Wetland Survey Report:
Greater Los Angeles Healthcare System
West Los Angeles Medical Center Master Plan Redevelopment

United States Department of Veterans Affairs
Greater Los Angeles Healthcare System

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Acronym List

FACU – Facultative Upland

FACW – Facultative Wetland

NRCS – Natural Resources Conservation Service

NWI – National Wetland Inventory

NWPL – National Wetland Plant List

PEIS – Programmatic Environmental Impact Statement

PEIR – Program Environmental Impact Report

USACE – U.S. Army Corps of Engineers

USDA – U.S. Department of Agriculture

USFWS – U.S. Fish and Wildlife Service

USGS – U.S. Geological Survey

WETS – NRCS Climate Analysis for Wetlands Tables

WLA – West Los Angeles

VA – Veterans Affairs

1. INTRODUCTION

This report documents the findings of the wetland survey conducted on November 8 and 9, 2017 within the arroyo area on the Veterans Affairs (VA) West Los Angeles Campus (WLA Campus). The WLA Campus is located in Los Angeles, Los Angeles County, California. The wetland survey was conducted as part of the Programmatic Environmental Impact Statement/Program Environmental Impact Report (PEIS/PEIR) for the West Los Angeles Medical Center Draft Master Plan Redevelopment. As part of the PEIS/PEIR, no development is being proposed for the arroyo area, and no permits or reviews are being requested from Federal or State agencies for the area.

2. SITE DESCRIPTION

2.1. Background

As shown by the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) Mapper, a freshwater forested/shrub wetland has been identified on the WLA Campus (USFWS, 2017). Figure 1 shows the arroyo topography with the USFWS NWI mapped wetland present from the northern part of the arroyo to the bottom/southern end of the arroyo. An intermittent stream is shown on several source maps of the WLA Campus, and other sources depict a "solid blue line stream" (USDA NRCS, 2017; California Wetlands Monitoring Workgroup, 2017; USGS, 2017).

According to the October 23, 2000 report by Locus Technologies, prior to 1996, "the Los Angeles County storm drain terminated and discharged into the north end of the arroyo." In 1996, to reduce erosion, an approximately 2,500-foot storm sewer and drain pipe was installed underground at the north end of the arroyo, directing the flow south to control the stormwater. Fill material was used to bury the stormwater pipe and to facilitate a landscape which could be used for future development. As jurisdictional wetlands were present within the storm drain project area, approximately three acres of wetlands were constructed at the southern end of the storm drain below the energy dissipation structure/outflow. The wetland construction was a mitigation measure to replace the lost wetland habitat at a ratio of 1.5 times the area removed during project construction and fill of the arroyo. Presently, much of the northern filled area contains sports fields and facilities used by the Brentwood School. (Lui, 2000)

Mapping from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soils website shows the soil type for the entire arroyo area is urban land-Sepulveda-Pierview complex (USDA NRCS, 2017). Past environmental studies documented that the arroyo has been used for disposal of waste from VA facilities and other sources. The identified buried waste sites were covered with clean fill to depths of 5 to 30 feet (or more) as protective measures during the storm drain construction and other project activities. One buried waste site appears to be within the northern portion of the wetland area. Soil and water have been tested at the WLA Campus over the years for hazardous materials. Testing has not indicated any elevated levels of contaminants or radioactive elements. Most of the water present in the arroyo is transported through the storm drain system and does not contact buried waste within the arroyo. However, to ensure wetland survey team safety, soil pits were not included in the wetland survey. (Lui, 2000; Allwest Geoscience, 2010)

