seasonal wetland plants, typically saltgrass (FAC), rushes (FAC, FACW, OBL), gumplant (*Grindelia* sp., FACW), bird's foot trefoil (FAC), and rabbitsfoot grass (*Polypogon* sp., FACW, OBL). Where topography permits, an upland community of non-native oats, bromes, and foxtail barley grasses buffers AW-2 from the barren (maintained/herbicide-treated) railroad track corridor.

Photo 16. Markup shows the open water and receded channel versus the adjacent seasonal wetland. The adjacent wetland is comprised of *Distichlis spicata* (FAC), *Lotus corniculatus* (FAC), rushes (FAC, FACW, OBL), *Grindelia* sp. (FACW) and *Polypogon* spp. (FACW, OBL).

[1] Relating to a system of inland, nontidal wetlands characterized by the presence of trees, shrubs, and emergent vegetation.

AW-2 soils are mapped by the NRCS Web Soil Survey as Omni silty clay (Ob), a hydric soil. AW-2 has multiple primary and secondary hydrology indicators: saturation (A3), drift deposits (B3), inundation visible on aerial imagery (B7), drainage patterns (B10), and saturation visible on aerial imagery (C9).

AW-2 can be categorized as Cowardin code PUS5E: Palustrine Unconsolidated Shore Vegetated Seasonally Flooded/Saturated.

Wetland Tributary 1 (WT-1)

IS-4 ends and WT-1 begins as the drainage rounds the steep base of the hills before heading east toward Alhambra Creek. In the transition from IS-4 to WT-1 the channel supports Hardstem and California Bulrush Marshes, a CDFW-designated SNC (S3). Hardstem bulrush or California bulrush is dominant or co-dominant in the herbaceous layer; bordering the channel is dense growth of California and Himalayan blackberry, arroyo willow, and coyote brush.

Photo 17. Photo shows the arroyo willow thicket and the understory of tules that becomes very dense as it emerges from the riparian canopy into the open area.

The riparian and shrub overstories cease with the hills, and emergent wetlands form begin to form within the channel. Emergent wetland vegetation varies by segment. There is a small patch of *Yerba Mansa Alkali Wet Meadow*, a CDFW-designated SNC (S2). Yerba mansa is an OBL wetland plant. To form a SNC it must comprise at least 30% relative cover, a membership rule it appeared to meet due to "runners" that formed a network over the channel. The population is likely to expand and contract seasonally and from year to year. It co-occurred with cocklebur. Emergent vegetation in other segments of the WT-1 include cocklebur, narrowleaf cattail (*Typha*

angustifolia), and bulrush (*Schoenoplectus* sp.). Some segments are open water, with at least one large pooled area containing abundant Sierran treefrog tadpoles. Other segments are saturated and unvegetated, with thick algal mats covering the channel bed.

Photo 18. Top left corner- *Anemopsis californica* patch. Top right corner- Adjacent wetland relative to the receding channel of open water, with emergent vegetation in the receding zone. Bottom left corner- bulrush emergents. Bottom right corner- *Typha angustifolia* patch and the drying channel.

WT-1 soils are mapped by the NRCS Web Soil Survey as Los Gatos loam 30 to 50 percent slopes (LeF) and as Omni silty clay (Ob), a hydric soil. Adjusting for map scale, it is presumed that soils are entirely Ob. WT-1 has multiple primary and secondary hydrology indicators: surface water (A1), saturation (A3), drift deposits (B3), inundation visible on aerial imagery (B7), water stained leaves (B9), aquatic invertebrates (B13), drainage patterns (B10), and saturation visible on aerial imagery (C9).

WT-1 can be characterized as Cowardin code PEM1E: Palustrine Emergent Persistent Seasonally Flooded/Saturated.

Seasonal Wetland 1 (SW-1), Saltgrass Flat

As WT-1 extends toward Alhambra Creek it transitions into a saltgrass flat that is SW-1. SW-1 soils are mapped by the NRCS Web Soil Survey as Omni silty clay (Ob), a hydric soil. No soil pits were dug. Saltgrass is a FAC species and has an equal chance of occurring in wetlands or uplands. Based on the mapped soil type and 100% vegetative coverage by saltgrass, combined with secondary hydrology indicators of drainage patterns (B10) and saturation visible on aerial imagery (C9), this feature is determined to be a seasonal wetland.

SW-1 can be characterized as Cowardin code PEM1E: Palustrine Emergent Persistent Seasonally Flooded/Saturated.

Photo 19. WT-1 ends into the saltgrass flat (SW-1).

Waters of the State

Waters of the State include waters that are potentially jurisdictional to CDFW under their Lake and Streambed Alteration Program, waters and wetlands that are potentially jurisdictional to RWQCB under their 401 Regional Water Quality Certification Program, and waters and wetlands that are potentially jurisdictional to BCDC because they are located in their shoreline band. Features that are potentially jurisdictional and their acreages are identified in Table 4. Waters of the State.

