Appendix O

Preliminary Delineation of Wetlands and Other Waters

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

SUNNYVALE EAST AND WEST CHANNELS FLOOD PROTECTION PROJECT
SUNNYVALE, CALIFORNIA

PRELIMINARY DELINEATION OF WETLANDS AND OTHER WATERS

Prepared by

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Prepared for

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8 May 2013

Project Number 3392-01

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Executive Summary

H. T. Harvey & Associates surveyed the Santa Clara Valley Water District's (District's) Sunnyvale East and West Channels Flood Protection Project area, as well as some adjacent areas, for areas potentially meeting the regulatory definition of Waters of the United States. The study area for this delineation, which includes the Sunnyvale East and West Channels, the Moffett Channel, and Pond A4, are located within the City of Sunnyvale, Santa Clara County, California.

The methodologies employed in the field strictly followed written guidance developed and approved by the federal resource agencies with jurisdiction over activities conducted within wetland/aquatic habitats. As a result of our studies, we identified approximately 36.28 acres (ac) of Section 404 wetlands and approximately 284.37 ac of Section 404 other waters (as summarized in the table below). The total Section 404 acreage determined to be present within the study area boundaries is 321.96 ac.

The total area of current Section 10 waters is defined as all areas below the mean high water line. The total area of historical Section 10 waters is confined to major tidal sloughs, and their tributaries, that underlie the current study area. Please note that in this study area, current Section 10 waters overlaps completely with Section 404 jurisdiction in tidal waters so the Section 10 acreage provided below in the Summary Table is not added to the Section 404 acreages but is part of the overall total. The total Section 10 acreage determined to be present within the study area boundaries is 45.74 ac.

The remaining upland habitat within the survey area met none of the regulatory definitions of jurisdictional waters as defined by the U. S. Army Corps of Engineers (USACE).

All wetlands and other waters within the study area boundaries are Traditional Navigable Waters.

Table ES 1. Summary of Jurisdictional Waters

Potential Jurisdictional Waters of the U.S	**Acres**
Section 404 Wetlands (above and below the High Tide Line)	36.28
Section 404 Other Waters	285.68
Current Section 10 Waters	45.74*
USACE Jurisdictional Areas Total	**321.96**

* presented as a subset of Section 404 jurisdiction, as such, this value is not included in USACE acreage total as described in greater detail below.

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Definition of Terms Used in this Report

Mean High Water Mark — the line on the shore established by the average of all high tides.

High Tide Line — a line or mark left upon tide flats, beaches, or along shore objects that indicates the intersection of the land with the water's surface at the maximum height reached by a rising tide.

Ordinary High Water Mark — the line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas.

Navigable Waters — those waters subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Section 1.0 Introduction

1.1 Study Area Description

H. T. Harvey & Associates surveyed the Santa Clara Valley Water District's (District's) Sunnyvale East and West Channels Flood Protection Project area, as well as some adjacent areas, for areas potentially meeting the regulatory definition of Waters of the United States. The study area for this delineation, which includes the Sunnyvale East and West Channels, the Moffett Channel, and Pond A4, is located within the City of Sunnyvale, Santa Clara County, California (Figure 1). The majority of the Sunnyvale East and West Channels (Sunnyvale Channels) are situated within a developed, urban land-use setting that includes commercial buildings, light industrial, and residential housing. In contrast, the northernmost portion of the study area occurs within the southern portion of the San Francisco Bay.

The Sunnyvale East Channel includes an approximately 6-mile (mi) alignment that extends from Inverness Way north, crossing under the El Camino Real, Highway (Hwy) 101, Hwy 237, and Caribbean Drive, where it joins the Guadalupe Slough at the southeast corner of Pond A4. The Sunnyvale West Channel includes an approximately 3-mi alignment from Almanor Avenue north crossing under Hwy 101, Hwy 237, and Caribbean Drive, where it joins the Moffett Channel at the southwest corner of Pond A4 adjacent to the City of Sunnyvale's Donald M. Somers Water Pollution Control Plant (WPCP). Portions of each of these channels occur within culverts conveying water beneath numerous road crossings and through urban developed areas.

Under existing conditions, the northern reaches of the Sunnyvale Channels are tidally influenced by a direct hydrologic connection to the Guadalupe Slough and the Moffett Channel. The Moffett Channel connects the Sunnyvale West Channel to the Guadalupe Slough and is also tidally influenced. Pond A4 is currently not tidally influenced. Several very small ponds, located directly adjacent to the southeast corner of Pond A4, also appear to be non-tidal (LSA Associates 2004). An additional non-tidal channel is located along the southern perimeter of Pond A4 within the study area boundaries.

The study area is located in the *Mt. View, Cupertino,* and *Milpitas* U.S. Geological Survey (USGS) 7.5-minute quadrangles (Figure 2). The Sunnyvale Channels and Pond A4 are relatively flat with elevations ranging from approximately 0 ft to 150 ft National Geodetic Vertical Datum of 1929 (NGVD29). Average annual precipitation in the study area vicinity is approximately 45.74 inches[1], and the average annual temperature, measured between 1948 and 2005, is 71 degrees Fahrenheit[2].

A total of 12 soil types underlie the study area [Figure 3, Soil Conservation Service (SCS) 1968]; the names of each of these soil types are listed in Table 1. Urban-land soil types are a complex of fill soils placed in areas

[1] www.idcide.com/weather/ca/san-jose.htm
[2] http://www.westerndisastercenter.org/sjc/monthly_max.html

that were once a part of, or directly adjacent to the outer margins of the San Francisco Bay, as well as silts built up in adjacent tidal flats that support salt marshes (Natural Resources Conservation Service [NRCS] 2010). Soil textures vary widely but are typically poorly drained with a high water table. Urban-land consists of areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, and other structures. Neither the Urban-land soil types nor the Novato clay and Novato silty clay soils are listed on the Santa Clara County hydric soils list (SCS 1992).

Table 1. Soil Types within the Sunnyvale East and West Channels Flood Protection Wetland Delineation Study Area

Soil Number	Soil Name
101	Urban-land, 0 to 2 percent slopes, basins
102	Urban-land 0 to 2 percent slopes, alluvial fans
112	Xerorthents, trash substratum, 15 to 30 percent slopes
131	Urban-land Elpaloalto complex, 0 to 2 percent slopes
140	Urban-land, Flaskan complex, 0 to 2 percent slopes
145	Urban-land Hangerone, reclaimed complex, 0 to 2 percent slopes
150	Urban-land Embarcadero complex, 0 to 2 percent slopes
155	Novato clay 0 to 1 percent slopes, tidally flooded
156	Novato silty clay loam, excessive salinity, 0 to 1 percent slopes, protected
165	Urban-land Campbell complex 0 to 2 percent slopes
175	Urban-land, Botella complex 0 to 2 percent slopes
185	Urban-land Bayshore complex, 0 to 2 percent slopes

Figure 4 depicts the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping in the vicinity of the study area (USFWS 2013). A total of 29 wetland types have been mapped in the vicinity of the study area (Figure 4). Of these, 18 wetland types are present within the study area (Table 2).