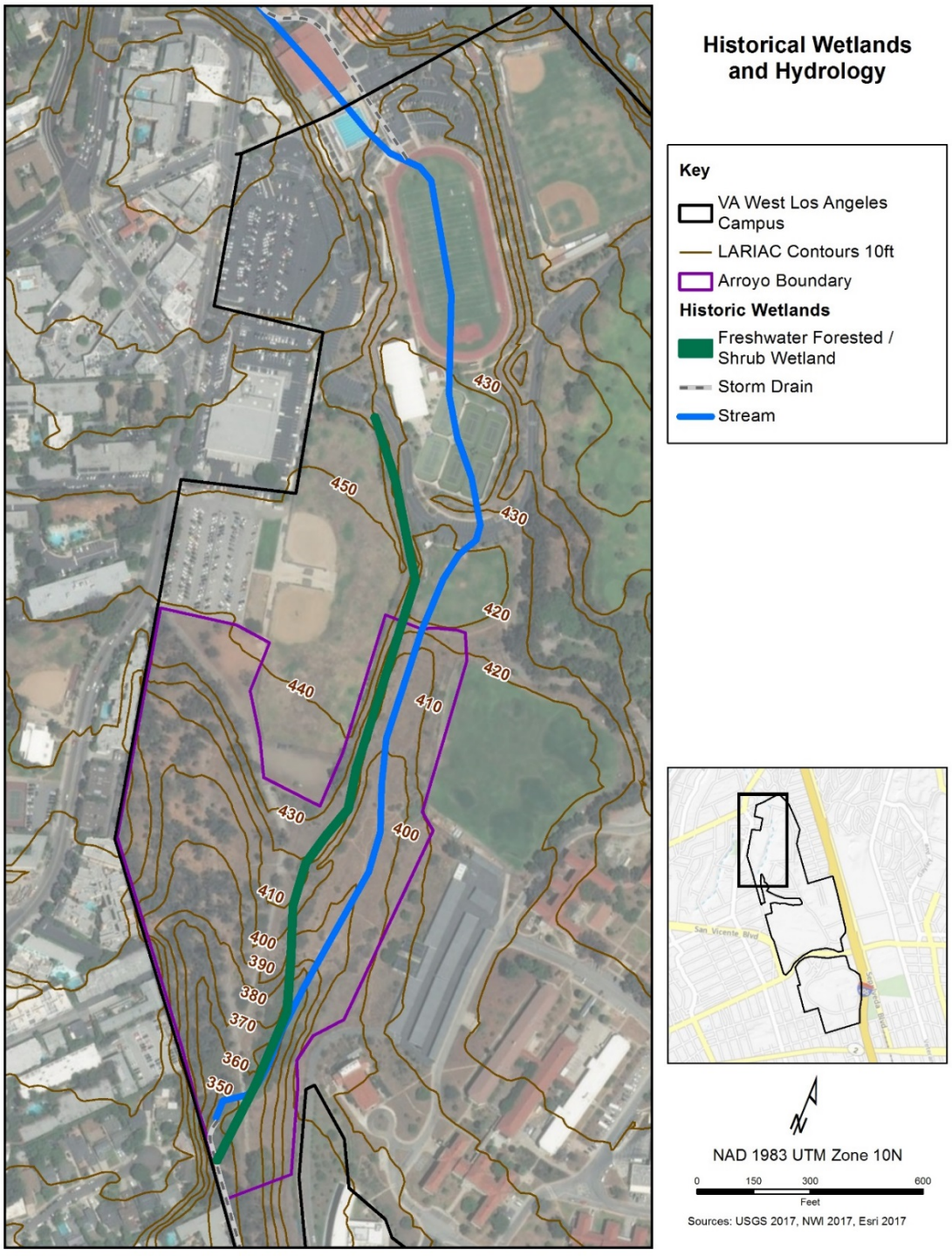

Figure 1. Topography, Historical Wetlands, and Hydrology of the Arroyo Area at the WLA Campus

2.2. Current Conditions

The initial ground-truthing and data gathering survey to identify wetlands took place within the arroyo on the northwest side of the WLA Campus, south of the Brentwood School baseball field, east and southeast of Veterans Barrington Park, and west of MacArthur Field, the Brentwood Theatre, and the solar array on the WLA Campus. The arroyo is fenced with open space and no structures are present within the fence line (Figure 2).

The open space within the arroyo supports native vegetation consistent with sage-scrub and chaparral along with non-native species common to the region. Avian species including red-tailed hawk, black phoebe, and Cooper's hawk were identified during the arroyo survey. Signs (tracks or feces) and sightings of wildlife noted during the arroyo ground-truthing survey include coyote, ground squirrel, western fence lizard, cottontail rabbit, and pocket gopher.