California Department of Fish and Wildlife

Waters of the State that are potentially jurisdictional to CDFW under their Lake and Streambed Alteration Program are IS-1, IS-2, IS-3, ED-1, IS-4, and WT-1, totaling 0.428 acre and 1873 linear feet in the ARDA as shown in Table 4. Riparian habitat is also potentially jurisdictional and was calculated to comprise 1.074 acre in the ARDA.

Regional Water Quality Control Board

Waters of the State that are potentially jurisdictional to RWQCB under their 401 Regional Water Quality Certification Program are IS-1, IS-2, IS-3, ED-1, IS-4, and WT-1. Wetlands that are potentially jurisdictional to RWQCB under their 401 Regional Water Quality Certification Program are AW-1, AW-2, and SW-1. These total 1.166 acres in the ARDA as shown in Table 4.

Bay Conservation and Development Commission

Waters and wetlands that are potentially jurisdictional to BCDC under their Shoreline Development program are portions of IS-3, ED-1, IS-4, WT-1, AW-1, AW-2, and SW-1 that occur within 100 feet inland of the Mean Higher High Water (MHHW) mark. The National Oceanic and Atmospheric Administration publishes a national GIS dataset that includes the MHHW mark, but BCDC uses a local dataset compiled by the San Francisco Estuary Institute. According to the latter dataset, a total of 0.656 acre/320 linear feet of BCDC shoreline band occurs in the ARDA, as shown in Table 4.

Table 4. Waters of the State

Aquatic Resource Name	Aquatic Resources Classification		Aquatic Resource Size (acre) Required for all resources	Aquatic Resource Size (linear feet) Required for only stream channels
	Cowardin	Location (lat/long)		
IS-1 Unnamed/EBRPD-mapped	R4SB	38.018632, -122.146846 38.019867, -122.146886	0.003 8' width used for this reach	24
IS-2 Unnamed/CDD mapped	R4SB	38.019198, -122.146846 38.019059, -122.147090	0.014 8' width used for this reach	79
IS-3 Unnamed/Unmapped	R4SB	38.019987, -122.148239 38.020268, -122.147815	0.191 ?' width used for this reach	408
ED-1 Unnamed/Unmapped Ditch	R4SBCx?	38.020522, -122.148056 38.020297, -122.147777	0.007 5' width used for this reach	79

Aquatic Resource Name	Aquatic Resources Classification		Aquatic Resource Size (acre) Required for all resources	Aquatic Resource Size (linear feet) Required for only stream channels
	Cowardin	Location (lat/long)		
IS-4 Unnamed Low Flow Channel continuation of IS1+IS2+IS3+ED1	R4SBCx?	38.020297, -122.147777 38.019364, -122.145562	0.104 8' width used for this reach	575
WT-1 Wetland Tributary/Emergent Wetland	PEM1E	38.019790, -122.146087 38.018984, -122.142880	0.109	708
Riparian	--	--	[1.074]*	--
Total Waters of the State under CDFW and RWQCB Jurisdiction*			**0.428**	**1873**
AW-1 Adjacent Wetland Creeping Ryegrass Turf	PFO3E	38.020123, -122.148-86 38.020291, -122.147875	0.052	--
AW-2 Adjacent Wetlands - Seasonal	PUS5E	38.019831, -122.146193 38.018984, -122.142880	0.543	--
SW-1 Saltgrass Flat	PEM1E	38.018984, -122.142880 38.019552, -122.143125	0.143	--
Total State Wetlands under RWQCB Jurisdiction			**0.738**	**--**
Shoreline Band	E2EM1		0.656	320
Total BCDC Shoreline Band			**0.656**	**320**

* Excludes Riparian. Cowardin wetland classification codes. *Source: Cowardin et al, 1979*:

R4SBC: Riverine, Intermittent Streambed, Seasonally Flooded; R4SBCx: Riverine, Intermittent Streambed, Seasonally Flooded, Excavated?; PFO3: Palustrine, Forested Broad-Leaved Evergreen, Seasonally Flooded/Saturated; PUS5E: Palustrine, Unconsolidated Shore, Vegetated, Seasonally Flooded/Saturated; PEM1E: Palustrine, Emergent, Persistent, Seasonally Flooded/Saturated; E2EM1: Estuarine Intertidal Emergent Persistent

Features Considered to be Non-Jurisdictional

The stand-alone swale (point **G**) is considered to be non-jurisdictional. It appears to be a small slump, or potentially a manmade channel dug to reduce the velocity of sheet flow down the hill. It may or may not overflow into the northwesternmost ED-1 (point **H**). No soil pit was dug. Vegetation included wild rye (*Elymus triticoides*) and non-native upland grasses.