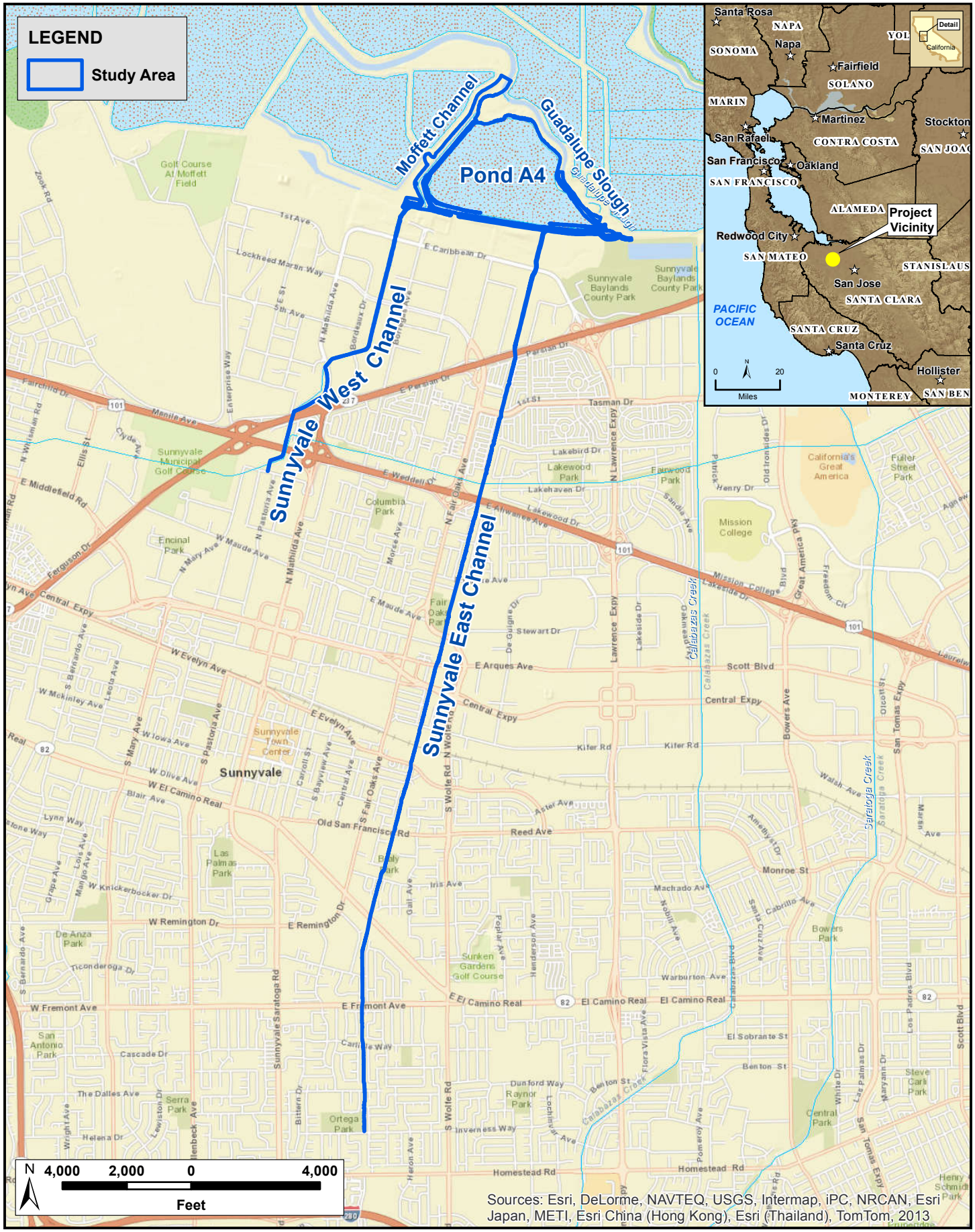
Table 2. National Wetland Inventory Wetlands Types Occurring Within the Wetland Delineation Study Area

Code	Description
E2EMN	Estuarine and Marine Wetland
E2EMN	Estuarine and Marine Wetland
L2UBK1h	Lake
E2EMN	Estuarine and Marine Wetland
E2EMN	Estuarine and Marine Wetland
E1UBL	Estuarine and Marine Deepwater
E2EMP	Estuarine and Marine Wetland
E2EMPh	Estuarine and Marine Wetland
L2UBK1h	Lake

Code	Description
L2UBK1h	Lake
E2EMN	Estuarine and Marine Wetland
E1UBL	Estuarine and Marine Deepwater
E2EMN	Estuarine and Marine Wetland
E1UBL	Estuarine and Marine Deepwater
E2EMN	Estuarine and Marine Wetland
E1UBL	Estuarine and Marine Deepwater
E1UBL	Estuarine and Marine Deepwater
E2EMN	Estuarine and Marine Wetland

1.2 Survey Purpose

The purpose of the field surveys was to identify the extent and distribution of potential jurisdictional waters such as wetlands and other waters occurring within the study area boundaries under conditions existing at the time of the survey. H. T. Harvey & Associates plant ecologists Brian Cleary, M.S. and Chris Gurney, M.S. surveyed the study area for features that may meet the physical criteria and regulatory definition of "Waters of the United States" (jurisdictional waters). These field characteristics included the presence of wetland vegetation, but also evidence of two tidal levels, the Mean High Water (MHW) line and the High Tide Line (HTL).



N:\Projects3300\3392-01\Reports\Wetland Delineation\Figure 1 Vicinity Map.mxd

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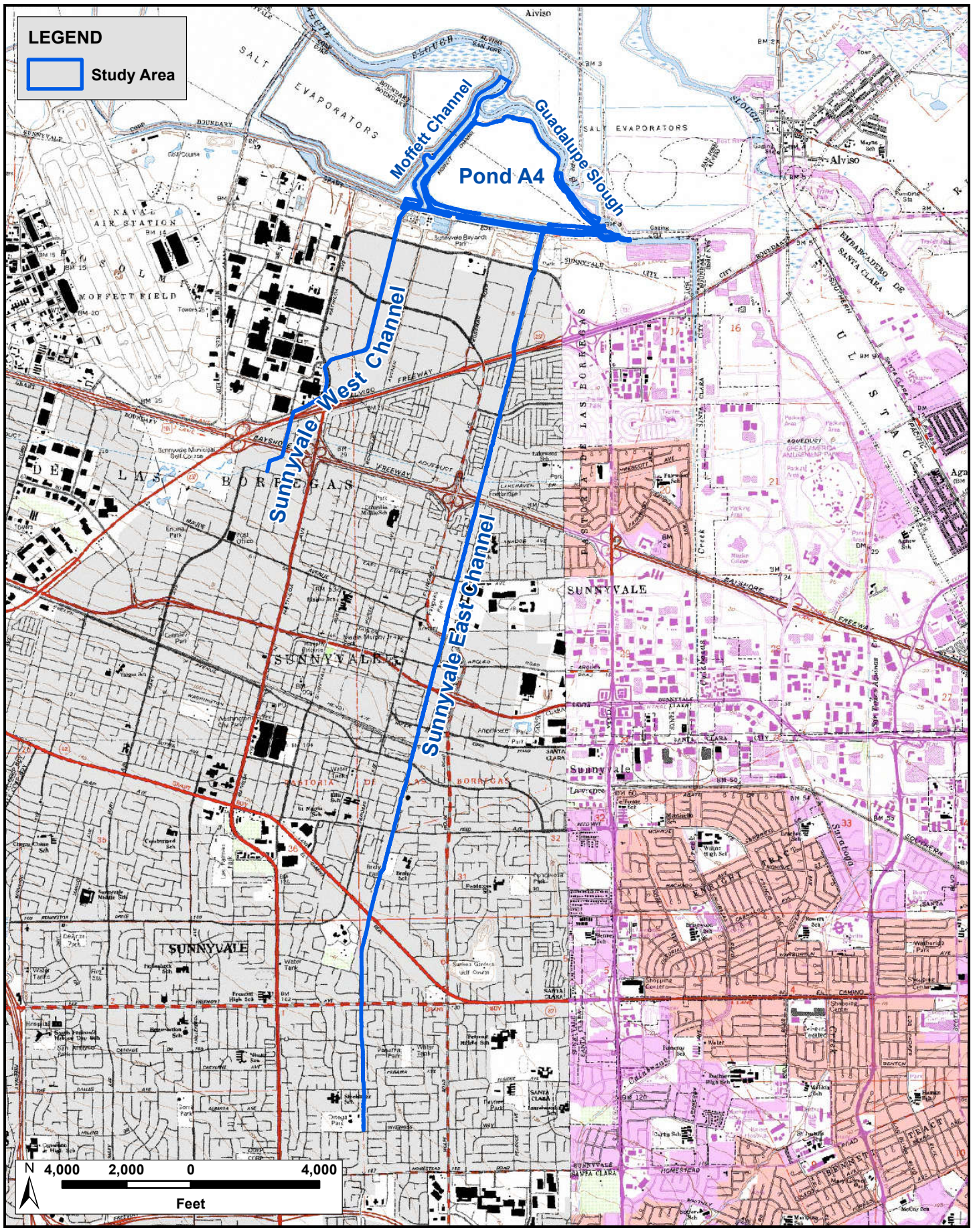
Figure 1: Vicinity Map
Sunnyvale East and West Channels Flood Protection Project- Wetland Delineation (3392-01)
May 2013