Top left: View from outside of fence at north end of arroyo, looking south from Brentwood school baseball field. Top right: View from inside of fence at north end of arroyo looking south. Bottom: Looking southeast from high point at the southeast corner of sports fields at Veterans Barrington Park.

Figure 2. North End of Arroyo

The current conditions of the arroyo show no water present and little evidence of streamflow or hydrology in the northern portion, and a small distinct area where water is present in the southernmost portion. The presence of water in the southern portion (Figure 3) corresponds with the outflow of the storm drain system below the energy dissipation structure. The water below the outflow area is most likely from irrigation or runoff from the storm drain system. Figure 4 displays the arroyo, the wetland area (vegetation boundary), and where the wetland survey was conducted (wetland survey plot). During the initial ground-truthing of the entire arroyo, the location of the USFWS NWI wetland was compared with current conditions. A steep slope directly below (to the east of) the Veterans Barrington Park is the wetland area shown on the NWI map. This area does not support riparian or wetland vegetation and the slope of the hillside could not support hydrology shown on current maps. Based on the surface features observed during the survey of the arroyo and the impacts resulting from the 1996 stormwater diversion drain project, the mapped hydrology and the USFWS NWI data no longer appear to be consistent with the current environment and wetland features present in the arroyo.

Figure 3. Overlooking Wetland Area, Looking from East Side to West

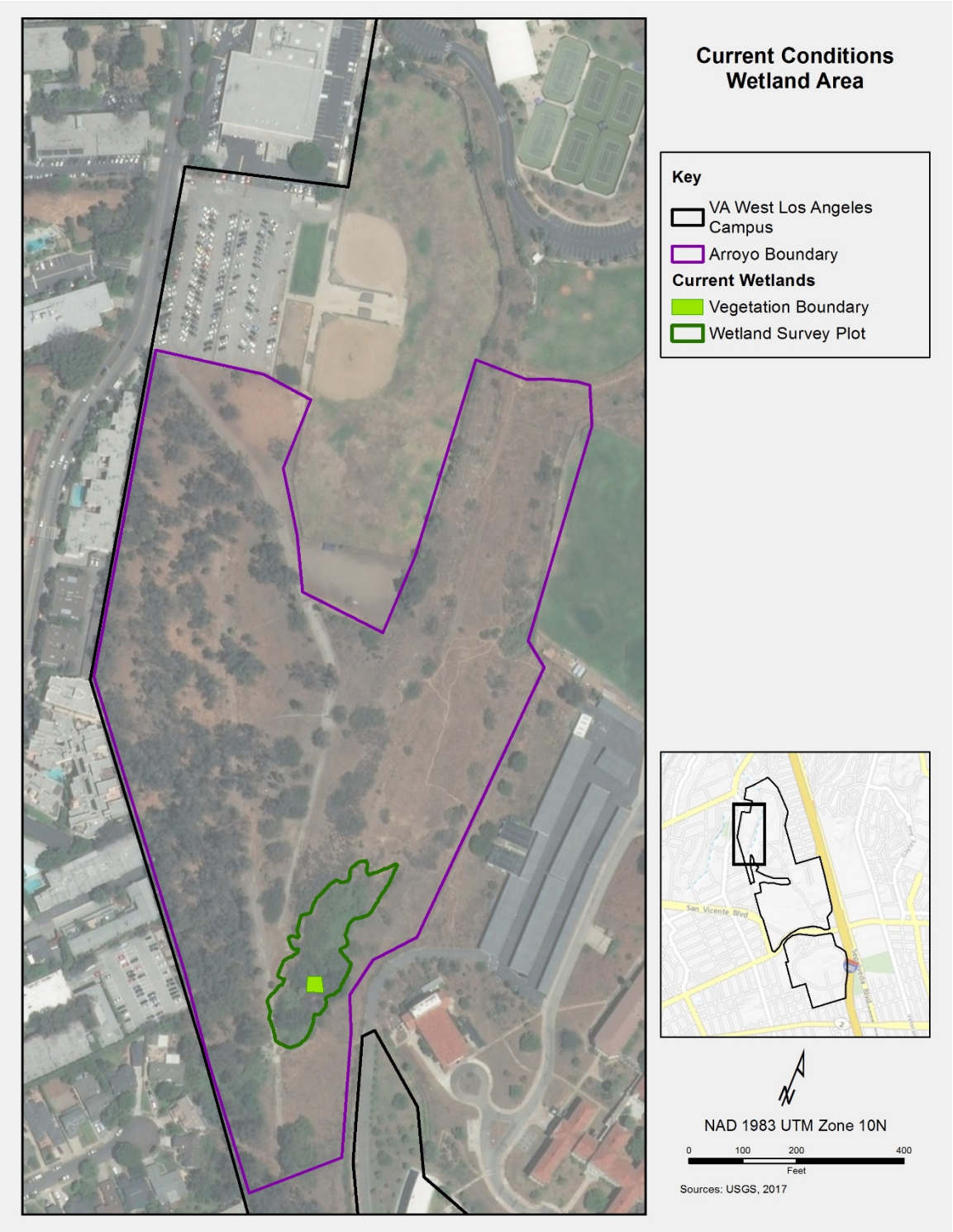

Figure 4. Current Conditions of Wetland Area at the WLA Campus

The entire arroyo was surveyed for wetlands, but only the southern area showed the presence of wetlands. Therefore, the wetland survey focused on the southernmost portion of the arroyo in the area below the storm drain outflow. This area contains dense vegetation, including native species associated with wetland and riparian areas such as arroyo willow (*Salix lasiolepis*) and mulefat (*Baccharis salicifolia*). The predominant vegetation present is the invasive, non-native arundo or giant reed (*Arundo donax*).