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Appendix A
Delineation Map/s

Appendix A includes an overview map and detail maps of all delineated aquatic resources ("Aquatic Resources Delineation Map") in accordance with the *Final Map and Drawing Standards for the South Pacific Division Regulatory Program* (Mapping Standards). Photo points are identified on the overview map in Appendix D, Site Photographs Map.

Aquatic resources that the requestor believes are not jurisdictional are identified on *Appendix A Delineation Map/s* as "Stand alone Swale".

To avoid cluttering the Aquatic Resources Delineation Map/s, the requested reference block identifying the individual(s) who conducted the delineation, date(s) of the maps, and date(s) of any revisions is provided here as follows:

Delineation date:	May 12, 2020
Delineators:	Natasha Dvorak/ Swaim Biological, Inc. Bridget Sousa/ Swaim Biological, Inc.
GIS & Map Preparers:	Chris Swaim/ Swaim Biological, Inc. Natasha Dvorak/ Swaim Biological, Inc.
Map Imagery Data:	Aerial Imagery provided by Kimley-Horn Local Imagery date: February 14, 2020
Date Maps Prepared:	Field delineation results were mapped in GIS in May and June 2020.
	Reports maps were prepared in May and June 2020.

East Bay Regional Park District
Martinez Bay Trail Project Phase II
Martinez, CA
May 2020

Appendix A - Delineation of Wetlands and Other Waters of the U.S. for the Martinez Bay Trail Project

SBI

Legend

- Map Reference Point
- Drainage_inlet
- BCDC Shoreline band
- NOAA USA medium shoreline
- Creeks/Drainages
- Survey Area Boundary (6.68 acres)
- Riparian Floodplain Boundary

Waters

- Waters (0.161 acre)
- 100-ft BCDC Shoreline Band Buffer
- Stand alone swale
- Riparian (1.074 acres)
- Wetlands (0.747 acre)

N

0 100 200 400 Feet

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983
Vertical Datum: NAVD88, U.S. Feet

1 in = 183 ft

Created on May 26, 2020

Made in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, as amended on February 10, 2016, by:

Natasha Dvorak and Chris Swaim
Swaim Biological, Incorporated
4435 First Street #312
Livermore, CA 94551

Delineators:Natasha Dvorak and Bridget Sousa
Delineation dates: May 12, 2020

Appendix B
Plant Species Observed in the Delineation Area

Genus	*Species*	Common Name	Wetland Indicator Status[a]	Cal-IPC Rating
Achillea	*millefolium*	yarrow	NL	
Aesculus	*californica*	buckeye	NL	
Ageratina	*adenophora*	thoroughwort	FACU	Moderate Federal: Noxious Weed
Anemopsis	*californica*	yerba mansa	OBL	
Artemesia	*californica*	California sage	NL	
Asclepias	*fascicularis*	narrowleaf milkweed	FAC	
Avena	*barbata*	wild oat	NL	Moderate
Avena	*fatua*	wild oat	NL	Moderate
Baccharis	*pilularis*	coyote brush	NL	
Baccharis	*salicifolia*	mulefat	FAC	
Brachypodium	*distachyon*	false brome	NL	Moderate
Brassica	*nigra*	black mustard	UPL	Moderate
Briza	*minor*	little rattlesnake grass	FAC	Naturalized
Bromus	*diandrus*	ripgut brome	NL	Moderate
Bromus	*hordeaceus*	soft chess	FACU	Limited
Bromus	*madritensis*	foxtail brome	UPL	Naturalized
Calystegia	sp.	morning glory	NL	
Carex	species	sedge	FACW-OBL	
Carduus	*pycnocephalus*	Italian thistle	UPL	Moderate
Centaurea	*melitensis*	tocalote	NL	Moderate
Centaurea	*solstitialis*	yellow star thistle	NL	High
Chenopodium	*murale*	nettle leaf goosefoot	FACU	Naturalized
Chlorogallum	*pomeridianum*	soap root	NL	
Claytonia	sp.	miner's lettuce	FAC?	
Cirsium	*vulgare*	bull thistle	NL	Moderate