N:\Projects3300\3392-01\Reports\Wetland Delineation\Figure 2 USGS Map.mxd

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Figure 2: USGS Map
Sunnyvale East and West Channels Flood Protection Project- Wetland Delineation (3392-01)
May 2013

Soils types only shown for ones intersecting project location

LEGEND

Study Area

Soil Series Boundary

N 2,200 1,100 0 2,200

Feet

Pond A4

Moffett Channel

Guadalupe Slough

Sunnyvale West Channel

Sunnyvale East Channel

E CARIBBEAN DR

W JAVA DR

E JAVA DR

LAWRENCE EXWY

GREAT AMERICA PKWY

LAFAYETTE ST

CENTRAL EXWY

N FAIROAKS AVE

N MATHILDA AVE

DUANE AVE

E DUANE AVE

OAKMEAD PKWY

E ARQUES AVE

ARQUES AVE

SCOTT BLVD

BOWERS AVE

KIFER RD

W EVELYN AVE

S MATHILDA AVE

S PASTORIA AVE

S WOLFE RD

E EVELYN AVE

OLD SAN FRANCISCO RD

S FAIROAKS AVE

REED AVE

MONROE ST

MOLLENBECK AVE

N SUNNYVALE RD

W REMINGTON DR

E REMINGTON DR

W FREMONT AVE

E FREMONT AVE

SUNNYVALE SARATOGA RD

Soil Number	Soil Name
101	Urban-land, 0 to 2 percent slopes, basins
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150	Urban-land Embarcadero complex, 0 to 2 percent slopes
151	Embarcadero silty clay loam, drained, 0 to 2 percent slopes
155	Novato clay 0 to 1 percent slopes, tidally flooded
156	Novato silty clay loam, excessive salinity, 0 to 1 percent slopes, protected
175	Urban-land, Botella complex 0 to 2 percent slopes
W	Water

N:\Projects\33003392-01\Reports\Wetland Delineation\Figure 3 Soils Map.mxd

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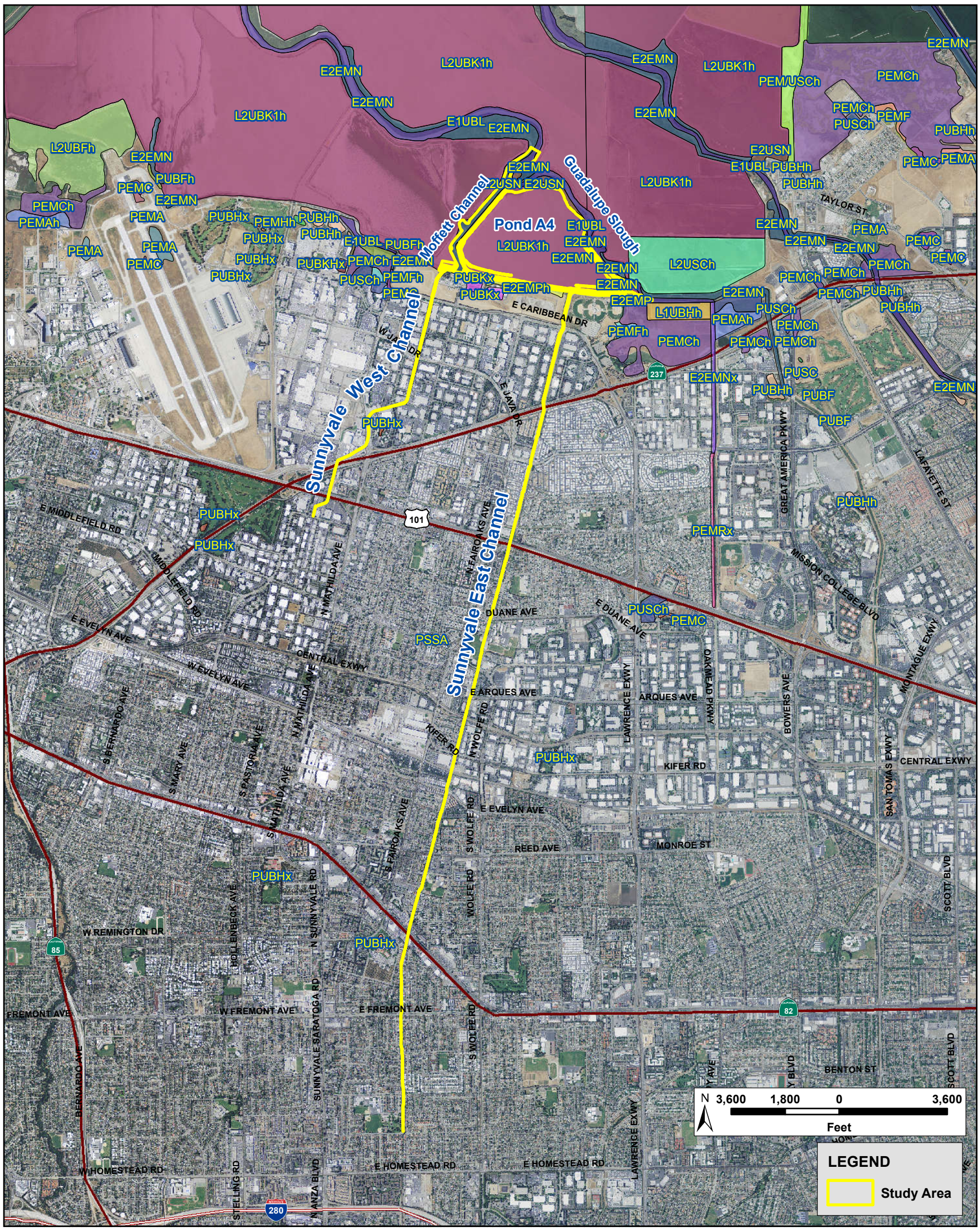
Figure 3: Soils Map

Sunnyvale East and West Channels Flood Protection Project- Wetland Delineation (3392-01)