The area of wetland starts downhill from where the first outflow drain emerges and is characterized by a deeply eroded channel below the drain structure. This area contains mostly invasive mustard, other upland species, and various refuse, clothing, and books. Wetland or riparian vegetation is absent surrounding the outflow. Approximately 15 to 20 feet south of the first drain is a larger, fenced outflow, which appears to be the main outflow and energy dissipation structure from the 1996 storm drain extension. This outflow is approximately 10 to 15 feet below the top of the eroded slopes. Riparian and wetland vegetation is present surrounding and downstream from this structure. Water was auditorily observed by the survey team near the bottom of the outflow area, but it could not be seen due to visually dark conditions at the bottom of the outflow area. Figure 2 shows views of the northern arroyo area, and Figure 3 shows the dense vegetation surrounding the wetland area.

The outer perimeter of the wetland area was surveyed and recorded. The area of predominantly willow and arundo is approximately 0.5 acres and runs about 380 feet from the storm drain outlet to the culvert crossing under the access road to the south. The culvert empties into a concrete ditch which flows into another storm drain under the adjacent neighborhood bordering South Barrington Road.

During the survey of the wetland area perimeter and while attempting to access the bottom of the arroyo, it was noted that some soils in the bottom of the vegetated area may not receive sunlight due to the density and composition of arundo. A variety of native and non-native upland vegetation were recorded while seeking access points. Table 1 identifies vegetation within the upland arroyo area and surrounding the wetland; Figure 5 displays photographs of species identified in Table 1.

Table 1. Upland Vegetation Species

Scientific Name	Common Name	Native Species (Yes/No)
Acmispon glaber (Vogel) Brouillet var. *glaber*	Deerweed	Yes
Artemisia californica Less.	California sagebrush	Yes
Arundo donax L.	Arundo/giant reed	No
Baccharis pilularis DC.	Coyote bush	Yes
Baccharis salicifolia (Ruiz Lopez & Pavon) Pers.	Mulefat	Yes
Brassica nigra (L.) W.D.J. Koch	Black mustard	No
Brassica rapa L.	Field mustard	No
Carpobrotus edulis (L.) L. Bolus	Ice plant	No
Cortaderia sp.	Pampas grass	No
Datura wrighti Regel	Sacred datura	Yes
Encelia californica Nutt.	California encelia	Yes
Malosma laurina (Nutt.) Abrams	Laurel sumac	Yes
Nicotiana glauca Graham	Tree tobacco	No
Ricinus communis L.	Castor bean	No
Sambucus nigra L. ssp. *Caerulea* (Raf.) R. Bolli	Blue elderberry	Yes

Source: (Calflora, 2017)