Genus	*Species*	Common Name	Wetland Indicator Status[a]	Cal-IPC Rating
Conium	*maculatum*	poison hemlock	FACW	Moderate
Cotoneaster	*francheti?*	cotoneaster	NL	Moderate
Cynosurus	*echinatus*	hedgehog dogtail grass	NL	Moderate
Cyperus	*eragrostis*	tall flat sedge	FACW	
Digitaria	*sanguinalis*	hairy crabgrass	FACU	Naturalized
Diplacus	*aurantiacus*	bush monkeyflower	FACU	
Dipsacus	*sativus*	Indian teasel	NL	Moderate
Distichlis	*spicata*	saltgrass	FAC	
Dittrichia	*graveolens*	stinkwort	NL	Moderate
Elymus	*glaucus*	blue wild rye	FACU	
Elymus (=Leymus)	*triticoides*	beardless Lyme grass	FAC	
Epilobium	*ciliatum*	FACW	FACW	
Epilobium	*densiflorum*	dense-flower willowherb	FACW	
Eriophyllum	*confertiflorum*	yellow yarrow	NL	
Erodium	*botrys*	storksbill	FACU	Naturalized
Erodium	*cicutarium*	storksbill	NL	Limited
Escholschzia	*californica*	California poppy	NL	
Eucalyptus	sp.	Eucalyptus	NL	Limited
Festuca	*myuros*	6-week's grass	NL	Moderate
Festuca	*perennis*	Italian rye grass	FAC	Moderate
Foeniculum	*vulgare*	fennel	NL	High
Frangula	*californica*	California coffeeberry	NL	
Fritillaria?	sp.		NL	
Galium	*aparine*	bedstraw	FACU	
Genista	*monspessulana*	French broom	NL	High
Geranium	*dissectum*	wild geranium	NL	Limited
Geranium	*molle*	cranebill	NL	Naturalized
Geranium	*purpureum*	herb robert	NL	Limited
Glyceria?	*occidentalis*	western manna grass	OBL?	Naturalized
Grindelia	sp.	gumplant	FACW	

Genus	Species	Common Name	Wetland Indicator Status[a]	Cal-IPC Rating
Helenium	*bigelovii*	Bigelow's sneezeweed	FACW	
Helenium	*puberulum*	sneezeweed	FACW	
Helminthotheca	*echioides*	bristly oxtongue	FACU	Limited
Heteromeles	*arbutifolia*	toyon	NL	
Holcus	*lanatus*	velvet grass	FAC	Moderate
Hordeum	*jubatum*	foxtail barley	FAC	
Hordeum	*marinum*	seaside barley	FAC	Moderate
Hordeum	*murinum*	mouse barley	FACU	Moderate
Iris	*pseudacorus*	yellow iris	OBL	Limited
Juglans	*hindsii*	walnut	FAC	
Juncus	*sp. mexicanus, patens?*	rush	FAC?	
Lactuca	*serriola*	prickly lettuce	FACU	Naturalized
Lamium	*purpureum*	henbit	NL	Naturalized
Lathyrus	*latifolius*	everlasting pea	NL	Naturalized
Lepidium	*latifolium*	perennial pepperweed	FAC	High
Lilium?	*pardalinum*	leopard lily	FACW	
Lonicera	*hispidula*	pink honeysuckle	FACU	
Lotus	*corniculatus*	bird's foot trefoil	FAC	Naturalized
Lythrum	*hyssopifolia*	hyssop loosestrife	OBL	Limited
Madia	*sativa*	coastal tarweed	NL	
Medicago	*lupulina*	black medic	FAC	Naturalized
Medicago	*polymorpha*	burclover	FACU	Limited
Melilotus	*indicus*	Indian sweet clover	FACU	Naturalized
Monardella	sp.	coyote mint	NL	
Oxalis	*corniculata*	creeping wood sorrel	FACU	Naturalized
Pentagramma	*triangularis*	goldback fern	NL	
Phalaris	*sp.*	grass	FACU?	Some species Native, others Naturalized
Phoenix	*canariensis*	Canary Island palm	NL	Limited
Phyla	*nodiflora*	turkey tangle fog fruit	FACW	
Plantago	*coronopus*	cut leaf plantain	NL	Naturalized

Genus	Species	Common Name	Wetland Indicator Status[a]	Cal-IPC Rating
Plantago	*lanceolata*	English plantain	FAC	Limited
Polypogon	*monspeliensis*	rabbitsfoot grass	FACW	Limited
Polystichum	sp.	sword fern	FACU?	
Prunus	sp.	plum	FACU?	Limited?
Quercus	*agrifolia*	coast live oak	NL	
Ranunculus	sp.	buttercup	FACU to OBL	
Rosa	*californica?*	California rose	FAC	
Rumex	*crispus*	curly dock	FAC	Limited
Rumex	*pulcher*	fiddle dock	FAC	Naturalized
Rubus	*armeniacus*	Himalayan blackberry	FAC	High
Rubus	*parviflorus*	western thimbleberry	FAC	
Rubus	*ursinus*	California blackberry	FAC	
Salix	*laevigata*	red willow	FACW	
Salix	*lasiolepis*	arroyo willow	FACW	
Sambucus	*nigra*	black elderberry	FACU	
Silybum	*marianum*	milk thistle	NL	Limited
Solanum	sp.	nightshade	FACU?	
Sonchus	*asper*	spiny sow-thistle	FAC	Naturalized
Sonchus	*oleraceus*	common sow thistle	UPL	Naturalized
Spergularia	*bocconi*	Boccone's sand spurry	FACW	Naturalized
Stachys	*bullata*	hedgenettle	NL	
Stipa	*miliacea*	Smilo grass	NL	Limited
Symphoricarpos	*albus*	common snowberry	FACU	
Torilis	*arvensis*	stickweed	NL	Moderate
Toxicodendron	*diversilobum*	poison oak	FACU	
Trichostemma	*lanceolatum*	vinegarweed	FACU	
Trifolium	*hirtum*	rose clover	NL	Limited
Trifolium	*tomentosum*	woolly clover	NL	Naturalized
Typha	*angustifolia*	narrow-leaf cattail	OBL	Naturalized
Umbellularia	*californica*	California bay laurel	FAC	