May 2013



NWI Code - Wetlands and Deepwater Habitats Classification

- E1UBL - Estuarine, subtidal, unconsolidated bottom, subtidal
- E2EMN - Estuarine, intertidal, emergent wetland, regularly flooded
- E2EMNx - Estuarine, intertidal, emergent wetland, regularly flooded, excavated
- E2EMP - Estuarine, intertidal, emergent wetland, irregularly flooded
- E2EMPh - Estuarine, intertidal, emergent wetland, irregularly flooded, diked/impounded
- E2USN - Estuarine, intertidal, unconsolidated shore, regularly flooded
- L1UBHh - Lacustrine, subtidal, unconsolidated bottom, permanently flooded, diked/impounded
- L2UBFh - Lacustrine, littoral, unconsolidated bottom, semipermanently flooded, diked/impounded
- L2UBK1h - Lacustrine, littoral, unconsolidated bottom, artificially flooded, hyperhaline, diked/impounded
- L2USCh - Lacustrine, littoral, unconsolidated shore, seasonally flooded, diked/impounded
- PEM/USC - Palustrine, emergent wetland/unconsolidated shore
- PEM/USCh - Palustrine, emergent wetland/unconsolidated shore, diked/impounded
- PEMA - Palustrine, emergent wetland, temporarily flooded
- PEMAh - Palustrine, emergent wetland, temporarily flooded, diked/impounded
- PEMC - Palustrine, emergent wetland, seasonally flooded

NWI Code - Wetlands and Deepwater Habitats Classification

- PEMCh - Palustrine, emergent wetland, seasonally flooded/diked/impounded
- PEMF - Palustrine, emergent wetland, semi-permanently flooded
- PEMFh - Palustrine, emergent wetland, semi-permanently flooded, diked/impounded
- PEMHh - Palustrine, emergent wetland, permanently flooded, diked/impounded
- PEMRx - Palustrine, emergent wetland, seasonally flooded, tidal, excavated
- PSSA - Palustrine, scrub/shrub wetland, temporarily flooded
- PUBF - Palustrine, unconsolidated bottom, semi-permanently flooded
- PUBFh - Palustrine, unconsolidated bottom, semi-permanently flooded, diked/impounded
- PUBHh - Palustrine, unconsolidated bottom, flooded, diked/impounded
- PUBHx Palustrine, unconsolidated bottom, permanently flooded, excavated
- PUBKHx - PUBHx Palustrine, unconsolidated bottom, artificially flooded, permanently flooded, excavated
- PUBKx - Palustrine, unconsolidated bottom, artificial, excavated
- PUSC - Palustrine, unconsolidated shore, seasonally flooded
- PUSCh - Palustrine, unconsolidated shore, seasonally flooded, diked/impounded

N:\Projects3300\3392-01\Reports\Wetland Delineation\Figure 4 NWI Map.mxd

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Figure 4: National Wetlands Inventory (NWI) Map

Sunnyvale East and West Channels Flood Protection Project- Wetland Delineation (3392-01)

May 2013

Section 2.0 Survey Methods

Prior to site surveys, topographic maps and aerial photographs of the study area were obtained from several sources and reviewed. These sources included the USGS quadrangle maps and NWI maps for the *Mt. View, Cupertino, and Milpitas* quadrangles, and Google Earth aerials. Additional information reviewed included the *Delineation of Waters of the United States Pond A4 Tidal Wetland Restoration Project* report (LSA 2004), and the Santa Clara Valley Water District's (District's) *Sunnyvale East Channel and Sunnyvale West Channel Flood Protection Project: Memo Describing Changes to Flow Pattern within the Project Footprint* (District 2010).

Surveys were conducted on 18-22, 25, 26, and 29 October, and 3 and 4 November 2010 using methodologies approved by the U.S. Army Corps of Engineers (USACE). Given the extent of the study site, 10 site visits were necessary to investigate the survey site for potential jurisdictional wetlands/other waters. The entire study area was surveyed on foot to determine the potential jurisdictional boundaries. As part of our field surveys, we investigated the floristic, hydrologic, and edaphic characteristics of all representative wetland and "other waters" habitats within the study area. Additionally, field surveys were conducted to determine the elevation of the MHW line and the HTL within the Sunnyvale Channels, and the Moffett Channel. An additional survey was conducted on 28 January 2013, for several small areas that were subsequently included within the study area boundary.

The vegetation, soils, and hydrology of the site were examined following the guidelines outlined in the *Routine Determination Method* in the Corps of Engineers 1987 Wetlands Delineation Manual (hereafter "*Corps Manual*"; Environmental Laboratory 1987). In addition, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (hereafter "*Regional Supplement*"; USACE 2008) was followed to document site conditions relative to hydrophytic vegetation, hydric soils, and wetland hydrology. As noted in the latter report, the *Regional Supplement* is designed to be used with the current version of the *Corps Manual*, except where superseded by instruction issued in the more recent and location-specific *Regional Supplement*. This report was also compiled in accordance with guidance provided in *Information Requested for Verification of Corps Jurisdiction* (USACE 2007a).

The study area was examined for topographic features, drainages, alterations to site hydrology, and areas of significant recent disturbance. A determination was then made as to whether normal environmental conditions were present at the time of the field surveys. These data were used to document which portions of the site were wetlands. Generally, surveys examined the vegetation, soils, and hydrology using the "Routine Determination Method, On-Site Inspection Necessary (Section D)" outlined in the *Corps Manual*, and using the updated data forms, vegetation sampling methods, and hydric soil and hydrology indicators developed for the *Regional Supplement*. This three-parameter approach to identifying wetlands is based upon the presence of hydrophytic vegetation, hydric soils, and wetland hydrology.

Overall, the approach used to identify wetlands included digging soil pits to sample soil from various depths, observing vegetation growing in proximity to the soil sample area, determining current hydrologic features, and inspecting for signs of seasonal hydrology (surface and subsurface) present near the sample area. Also, in tidal areas the USACE claims jurisdiction over all areas up to the HTL and/or the furthest landward extent of vegetation associated with salt or brackish water in coastal wetlands (under Section 404 of the Clean Water Act 1972). Under Section 10 of the Rivers and Harbors Act (1899), USACE jurisdiction extends up to the MHW line.

A brief overview of the USACE methodology specifically applicable to the identification of jurisdictional waters in the study area is summarized below.

2.1 Identification of Section 404 Wetlands and Other Waters

2.1.1 Identification of Section 404 Potential Jurisdictional Wetlands (Special Aquatic Sites)

Vegetation. Plants observed at each of the sample sites (and those observed during the reach survey) were identified to species level or at a minimum genus level (depending on the vegetation structures available during the fall) using *The Jepson Manual, Vascular Plans of California, Second Edition* (Baldwin et al. 2012). The wetland indicator status of each species was obtained from the 2012 National Wetland Plant List (Lichvar 2012) for the Arid West region. The recent revision of plant names within *The Jepson Manual, Vascular Plants of California, Second Edition* (Baldwin et al. 2012) has led to several differences in nomenclature between the latest Jepson Manual and the 2012 Wetland Plant List. Therefore, both the revised names and the former names are included in the plant occurrence table (Appendix A).

At each observation area, a list of species was compiled and a visual estimate of the percent cover of plant species was made following guidance provided in the *Regional Supplement*. It was then determined which of the observation areas supported wetland vegetation using the applicable Hydrophytic Vegetation Indicator (i.e., 1-Dominance Test; 2-Prevalence Test; or, 3-Morphological Adaptations) as described in the *Regional Supplement*.

Under the 2012 National Wetland Plant List (Lichvar et al. 2012), vascular plants have been grouped into one of five categories that signify their wetland indicator status. The five groups include obligate wetland plants, facultative wetland plants, facultative plants, facultative upland plants, and upland plants; these wetland indicator statuses have been assigned to each species through qualitative ecological descriptors (Table 2). As an example, a species that usually occurs in wetlands, but may occur in non-wetland habitats is designated as a facultative wetland indicator species. In the current national list the five basic levels of wetland indicator status does not include plus (+) or minus (-) indicators.