Top left: blue elderberry; Top center: coyote bush; Top right: California sagebrush; Center left: laurel sumac; Center center: California encelia; Center right: surveyor with deerweed in foreground and ice plant; Bottom left: deerweed; Bottom right: dense stand of laurel sumac

Figure 5. Upland Vegetation Species Observed in Arroyo at WLA Campus

3. SURVEY SITE AND METHODOLOGY

A delineation of the entire wetland area had been planned prior to the initial site visit. Following the ground truthing and field reconnaissance of the wetland area, the survey team suspected that due to lack of access to the entire wetland area, a full delineation would not be possible. Two locations were identified as possible access points for setting up survey plots for the wetland delineation process. Other attempts to access survey locations failed due to dense, impassable vegetation (primarily arundo).

Weather conditions on Wednesday, November 8, 2017 were sunny, with a temperature of approximately 70 degrees Fahrenheit. The NRCS Climate Analysis for Wetlands Tables (WETS Tables) in Appendix A show a monthly summary of temperature and precipitation from 1997 to 2017. The WETS Tables are used in wetland identification to show average precipitation over an expanse of time. By reviewing 30 years of data and comparing the present condition of a location, the presence of water due to several months or years of heavy rainfall can be ruled out when determining hydrology. The same comparison can be made in an area that has experienced long-term drought and has no hydrology present. The WETS Tables provide long-term data to help support wetland determination of an area in addition to on the ground findings. California has experienced drought conditions since about 2010; 2017 started out with higher than average precipitation, but returned to lower than average precipitation levels for most of 2017 (Table 2) (USDA NRCS and National Water and Climate Center, 2016; USDA NRCS and National Water Climate Center, 2018).

Table 2. Average Precipitation vs. 2017 Precipitation at the University of California, Los Angeles

Month	Average Precipitation (inches)*	2017 Precipitation (inches)	Difference from average (inches)
January	3.68	8.99	+5.31
February	4.23	5.55	+1.32
March	2.79	0.29	-2.50
April	1.11	0.20	-0.91
May	0.25	0.15	-0.10
June	0.06	0.06	0.00
July	0.01	0.00	-0.01
August	0.09	0.00 (trace)	-0.09
September	0.19	0.12	-0.07
October	0.59	0.01	-0.58
November	1.65	0.11	-1.54
December	2.82	0.00	-2.82
Total	**17.48**	**15.48**	**-2.00**

*Average rainfall totals from 03/01/1933 to 06/09/2016
Sources: (Western Regional Climate Center, 2018; USDA NRCS and National Water Climate Center, 2018)

3.1. Survey Sites

The entire arroyo was ground-truthed, photographed, and surveyed, noting vegetation, wildlife, and other conditions, and the perimeter of the wetland was extensively inspected for areas to sample. Access to a possible survey location near the storm drain outflow structure was attempted on November 8, 2017, but could not be accomplished due to the dense brush. A second attempt was made on November 9, 2017, using branch loppers to cut access through the dense brush, but an impenetrable wall of arundo blocked passage downstream and to the bottom of the channel. Behind the arundo was a suspected stream bank that appeared to drop steeply downward into darkness. Due to the lack of sunlight, this area likely would be devoid of vegetation. The team was unable to set a survey plot or take samples of the storm drain outfall area due to the lack of access.

A single location was identified with access to the bottom of the channel, approximately 200 feet south of the storm drain outflow. This site had been cleared previously using a chainsaw to cut down the willow trees and arundo, which opened the site to sunlight and access to the bottom of the channel.

3.2. Methodology

Prior to the wetland survey, desktop data was collected to begin identifying soil types, topology, hydrology, wetlands, and vegetation that might be present. At the cleared area, the survey team visually observed standing water, damp and saturated soils with evidence of standing water, capillary fringe[1] on the east slope of the canyon, evidence of past hydrology, and wetland obligate vegetation. At this point, the survey team confirmed that a delineation of the entire wetland area was unlikely due to the conditions of the surrounding vegetation and safety concerns. The team felt that if the area was cleared of the invasive arundo, a full wetland delineation had a better chance to be conducted and an accurate attempt of mapping the wetland could proceed.