Genus	*Species*	Common Name	Wetland Indicator Status[a]	Cal-IPC Rating
Urtica	*urens*	annual stinging nettle	NL	
Vicia	*sativa*	garden vetch	FACU	Naturalized
Vicia	*villosa*	spring vetch	NL	Naturalized
Xanthium	*strumarium*	rough cocklebur	FAC	

Sources: Environmental Laboratory 1987; U.S. Army Corps of Engineers 2012; Baldwin et al. 2012; Lichvar, et al., 2014; 2016; 2018.

[a] Indicator Status Definitions:

OBL	=	Obligate, almost always occurs in wetlands (>99% probability of occurrence)
FACW	=	Facultative wetland, usually occurs in wetlands (66%–99% probability)
FAC	=	Facultative, equally likely to occur in wetlands or nonwetlands (34%–66% probability)
FACU	=	Facultative upland, usually occurs in nonwetlands but occasionally in wetlands (1%–33% probability)
UPL	=	Obligate upland, almost never occurs in wetlands (<1% probability)
NI	=	No indicator (insufficient information to assign an indicator status)
~	=	unsure as to FAC or FACU (plant not identifiable to species in its current condition)
--	=	unsure as to FAC, FACU, or UPL (plant not identifiable to species in its current condition)

Appendix C
Routine Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Martinez Bay Trail City/County: Martinez, Contra Costa Sampling Date: 5/12/2020
Applicant/Owner: EBRPD / Kimley-Horn State: CA Sampling Point: WET-1
Investigator(s): N. Dvorak, B Sousa Section, Township, Range: none mapped
Landform (hillslope, terrace, etc.): modified toe of slope Local relief (concave, convex, none): concave Slope (%): 1-2%
Subregion (LRR): Arid West Lat: 38.020479 Long: -122.177997 Datum: lat/long GG
Soil Map Unit Name: Los Gatos Loam 50-75% slopes LeG NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ✓
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No ____
Hydric Soil Present? Yes ____ No ____
Wetland Hydrology Present? Yes ____ No ____
Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: Below average rainfall year. This feature has been consistently modified for 80+ years, and is subject to UPRR ROW maintenance - veg clearing, gravel fill, draining.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5')			
1. Digitaria sanguinalis	40	Y	FACU
2. Festuca perennis	30	Y	FAC
3. Conium maculatum	3	N	FACW
4. Xanthium strumarium	3	N	FAC
5. Helminthotheca echioides	3	N	FAC
6. Toxis arvensis	3	N	NL
7. Polygonum monspeliensis	2	N	FACW
8. Cynosurus echinatus	1	N	NL
	85 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 15 % 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	5	x 2 =	10
FAC species	26	x 3 =	108
FACU species	40	x 4 =	160
UPL species	1	x 5 =	20
Column Totals:	85 (A)		298 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0¹
__ Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: Area adjacent to ED-1. Dominated by FAC + FACU species.

SOIL

Sampling Point: WET-1

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
								No soil pits dug. Tire rut pedS examined. Soil was likely imported fill. A few redox concentrations *

[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 X

Remarks: * were observed in the matrix but were considered to be less than 2% and not prominent.

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 Visible 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)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: * Maybe visible in 5/2005 Google Earth historical imagery.

Appendix D
Site Photographs Map

East Bay Regional Park District
Martinez Bay Trail Project Phase II
Martinez, CA
May 2020

Appendix D
Overview Map for Site Photographs
Martinez Bay Trail Project

SBI

Legend

- Photo Locations
- Survey Area Boundary (6.68 acres)

N

0 100 200 400
Feet

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983
Vertical Datum: NAVD88, U.S. Feet

1 in = 171 ft

Created on May 26, 2020

Appendix E
Soil Survey and Hydric Soil Information

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 Contra Costa County, California

May 19, 2020

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.

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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.