Table 3. Wetland Indicator Status Categories for Vascular Plants.

SYMBOL	INDICATOR CATEGORY	DEFINITION
OBL	Obligate	Almost always occur in wetlands.
FACW	Facultative Wetland	Usually occur in wetlands, but may also occur in non-wetlands.
FAC	Facultative	Occur in wetlands and non-wetlands.
FACU	Facultative Upland	Usually occur in non-wetlands, but may occur in wetlands.
UPL	Upland	Almost never occur in wetlands

* Based upon information in the *National Wetland Plant List Indicator Rating* (Lichvar et al. 2012).
"NI" = Non-indicator plants, not on the list.

Obligate and facultative wetland indicator species are hydrophytes that occur "in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987). Facultative indicator species may be considered wetland indicator species when found growing in hydric soils that experience periodic saturation. A list of the vascular plants observed within the study area, and their current indicator status has been provided in Appendix A. Plants species that are not on the regional list of wetland indicator species are upland species.

Soils. Where possible, the top 22 inches of the soil profile were examined for hydric soil indicators. Diagnostic features include numerous indicators defined and described by the National Technical Committee for Hydric Soils (NTCHS). These indicators include the presence of organic soils (Histosols, A1), histic epipedons (A2), depleted matrix (F3), redox depressions (F8), redox dark surface (F6), and mottling indicated by the presence of gleyed or bright spots of colors (in the former case, blue grays; in the latter case, orange red, or red brown) within the soil horizons observed, among other features. Mottling of soils usually indicates poor aeration and lack of good drainage. Munsell Soil Notations (Munsell Color 2009) were recorded for the soil matrix for each soil sample. The last digit of the Munsell Soil Notation refers to the chroma of the sample. This notation consists of numbers beginning with 0 for neutral grays and increasing at equal intervals to a maximum of about 20. Chroma values of the soil matrix that are 1 or less, or 2 or less when mottling is present, are typical of soils that have developed under anaerobic conditions. The first digit of the Munsell Soil notation refers to the value of the sample, with numbers beginning from 2 for saturated colors to a maximum of about 8 for faded or light colors. Hydric soils often show low value colors when soils have accumulated sufficient organic material to indicate development under wetland conditions, but can show high value colors when iron depletion has occurred, removing color value from the soil matrix.

In sandy soils, such as alluvial deposits in the bottom of drainage channels, hydric soil indicators include high organic matter content in the surface horizon (Sandy Mucky Mineral, S1) and streaking of subsurface horizons by organic matter (A5). In some cases, as described in the *Regional Supplement*, coarse soils can be naturally problematic when recently deposited in floodplains or channels. These soils can lack certain

features of hydric soils that require several years to develop, such as a low value and low chroma from a build-up of organic material coating the coarse grains. All soil colors indicated in this report were taken under clear, sunny skies using moistened soil samples.

The Soil Survey of Santa Clara County, California (SCS 1968) and the *Brief Soil Descriptions (CA), Santa Clara Area, California, Western Part* (NRCS 2010) were consulted to determine which soil types have been mapped in the study area. The list of hydric soils in Santa Clara County is included in Appendix B.

Hydrology. Each of the sample sites was examined for positive field indicators (primary and secondary) of wetland hydrology following the guidance provided in the *Regional Supplement*. Such indicators might include visual observation of inundation (A1) and/or soil saturation (A3), watermarks (B1), drift lines (B3), water-borne sediment deposits (B2), water-stained leaves (B9), and drainage patterns within wetlands (B10).

2.1.2 Identification of Section 404 Other Waters

Surveys were also conducted within the study area for "other waters." "Other waters" include lakes, seasonal ponds, channels, tributary waters, non-wetland linear drainages, and seasonal springs. Such areas are identified by the (seasonal or perennial) presence of standing or running water and generally lack hydrophytic vegetation. "Other waters" extend to the ordinary high water (OHW) mark on opposing channel banks in non-tidal drainage channels. The OHW mark is typically indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in character of soil, destruction of vegetation, exposed roots on the bank, deposition of leaf litter and other debris materials or lower limit of moss growth on channel banks. All surveys were conducted using methodologies presented in *Review and Synopsis of Natural and Human Controls on Fluvial Channel Processes in the Arid West* (USACE 2007b).

In tidal waters, Section 404 other waters extend to the landward extent of vegetation associated with salt or brackish water or the HTL. The HTL is defined as *the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gauges, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.*

2.2 Identification of Section 10 Waters (Historical and Current)

In regards to mapping Section 10 waters, it is important to understand that the USACE does not regulate wetlands under Section 10, only the aquatic or open waters component of bay habitat (under the 1899 Rivers and Harbors Act). Thus, while there is overlap between Section 404 jurisdiction (which in tidal waters extends from the HTL bayward) and Section 10 jurisdiction (which extends from the MHW line bayward), the acreage of Section 10 jurisdiction is only reported as "waters," with no separate mapping or acreage

provided for wetlands. Additionally, Section 10 is divided into "current" and "historical" for mapping purposes, where applicable, and as described below.

2.2.1 Current Section 10 Waters

Current Section 10 waters can occur in both tidal and freshwater systems. In tidal waters, Section 10 waters include open water, mud flats, and adjacent special aquatic sites up to the limit of the MHW line in areas currently exposed to fully tidal or muted-tidal action. In freshwater sites, Section 10 includes the lateral extent of the ordinary high water mark on opposing channel banks. The height of the MHW line was obtained from long-term monitoring records (i.e. average over 19.6-year tidal epoch) monitoring maintained by the National Oceanic and Atmospheric Administration (NOAA). Based on this datum, the MHW mark is calculated by that agency to be 8.7 ft (relative to Mean Lower Low Water) at the Guadalupe River Gold Street Bridge crossing in Alviso[3].

2.2.2 Historical Section 10 Waters

Historical Section 10 waters occur behind levees, are currently not exposed to tidal or muted-tidal influence, and meet certain criteria. These criteria include: 1) the area is presently at or below MHW; 2) the area was historically at or below MHW in its "unobstructed, natural state"; and 3) there is no evidence that the area was ever above MHW (Calvin Fong Memo, USACE, 1983).

Procedures for determining historical Section 10 jurisdiction behind levees are as follows:

- First, determine present MHW for the area in question.
  - Use surveyed elevation data from the prospective applicant.
  - If elevation data are not available, use the survey technique for determining MHW on the outboard side of the dike and project the MHW line back to the area in question.
  - Those areas behind dikes that are presently above MHW are not subject to Section 10 permit requirements (provided they were above MHW prior to 28 January 1972 or were filled to above MHW thereafter under USACE permit) because they are presently at or above MHW.
  - Those areas that are presently at or below MHW may be subject to Section 10 permit requirements. To determine whether these areas are subject to Section 10, two additional facts must be obtained (which are numbers 2 and 3 of the historical waters definition provided above).
- The second step is to determine whether those areas presently at or below MHW were historically below MHW before the dikes were built.
  - If available, use elevation data that were surveyed just prior to or just after the dikes were built. More often then not, this information is not available but potential sources include city and county planning commissions, public works departments, California Department of Transportation, State Lands Commission, etc.

[3] http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=9414551%20GOLD%20STREET%20BRIDGE,%20ALVISO%20SLOUGH,%20CA&type=Bench%20Mark%20Data%20Sheets

- If historic elevation data are not available, use the T-charts of 1850-90 to determine the location of the historic sloughs, if any, in those areas that are presently below MHW. The premise is that the historic sloughs were subject to the ebb and flow of the tides, and thus were below MHW.
- Those areas presently below MHW and historically below MHW as determined by elevation data or T-charts would be considered at or below MHW historically.
- Areas that were historically below MHW and filled above MHW (as shown by reliable data) but due to subsidence are now below MHW are not subject to Section 10 authority, but may be subject to Section 404 jurisdiction.