A 30-foot by 30-foot survey plot was measured and marked with red flags to denote the sampling area. U.S. Army Corps of Engineers (USACE) Arid West Region determination data forms were used to gather data from the survey plot (USACE, 2008). *The Jepson Manual: Vascular Plants of California* was used to key unknown plant species (Hickman, 1993). Vegetation species were identified and photographed, wetland hydrologic characteristics were recorded and photographed, and soil samples were taken using an auger and matched to Munsell Soil Charts. Vegetation is discussed in Section 3.6.2.1, soils in Section 3.3.3, and hydrology in Section 3.3.4.

[1] Capillary fringe describes the soils above a saturated area or a water table where the water has permeated the higher soils through capillary action ("the movement of water in the interstices of a porous medium due to capillary forces"). The U.S. Geological Survey (USGS) defines capillary fringe as "the lower subdivision of the unsaturated zone immediately above the water table in which the interstices are filled with water under pressure less than that of the atmosphere, being continuous with the water below the water table but held above it by capillary forces." (USGS, 2013)

3.3. Survey Site Description

3.3.1. Overview

The wetland survey plot (Figure 6) is located approximately 200 feet south of the storm drain outflow. The saturated land is oriented from north to south, with a steep bank (approximately 30-degree slope) on the east side and a gradually sloping bank on the west. Figure 7 shows images facing east and west from the survey area. The vegetation and hydrology are suspected to be a result of the 1996 storm drain installation and wetland restoration project (Lui, 2000). The entire area was disturbed and had recently been cleared of trees and arundo, with much of the cut vegetation remaining on the ground. Access to the bottom of the arroyo was cleared, making a survey possible. The conditions of the survey plot and surrounding area were atypical compared to the rest of the wetland area because much of the overstory vegetation had been removed and sunlight was able to penetrate to soils below. Additional features noted in the survey plot were discarded books, toys, clothing, and other refuse.

Figure 6. Wetland Survey Plot

Figure 7. Views from Wetland Survey Plot, Looking West (top photo) and East (bottom photo)

3.3.2. Vegetation

The vegetation within the wetland survey plot had recently been disturbed and removed; cut branches, stacked willow logs, and piles of arundo remained on the site. It is suspected that if the area had not been cleared, no herbaceous species or other vegetation noted in the survey would be present due to the heavy overstory and lack of light penetration. The vegetation species in the sample plot were compared to the USACE Arid West Region National Wetland Plant List (NWPL) (USACE, 2008). The list provides a categorization of wetland indicator status (e.g., obligate, facultative wetland, and facultative upland) for vegetation which is used to calculate wetland dominance (USACE, 2008). Wetland dominance is an estimated calculation using percent cover of hydrophytic vegetation within a sample plot (USACE, 2008). Obligate wetland species are plants which are only found in wetlands or saturated soils within lakes, rivers, or streams; facultative wetland species are plants which are occasionally found in non-wetlands, but usually occur within wetlands; and facultative upland species are plants which are occasionally found

in wetlands, but usually occur in non-wetlands (USACE, 2008). Vegetation species, wetland indicator status, and percent cover within the sample plot are shown in Table 3.

Table 3. Vegetation Identified within the Wetland Survey Plot

Scientific Name	Common Name	Percent Cover*	Wetland Indicator Status	Native/Non-native
Arundo donax L.	Arundo/giant reed	10.0%	FACW[1]	Non-native
Cyperus involucratus Rottb.	Umbrella plant	1.0%	FACW[1]	Non-native
Fraxinus uhdei (Wenz.) Lingel.	Shamel ash	1.0%	FACU[2]	Non-native
Oxalis pes-caprae L.	Bermuda buttercup	0.2%	N/A	Non-native
Ricinus communis L.	Castor bean	2.0%	FACU[2]	Non-native
Salix lasiolepis (Benth.)	Arroyo willow	70.0%	FACW[1]	Native

[1] FACW—Facultative Wetland: Occasionally found in non-wetlands but usually occur in wetlands (67-99% wetland occurrence).
[2] FACU—Facultative Upland: Occasionally found in wetlands but usually occur in non-wetlands (1-33% wetland occurrence).
*Does not total 100 percent due to openings in canopy and bare ground
Sources: (Lichvar, Melvin, Butterwick, & and Kirchner, 2012; USACE, 2008)

Most of the wetland survey plot was bare ground or land covered with cut branches, although a few herbaceous species were identified. One fungi species, an unidentified gilled mushroom, was noted growing in the ground near the trunk of a willow tree. Arroyo willow and arundo were the dominate cover species in the wetland survey plot and both are facultative wetland species listed in the USACE Arid West Region NWPL. Figure 8 displays several of the vegetation species within the survey plot; Figure 9 displays the fungi and surrounding vegetation.