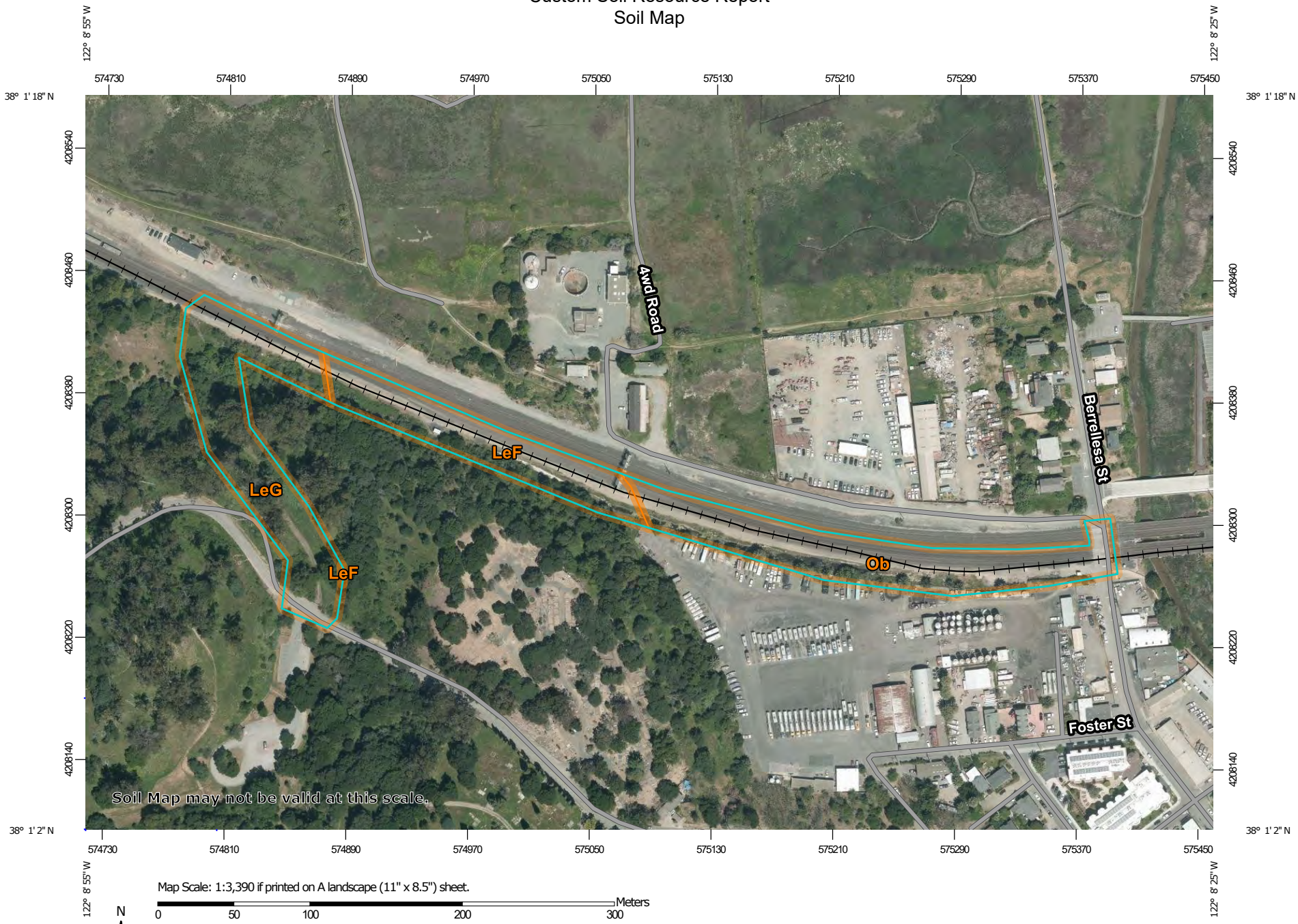
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:3,390 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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: Contra Costa County, California
Survey Area Data: Version 16, Sep 17, 2019

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

Date(s) aerial images were photographed: Apr 25, 2019—Apr 29, 2019

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
LeF	Los Gatos loam, 30 to 50 percent slopes	1.5	24.6%
LeG	Los Gatos loam, 50 to 75 percent slopes	2.3	38.1%
Ob	Omni silty clay	2.3	37.2%
Totals for Area of Interest		**6.1**	**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.

Contra Costa County, California

LeF—Los Gatos loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: h99r
Elevation: 500 to 2,000 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 260 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Los gatos and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Los Gatos

Setting

Landform: Upland slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 27 inches: clay loam
H3 - 27 to 30 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: STEEP LOAMY (R015XD116CA)
Hydric soil rating: No

Minor Components

Dibble

Percent of map unit: 4 percent
Hydric soil rating: No

Los osos
Percent of map unit: 4 percent
Hydric soil rating: No

Millsholm
Percent of map unit: 4 percent
Hydric soil rating: No

Vallecitos
Percent of map unit: 3 percent
Hydric soil rating: No

LeG—Los Gatos loam, 50 to 75 percent slopes

Map Unit Setting
National map unit symbol: h99s
Elevation: 500 to 2,000 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 260 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition
Los gatos and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Los Gatos

Setting
Landform: Upland slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile
H1 - 0 to 8 inches: loam
H2 - 8 to 27 inches: clay loam
H3 - 27 to 30 inches: unweathered bedrock