Section 3.0 Survey Results

As a result of our studies, we identified approximately 36.28 acres (ac) of Section 404 wetlands and approximately 285.68 ac of Section 404 other waters (as summarized in Table 3 below). The total Section 404 acreage determined to be present within the study area boundaries, including the Sunnyvale Channels, the Moffett Channel, and the area in and around Pond A4, is 321.96 ac.

Current and historical Section 10 waters were also identified within the boundaries of the study area. Current Section 10 waters occur within the Moffett Channel and extend upstream into portions of the Sunnyvale Channels. These areas totaled 45.74 acres. Historical Section 10 waters included areas associated with the Moffett Channel and Pond A4 where evidence indicates historical tidal sloughs once occupied areas at or below the MHW line in their unobstructed, natural state (Figure 5). Please note that Current Section 10 waters overlap completely with Section 404 jurisdiction in tidal waters so the Section 10 acreage provided below in Table 3 is not added to the Section 404 acreages but is part of the overall total.

The remaining upland habitat within the survey area met none of the regulatory definitions of jurisdictional waters as defined by the USACE. A total of 18 Sample Points were taken throughout the survey area. Wetland data forms for the Sample Points are provided in Appendix C. Figures 6a, 6b, and 6c (in the rear pocket of this report) present the extent and distribution of Section 404 wetlands and other waters, and current Section 10 waters, as contained within the boundaries of the study area.

Table 4. Summary of Jurisdictional Waters

Potential Jurisdictional Waters of the U.S	Acres
Section 404 Wetlands (above and below the High Tide Line)	36.28
Section 404 Other Waters	285.68
Current Section 10 Waters	45.74*
USACE Jurisdictional Areas Total	**321.96**

* presented as a subset of Section 404 jurisdiction, thus, value is not included in USACE acreage total.

Information pertinent to the identification of jurisdictional waters assembled during the investigations is presented in three appendices attached to this report.

- Appendix A — Plant List
- Appendix B — Soil Descriptions
- Appendix C — USACE Wetland Determination Data Forms
- Appendix D — Photographs of Site Conditions

3.1 Observations/Rationale/Assumptions

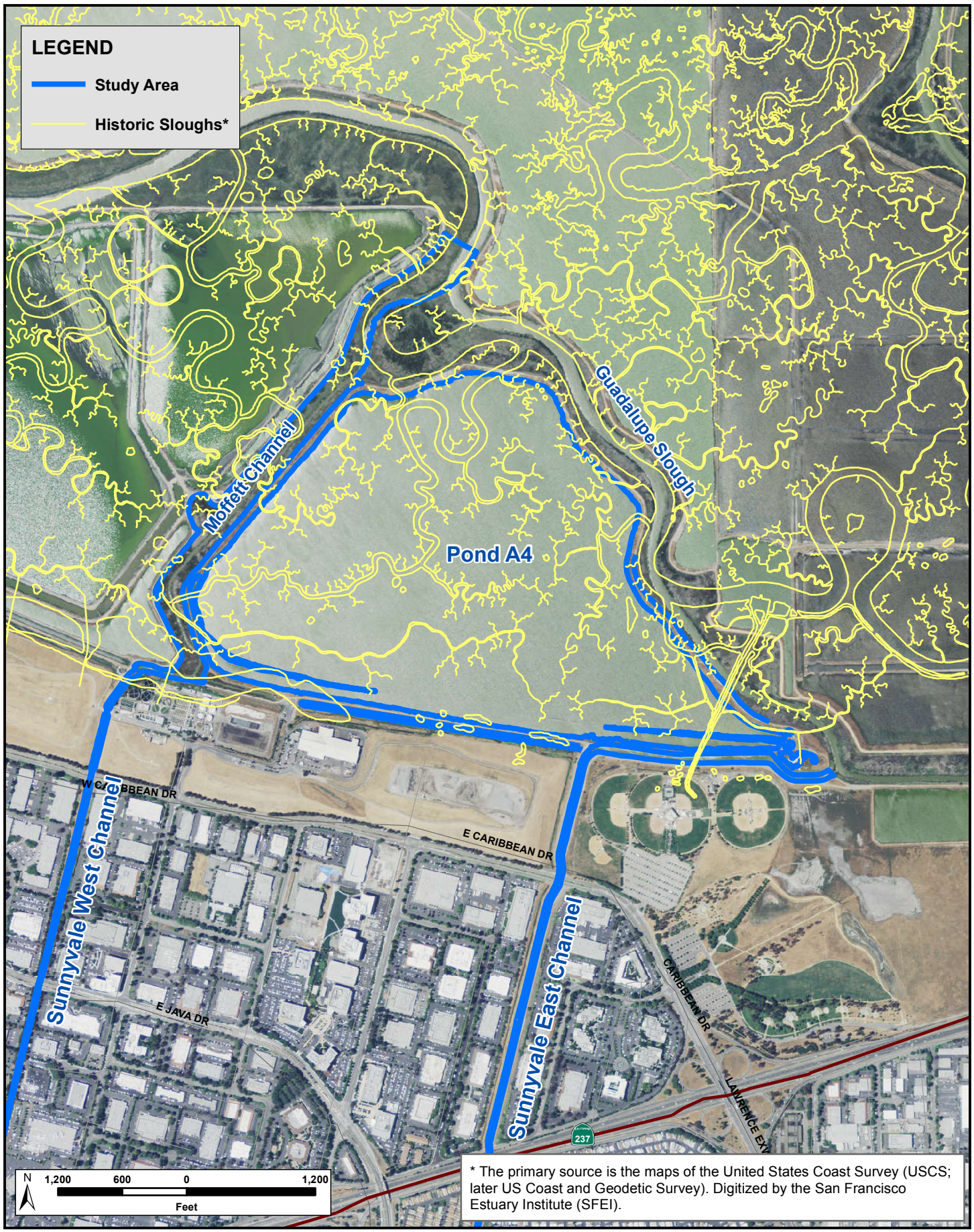
The approximate MHW line associated with the Sunnyvale Channels (Photograph 1) was surveyed in the field with a Trimble Pro XR GPS receiver during a MHW tide event occurring on 29 October 2010. Comparative field characteristics between low and high tides, such as the absence of visible and/or exposed mudflats, sediment marks, and drift deposits along the channel banks during the MHW tide event, were used to identify the location of the maximum extent of tidal waters in the northern reaches of the Sunnyvale Channels described below. Further, based on the complete inundation of these physical indicators during the high tide event, and the known HTL identified at 9.3 ft (NTDE), it was determined that the HTL representing the upper limit of Section 404 other waters occurs approximately 0.6 vertical feet above the MHW mark.

Photograph 1. Tidal portion of Sunnyvale West Channel.

The MHW and HTL datum, including analysis of the comparative field characteristics between low and high tides, was also used to delineate the boundaries of jurisdictional waters within the Moffett Channel. Evidence of sediment deposits, vegetation lines, and accumulation of debris indicating drift lines were observed in the channel.

Non-tidal Section 404 wetlands were identified around much of the periphery of Pond A4. Pond A4 (Photograph 2) is currently not tidally influenced. The pond is managed by operating a pump located at its southeast corner. The majority of the wetlands within Pond A4 are located above the OHW mark of the pond. Several small ponds (i.e., Ponds 1-3) that are connected by culverts to Pond A4 were identified at the southeast corner of Pond A4 and appear to have the same non-tidal hydrology. An additional non-tidal channel is located along the southern perimeter of Pond A4 within the boundaries of the study area.