Top left: Shamel ash and arroyo willow branches; Top right: umbrella plant; Bottom left: arroyo willow with arundo in background; Bottom right: arroyo willow with cut branches

Figure 8. Vegetation within Wetland Survey Plot

Top left: cut branches and gilled mushrooms; Top right: cut willow and arundo; Center left: arundo with large willow log; Bottom left: willow branches; Bottom right: willow and arundo

Figure 9. Examples of Observed Vegetation Surrounding Wetland Survey Plot

Based on the percentage of dominance of the vegetation (facultative wetland vegetation species), hydrophytic vegetation is present and dominant within the sample area, indicating the plot supports wetland vegetation.

3.3.3. Soils

Most of the wetland survey plot was bare ground or ground covered with brush and leaf litter. Upland soils were dry, but toward the bottom of the slopes, the soils were moist and showed the presence of water. A capillary fringe was present where the steep slope on the east side of the channel intersected

with the damp soils at the bottom of the channel (Figure 10). Soils observed in the moist areas consisted of coated sand, gravel, silt, with a thin layer of dark, sticky silt at the surface.

Two soil samples were taken: one sample from the center of the wetland survey plot within the saturated soil, and another sample from the lower bank on the west side, about one foot from the visible line of moist soils. Core samples of soils were obtained using an auger at a depth of 6 to 7 inches. Based on the Munsell Color Charts, the soil color at sample point one ranged from dark olive gray (5Y, 3/2) to very dark greyish brown (2.5Y, 3/2), and at sample point two from light olive brown (2.5Y, 5/3) to olive (5Y 5/3). The soil texture from sample point one was sandy clay loam with silt loam on the surface, whereas the soil texture for sample point two was silty clay loam. The soil color at both sample points may indicate potential of saturated soil conditions; however, no obvious hydric soil characteristics such as mottling, reduced[2], or gleyed matrix[3] colors were identified in the soil samples. Soil pits were not used, so detailed observations and analysis of soils within the wetland survey plot are limited. Figure 10 displays soils and locations where the samples were taken.

[2] Reduced matrix: Soil matrix that has a low chroma in situ due to presence of reduced iron, but whose color changes in hue or chroma when exposed to air as Fe2+ is oxidized to Fe3+ (USACE, 2008).
[3] Gleyed matrix: Soils with a combination of hue, value, and chroma that indicate iron may be reduced in an aerobic environment, such as in saturated soils (USDA NRCS, 2017).

Figure 10. Soil Sample Locations and Capillary Fringe

3.3.4. Hydrology

Hydrology indicators included standing water just upstream of the wetland survey plot. The standing water was measured at approximately 9.5 inches deep about 2-feet from the downstream edge. Aquatic invertebrates, possibly mosquito or midge larvae, were observed. The water had a thin layer of oil or scum and was slightly cloudy. The survey team took care to not come into direct contact with the water due to the visual conditions and the presence of refuse. The team was unable to determine if the standing water was being contained by fallen logs and vegetation or if the water was within a low point in the arroyo. The team was also unable to ascertain how far upstream standing water was present due to the limited access. Downstream of the standing water, within the wetland survey plot, the soils were moist

and a capillary fringe of about 6 to 12 inches was present along the banks of the arroyo. Figure 11 shows hydrology features within and upstream of the wetland survey plot.

Figure 11. Hydrology Features Within and North of Wetland Survey Plot

4. FINDINGS AND CONCLUSIONS

Although a full delineation for a wetland determination was not conducted, the arroyo area below the lower storm drain outflow was observed to support wetland vegetation. The presence of water at the outflow, standing water approximately 200 feet downhill from the outflow, and moist soils within the survey plot provide additional support for the presence of a wetland. The presence of water in November, especially after a normal (dry) summer, followed by a somewhat drier than normal fall, further supports the presence of water year-round or close to year-round. The arroyo below the stormwater outflow appears to act as an ephemeral drainage during and following storm events or after heavy irrigation from areas connected to the storm drain system. Some natural hydrology may be present due to the low point in the arroyo topography (Figure 1).