Properties and qualities
Slope: 50 to 75 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: VERY STEEP LOAMY (R015XD119CA)
Hydric soil rating: No

Minor Components

Gaviota

Percent of map unit: 4 percent
Hydric soil rating: No

Millsholm

Percent of map unit: 4 percent
Hydric soil rating: No

Los osos

Percent of map unit: 4 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent
Hydric soil rating: No

Ob—Omni silty clay

Map Unit Setting

National map unit symbol: h9b7
Elevation: 10 to 100 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 260 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Omni and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Omni

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 8 inches: silty clay
H2 - 8 to 38 inches: clay
H3 - 38 to 60 inches: stratified loamy sand to sandy clay loam to clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Medium
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: About 30 to 48 inches
Frequency of flooding: Rare
Frequency of ponding: Occasional
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Reyes

Percent of map unit: 5 percent
Landform: Marshes
Hydric soil rating: Yes

Marcuse

Percent of map unit: 5 percent
Landform: Rims
Landform position (three-dimensional): Rise
Hydric soil rating: Yes

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Appendix F
WETS Table

WETS Table

WETS Station: MARTINEZ WATER PLANT, CA								
Requested years: 1971 - 2020								
Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	55.6	38.2	46.9	3.90	1.50	4.73	7	0.0
Feb	61.1	41.0	51.1	3.65	1.60	4.45	7	0.0
Mar	66.2	43.8	55.0	2.92	1.25	3.50	6	0.0
Apr	71.9	45.8	58.8	1.26	0.45	1.52	3	0.0
May	78.8	49.3	64.0	0.46	0.11	0.40	1	0.0
Jun	85.5	53.0	69.3	0.10	0.00	0.08	0	0.0
Jul	89.0	54.2	71.6	0.02	0.00	0.00	0	0.0
Aug	87.8	54.1	71.0	0.05	0.00	0.00	0	0.0
Sep	84.6	52.8	68.7	0.18	0.00	0.16	1	0.0
Oct	76.3	48.5	62.4	0.91	0.30	0.99	2	0.0
Nov	64.1	42.6	53.4	2.39	0.94	2.89	5	0.0
Dec	56.0	37.8	46.9	3.43	1.57	4.14	7	0.0
Annual:					14.94	22.30		
Average	73.1	46.8	59.9	-	-	-	-	-
Total	-	-	-	19.28			39	0.0

GROWING SEASON DATES			
Years with missing data:	24 deg = 3	28 deg = 4	32 deg = 4
Years with no occurrence:	24 deg = 45	28 deg = 28	32 deg = 2
Data years used:	24 deg = 47	28 deg = 46	32 deg = 46
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	No occurrence	1/30 to 12/11: 315 days
70 percent *	No occurrence	No occurrence	1/21 to 12/21: 334 days
* Percent chance of the growing season occurring between the Beginning and Ending dates.			

STATS TABLE - total precipitation (inches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1970		1.43	1.41	0.20	0.00	0.07	0.00	0.00	0.00	0.45	5.82	6.37	15.75
1971	1.96	0.16	2.62	0.81	0.27	0.00	0.00	0.00	0.08	0.01	0.88	3.84	10.63
1972	1.00	1.66	0.32	0.79	0.00	0.14	0.00	0.00	0.43	2.99	5.16	2.21	14.70
1973	9.31	5.11	1.76	0.14	T	0.00	0.00	0.00	0.21	1.58	5.73	4.05	27.89
1974	2.39	1.09	5.02	1.80	T	0.00	0.28	0.00	0.00	0.89	0.64	2.06	14.17
1975	1.40	4.89	5.90	1.71	0.00	0.02	0.16	0.03	T	1.57	0.18	0.52	16.38
1976	0.35	2.02	0.92	0.46	0.00	0.00	0.00	0.58	0.76	0.48	0.70	1.53	7.80
1977	1.57	1.20	1.63	0.05	0.61	0.00	0.00	0.00	0.64	0.08	2.72	4.63	13.13