Photograph 2. Wetlands along perimeter of Pond A4.



N:\Projects3300\3392-01\Reports\Wetland Delineation\Figure 5 Historic Sloughs Map.mxd

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Figure 5: Historic Sloughs
Sunnyvale East and West Channels Flood Protection Project- Wetland Delineation (3392-01)
May 2013

All wetlands and other waters occurring within the study area boundaries meet the definition of Traditional Navigable Waters (TNW's) including: (a) the water body is subject to the ebb and flow of the tide, and/or, (b) the water body is presently used, or has been used in the past, or may be susceptible for use to transport interstate or foreign commerce. In the San Francisco District of the USACE, the latter definition generally includes water bodies that are accessible to the public and possess sufficient volume of water at any time of the year to float a small watercraft such as a kayak or canoe.

3.2 Areas Meeting the Regulatory Definition of Waters of the U.S.

3.2.1 Identification of Section 404 Potential Jurisdictional Wetlands (Special Aquatic Sites)

A total of 36.28 ac of Section 404 wetlands were observed and documented as occurring within the Sunnyvale East Channel, Sunnyvale West Channel, the Moffett Channel, and areas in and around Pond A4 (Figure 6a, 6b, and 6c; oversized). These included wetlands situated within tidal waters up to the HTL or vegetation associated with brackish water and wetlands in non-tidal settings, located above or landward of the HTL (Appendix A).

Vegetation. Sample Points 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A and 11A (Appendix C) are located within potential wetland habitat. Hydrophytic vegetation was encountered in all of these wetland areas and was dominated largely by a suite of freshwater, brackish and salt marsh wetland plant species including water-cress (*Nasturtium officinale*, OBL), American brooklime (*Veronica americana*, OBL), broad-leaved cattail (*Typha latifolia* OBL), tall umbrella sedge (*Cyperus eragrostis*, FACW), California bulrush (*Schoenoplectus californicus*, OBL), common bulrush (*Bolboschoenus robustus*, OBL) spearscale (*Atriplex prostrata*, FACW), and common pickleweed (*Salicornia pacifica*, OBL).

Soils. Soils were comprised predominantly of silty loam, sand, and loamy clay with a mixture of gravel, cobble, and fine sediments deposited by tidal action. Sample Points 3A, 4A, and 10A (Appendix C) all occurred in daily or seasonally saturated wetlands that satisfied the requirements for the Sandy Redox indicator (S5). Sample Points 2A, 5A, and 6A occurred within Loamy Mucky Mineral (F1) soils with a high amount (i.e., over 10 percent) of organic carbon. The remaining wetland Sample Points (7A, 8A, 9A, and 11A) included common or distinct concentration mottles (or soft masses) within the soil matrices of each of the soil samples, and colors of 10 YR 3/2, 2.5 Y 5/3 and Gley1 3/10Y.

Hydrology. Hydrologic indicators noted within the wetlands included: Surface Water (A1), High Water Table (A2), Saturation (A3), Water Marks (B1), Sediment Deposits (B2), Drift Deposits (B3), Drainage Patterns (B10), Inundation Visible on Aerial Imagery (B7), and Oxidized Rhizospheres along Living Roots (C3).

3.2.2 Identification of Section 404 Other Waters

Section 404 other waters were observed on site as occurring below the HTL, as shown on Figure 6a, 6b and 6c (oversized). These areas totaled approximately 285.68 ac. The Sunnyvale Channels convey perennial flows associated primarily with seasonal storm water and landscape irrigation water runoff that occurs during the winter and summer months, respectively. Groundwater associated with a local high water table also contributes a significant amount of water into the Sunnyvale East Channel (District 2010). Groundwater that daylights adjacent to the south shoulder of the Central Expressway beneath the North Fair Oaks Avenue overpass was observed flowing into the Sunnyvale East Channel via several storm drains and culverts on 4 November 2010. Additional Section 404 other waters include areas within the Moffett Channel, and other waters associated with the area in and around Pond A4.

3.2.3 Identification of Section 10 Waters (Current and Historical)

Current Section 10 Waters. Current Section 10 jurisdiction observed within the study area boundaries includes 45.74 ac, all situated below the MHW line Figure 6a, 6b and 6c (oversize). It is important to note that Section 10 jurisdiction overlaps completely with Section 404 jurisdiction within the defined study area boundaries.

Per the tidal data and field observations described above, the upper limit of current Section 10 waters in the Sunnyvale East Channel was identified near the intersection of Greenlake Drive and Hiddenlake Drive (Figure 6b, Sheet 2) south of Tasman Drive in Sunnyvale (Sample Point 5A and Appendix C Photograph D-5). The upper limit of current Section 10 waters in the Sunnyvale West Channel was identified directly adjacent to the north side of the Mathilda Road under crossing (Figure 6c, Sheet 3) in Sunnyvale (Sample Point 10A and Appendix C, Photograph D-10). These upper limits of current Section 10 waters are consistent with the general Section 10 limits described in the District's 2010 Memo (District 2010).

The lower elevational reaches of current Section 10 waters in the tidal reaches of the Sunnyvale Channels and the Moffett Channel support primarily brackish marsh plant species including California bulrush, common bulrush, and spearscale (Sample Points 6A, 9A and Appendix C, Photographs D-9 and D-10).

Historical Section 10 Waters. Historical Section 10 waters occur within tidal sloughs underlying the Moffett Channel and Pond A4, as shown on Figure 5.

3.3 Areas Not Meeting the Regulatory Definition of Waters of the U.S.

The remainder of the survey area met none of the regulatory definitions of jurisdictional waters. Information relative to plants, soils, and hydrology are summarized in data forms (see Appendix C) for Sample Points 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B, and 11B. Upland areas on-site occurred along levee tops and were dominated by grasses and forbs. These areas were subject to a high degree of disturbance were ruderal in nature. Of the 18

Sample Points recorded on site, six were taken in the levee habitat (Appendix C, Sample Points 1B, 2B, 3B, 4B, 7B, and 8B).

Soils were observed to be clay loam, loamy clay, and silty loam with a matrix color of 10 YR 3/2, 10 YR 3/3 and 2.5 Y 7/3 with no mottles and no other indicators of regular inundation (i.e., organic buildup or streaking). Many areas appeared to be comprised of imported fill soil material.

No evidence of hydrology, such as inundation, saturation, sediment deposits, or drainage patterns in wetlands, was observed in any of these locations.

Upland vegetation within some of these areas including Sample Points 1B, 2B, and 3B was mowed to the ground as part of the District levee maintenance operations. Vegetation in Sample Points 4B, 5B, 7B, and 8B was predominantly comprised of upland species, including, wild oats (*Avena fatua*, UPL), ripgut grass (*Bromus diandrus*, UPL), black mustard (*Brassica nigra*, UPL), wild radish (*Raphanus sativus*, UPL), soft chess (*Bromus hordeaceus*, FACU), and bristly ox-tongue (*Helminthotheca echioides*, FACU).