1978	8.03	3.72	5.73	2.67	0.08	0.00	0.00	0.00	0.13	0.00	1.14	0.68	22.18
1979	5.90	4.50	3.62	1.16	0.46	0.00	0.00	0.00	0.00	1.20	2.58	4.86	24.28
1980	5.18	7.51	2.55	1.23	0.17	0.02	0.18	0.00	0.00	0.20	0.06	1.94	19.04
1981	4.97	1.00	3.45	0.20	0.11	0.00	0.00	0.00	0.18	2.05	6.42	3.77	22.15
1982	8.51	2.33	5.55	4.10	0.00	0.03	0.00	0.02	1.00	2.19	5.51	3.00	32.24
1983	6.40	6.09	9.10	2.72	0.25	0.00	0.00	0.71	0.95	0.62	6.65	5.60	39.09
1984	0.33	1.74	1.18	0.64	0.01	0.05	0.00	0.11	0.15	1.63	6.01	1.37	13.22
1985	0.76	2.10	3.68	0.04	0.03	0.08	0.02	0.00	0.28	0.90	3.67	2.67	14.23
1986	3.83	11.70	5.66	0.78	0.38	0.00	0.04	0.00	0.75	0.03	0.11	1.56	24.84
1987	2.46	3.33	2.11	0.06	0.14	0.00	0.00	0.00	0.00	1.46	1.29	3.91	14.76
1988	4.62	0.37	T	2.65	0.40	0.44	0.00	0.00	0.00	0.32	2.54	M3.06	14.40
1989	1.18	1.23	4.97	0.41	0.05	0.11	0.00	0.11	1.23	1.56	1.80	0.00	12.65
1990	3.18	3.36	1.35	0.30	1.81	0.00	0.00	0.00	0.15	0.18	0.34	1.35	12.02
1991	0.41	3.16	6.82	0.36	0.12	0.35	0.00	0.05	0.02	2.00	0.65	2.01	15.95
1992	1.69	6.39	2.83	0.18	0.00	0.22	0.00	0.00	0.00	1.12	0.13	6.29	18.85
1993	9.67	4.19	1.85	0.62	0.57	0.44	0.00	0.00	0.00	0.28	2.50	2.32	22.44
1994	1.98	3.80	0.27	0.86	1.47	0.06	0.00	0.00	0.00	0.80	6.86	2.40	18.50
1995	10.38	0.13	10.00	0.83	1.08	1.37	0.00	0.00	0.00	0.00	0.04	5.91	29.74
1996	5.55	5.93	2.24	1.37	1.76	0.00	0.00	0.00	0.00	0.67	2.22	6.82	26.56
1997	8.14	0.19	0.28	0.07	0.40	0.19	T	0.65	0.05	0.81	6.32	2.46	19.56
1998	7.19	12.18	2.03	1.31	2.66	T	0.00	0.00	0.12	0.43	2.35	1.60	29.87
1999	2.72	5.31	1.92	1.94	0.07	0.00	0.00	0.00	0.01	0.42	1.41	0.37	14.17
2000	6.55	7.75	1.91	0.86	1.10	0.12	0.00	T	0.07	1.74	1.04	0.77	21.91
2001	2.82	7.21	1.13	1.07	0.00	0.20	0.00	0.00	0.21	0.25	3.77	7.04	23.70
2002	1.07	1.47	2.00	0.26	1.08	0.00	0.00	0.00	0.00	0.00	2.50	10.31	18.69
2003	1.58	1.17	1.48	3.49	0.60	0.00	0.00	0.00	0.10	0.00	1.39	6.11	15.92
2004	2.07	5.10	0.63	0.06	0.08	0.00	0.00	0.00	0.09	2.47	2.94	5.09	18.53
2005	4.11	3.48	2.75	1.49	1.35	0.14	0.00	0.00	0.00	0.12	1.56	10.85	25.85
2006	2.30	2.03	5.70	4.33	0.55	T	0.00	0.00	0.00	0.19	1.84	2.41	19.35
2007	0.44	3.85	0.25	0.73	0.28	0.00	0.05	0.00	0.04	1.98	0.72	2.23	10.57
2008	7.79	1.98	0.03	0.05	0.01	0.00	0.00	0.00	0.00	0.15	2.13	2.02	14.16
2009	1.05	6.18	2.62	1.39	0.66	T	T	0.00	0.11	4.00	0.64	2.72	19.37
2010	6.43	2.40	2.01	3.19	1.08	0.00	0.00	0.00	0.00	1.01	2.21	5.50	23.83
2011	M1.52	M4.63	M6.99	M0.21	M0.43	M2.52	0.00	0.00	0.00	M0.78	M1.08	0.06	18.22

2012	M2.87	1.07	5.16	2.94	0.00	0.03	0.00	0.00	0.00	1.25	M0.24	6.51	20.07
2013	0.53	0.30	0.46	0.93	0.01	0.80	0.00	0.00	0.80	0.00	1.40	0.54	5.77
2014	0.08	4.99	1.87	2.12	0.00	0.00	0.00	0.11	0.28	0.20	1.42	10.74	21.81
2015	0.02	2.08	0.13	1.01	0.05	0.19	0.01	0.00	0.00	0.08	1.60	2.70	7.87
2016	5.39	1.26	4.89	1.05	0.21	0.00	0.00	0.00	0.00	2.61	1.24	3.15	19.80
2017	11.53	7.49	2.88	2.82	0.00	T	0.00	T	0.00	0.30	4.42	0.06	29.50
2018	3.03	0.64	5.23	2.32	0.00	0.00	0.00	0.00	0.00	0.06		M2.88	14.16
2019	5.59	8.47	3.61	0.29	1.90	0.00	0.00	0.00					19.86
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													