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Appendix A.
Plants Observed at the Sunnyvale East and West Channels Flood Protection Wetland Delineation Study Area

Appendix A. Plants Observed on the Sunnyvale East and West Channels Flood Protection Wetland Delineation Study Area.			
FAMILY NAME	**SCIENTIFIC NAME**	**COMMON NAME**	**INDICATOR STATUS**
Aizoceae	*Mesembryanthemum nodiflorum*	slender-leaved iceplant	FAC
	Tetragonia tetragonioides	New Zealand spinach	NI/UPL
Alismataceae	*Alisma triviale*	water plantain	OBL
Apiaceae	*Conium maculatum*	poison hemlock	FACW
	Foeniculum vulgare	sweet fennel	UPL
Araliaceae	*Hedera helix*	English ivy	NI/UPL
Asteraceae	*Baccharis pilularis*	coyote brush	NI/UPL
	Carduus pycnocephalus	Italian thistle	NI/UPL
	Centaurea solstitialis	yellow star-thistle	NI/UPL
	Cotula coronopifolia	brass-buttons	OBL
	Dittrichia graveolens	stinkwort	NI/UPL
	Erigeron canadensis	horsetail	FACU
	Euthamia occidentalis	Western goldentop	FACW
	Grindelia stricta var. *angustifolia*	gumplant	NI/UPL
	Helminthotheca echioides	bristly ox-tongue	FACU
	Lactuca serriola	prickly lettuce	FACU
	Sonchus oleraceus	common sowthistle	UPL
	Taraxacum officinale	dandelion	FACU
Boraginaceae	*Heliotropium curassavicum* var. *oculatum*	seaside heliotrope	FACU
Brassicaceae	*Brassica nigra*	black mustard	NI/UPL
	Hirschfeldia incana	small-pod mustard	NI/UPL
	Lepidium latifolium	perennial peppergrass	FAC
	Nasturtium officinale	water cress	OBL
	Raphanus sativus	cultivated radish	NI/UPL
Caryophyllaceae	*Spergularia salina*	sand-spurrey	OBL
Chenopodiaceae	*Atriplex prostrata*	spearscale	FACW
	Salicornia depressa	slender grasswort	NOL
	Salicornia pacifica (Sarcocornia pacifica)	common pickleweed	OBL
	Salsola soda	oppositeleaf Russian thistle	FACW
	Salsola tragus	Russian thistle	FACU
Convolvulaceae	*Cressa truxillensis*	alkali weed	FACW
Cuscutaceae	*Cuscuta salina*	salt marsh dodder	NOL
Cyperaceae	*Bolboschoenus maritimus* (*Schoenoplectus maritimus*)	alkali bulrush	OBL
	Bolboschoenus robustus (*Schoenoplectus robustus*)	common bulrush	OBL
	Cyperus eragrostis	tall flatsedge	FACW
	Eleocharis macrostachya	common spikerush	OBL
	Schoenoplectus californicus	California bulrush	OBL
Equisetaceae	*Equisetum arvense*	common horsetail	FAC
Fabaceae	*Vicia sativa*	common vetch	FACU
Frankeniaceae	*Frankenia salina*	alkali heath	FACW
Geraniaceae	*Erodium cicutarium*	redstem filaree	NI/UPL

Appendix A. Plants Observed on the Sunnyvale East and West Channels Flood Protection Wetland Delineation Study Area.			
FAMILY NAME	**SCIENTIFIC NAME**	**COMMON NAME**	**INDICATOR STATUS**
Juglandaceae	*Juglans hindsii*	Northern California black walnut	FAC
Juncaceae	*Juncus balticus*	Baltic rush	OBL
Juncaginaceae	*Triglochin maritima*	seaside arrow-grass	OBL
Malvaceae	*Malva parviflora*	cheeseweed	NOL
Myoporaceae	*Myoporum laetum*	lollypop tree	FACU
Onagraceae	*Epilobium glaberrimum*	glaucus willowherb	FACW
Papaveraceae	*Eschscholzia californica*	California poppy	NI/UPL
Plantaginaceae	*Plantago lanceolata*	narrowleaf plantain	FAC
	Plantago major	common plantain	FAC
Poaceae	*Avena barbata*	slender oats	NI/UPL
	Bromus diandrus	ripgut grass	NI/UPL
	Bromus hordeaceus	soft chess	FACU
	Cortaderia jubata	pampas grass	FACU
	Cynodon dactylon	Bermuda grass	FACU
	Distichlis spicata	saltgrass	FAC
	Festuca perennis (Lolium perenne)	Italian ryegrass	FAC
	Hordeum depressum	dwarf barley	FACW
	Paspalum distichum	knotgrass	FAC
	Poa annua	annual bluegrass	FACU
Polygonaceae	*Persicaria amphibia*	water smartweed	OBL
	Persicaria punctata	knotweed	OBL
	Rumex crispus	curly dock	FAC
	Rumex salicifolius	willow dock	FACW
Rosaceae	*Rubus armeniacus*	Himalayan blackberry	FACU
Rubiaceae	*Galium* sp.	bedstraw	---
Salicaceae	*Salix* sp.	willow	---
Scrophulariaceae	*Kickxia elatine*	fluellin	UPL
	Mimulus guttatus	seep monkeyflower	OBL
	Veronica americana	American brooklime	OBL
Typhaceae	*Typha angustifolia*	narrow-leafed cattail	OBL
	Typha latifolia	broad-leaved cattail	OBL
The species are arranged alphabetically by family name for all vascular plants encountered during the plant survey. Plants are also listed alphabetically within each family. In some cases, it was not possible to accurately identify a particular plant to the species level due to the absence of specific anatomic structures required for identification. NOL = Not on List			

Appendix B.
Soils

Complete document available for review at:

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

or upon request to:

Tiffany Hernandez, Environmental Planner
Santa Clara Valley Water District
(408) 265-2607
thernandez@valleywater.org

Appendix C.
Wetland Determination Data Forms

Complete document available for review at:

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

or upon request to:

Tiffany Hernandez, Environmental Planner
Santa Clara Valley Water District
(408) 265-2607
thernandez@valleywater.org

Appendix D.
Photographs

Photograph D-1. South view of obligate hydrophytes dominated by water cress in Sample Point 1A located in the Sunnyvale East Channel south of Inverness Way.

Photograph D-2. South view of mowed, ruderal grassland habitat along the east levee bank at Sample Point 1B in the Sunnyvale East Channel south of Inverness Way.

Photograph D-3. Wetlands dominated by tall umbrella sedge within an upper reach of the Sunnyvale East Channel at Sample Point 3A on the north side of Old San Francisco Road. Portions of this reach of the channel were partially dry during the survey.

Photograph D-4. North view of mowed, ruderal grassland habitat in Sample Point 3B along the east levee bank of the Sunnyvale East Channel.

Photograph D-5. Freshwater emergent wetlands in the Sunnyvale East Channel south of Central Expressway.

Photograph D-6. The upper limit of Section 10 Waters of the U.S. associated with the mean high water line in the Sunnyvale East Channel, Sample Point 5A south of Tasman Drive.

Photograph D-7. Northwest view of Section 404 non-tidal salt marsh wetlands dominated by pickleweed in Sample Point 7A located along the eastern edge of Pond A4.

Photograph D-8. Ruderal, upland grassland in Sample Point 7B along the eastern edge of Pond A4.

Photograph D-9. Section 10 Waters of the U.S. in Sample Point 9A associated with the Moffett Channel supporting tidal brackish marsh. The Moffett Channel is a tributary to the Guadalupe Slough. The tidal waters also include freshwater associated with the Sunnyvale West Channel and treated wastewater pumped from the City of Sunnyvale's Donald M. Somers Water Pollution Control Plant.

Photograph D-10. The upper limit of Section 10 Waters of the U.S. associated with the mean high water line in the Sunnyvale West Channel, Sample Point 10A adjacent to the north side of Mathilda Road.

Photograph D-11. Section 10 Waters of the U.S. below the mean high tide line and Section 404 wetlands below the high tide line in the Sunnyvale East Channel just south of Pond A4. The tidal waters drain directly into the Guadalupe Slough at the southeast corner of Pond A4.

Photograph D-12. West view of Section 404 Waters of the U.S. (i.e., other waters) in Pond A4.