Overall, the alteration of the landscape from storm drain installation, construction, and fill within the north end of the arroyo has changed the surface hydrology and wetlands previously mapped by USFWS, NRCS, USGS, and other entities. The land north of the storm drain no longer experiences year-round or ephemeral drainage from natural runoff as it had prior to installation of the storm drain extension documented in 1996. The scrub-shrub wetland as mapped by the USFWS is also no longer present. The vegetation, as seen on aerial maps, along the mapped wetland shown on the NWI map was ground-truthed to confirm is the presence of non-riparian vegetation growing on the steep slope adjacent to Veterans Barrington Park. The wetland area (Figure 4) is likely the remnant of the three acres of wetland restoration planted following the storm drain extension project. The area now supporting facultative wetland vegetation, primarily willow and arundo, is about 0.5 acres.

The open space within the arroyo does support native vegetation consistent with sage-scrub and chaparral along with non-native species common to the region. The land provides habitat for avian species including red-tailed hawk, black phoebe, and Cooper's hawk. Other wildlife which use the arroyo include coyote, ground squirrel, cottontail rabbit, and pocket gopher. Given the developed condition of the surrounding area, the arroyo open space provides a unique habitat island for wildlife and native vegetation.

Based on the field survey, the approximately 0.5-acre area supporting willow and arundo contains a smaller area or areas that could be delineated as a wetland. Due to the density of vegetation inhibiting access to the entire area, a full wetland delineation was not conducted. Because there is no proposed action for the arroyo area and potential wetland areas, no impacts to Waters of the U.S. are anticipated and no associated Federal or State permits are required.

LIST OF PREPARERS

Survey Team: Meghan Klassen, Pamela Middleton, Jennifer Salerno, and Lindsey Veas

Report Author: Pamela Middleton

Biological Lead and Reviewer: Jennifer Salerno

Wetlands Lead and Reviewer: Katie Hite

Maps: Elizabeth Ducey

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APPENDICES

Appendix A. NRCS Climate Analysis for Wetlands Tables

WETS Table

WETS Station: U C L A, CA

Requested years: 1997 - 2017

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	68.2	51.8	60.0	3.49	0.99	4.11	4	0.0
Feb	67.4	50.8	59.1	4.56	1.25	5.35	5	0.0
Mar	68.6	52.1	60.4	1.89	0.56	2.13	3	0.0
Apr	69.4	53.1	61.3	0.87	0.24	0.88	2	0.0
May	70.9	56.4	63.6	0.43	0.00	0.30	1	0.0
Jun	73.0	59.2	66.1	0.07	0.00	0.04	0	0.0
Jul	77.3	62.4	69.8	0.02	0.00	0.02	0	0.0
Aug	78.7	62.9	70.8	0.01	0.00	0.00	0	0.0
Sep	79.1	62.6	70.8	0.21	0.00	0.10	0	0.0
Oct	76.4	59.7	68.1	0.80	0.05	0.55	1	0.0
Nov	72.3	55.5	63.9	1.04	0.43	1.18	2	0.0
Dec	67.0	51.1	59.0	2.86	0.82	3.38	4	0.0
Annual:					10.93	19.28		
Average	72.4	56.5	64.4	-	-	-	-	-
Total	-	-	-	16.24			21	0.0

GROWING SEASON DATES			
Years with missing data:	24 deg = 0	28 deg = 0	32 deg = 0
Years with no occurrence:	24 deg = 21	28 deg = 21	32 deg = 21
Data years used:	24 deg = 21	28 deg = 21	32 deg = 21
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	No occurrence	No occurrence
70 percent *	No occurrence	No occurrence	No occurrence

* 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
1933			0.23	M0.75	M0.05	M0.49	MT	M0.03		M0.56	M0.02	M10.67	12.80
1934	M3.80	M1.70	T	M0.09		M0.83			0.08	M1.11	M2.14	4.16	13.91
1935	3.14	2.05	4.44	4.50	MT			M0.16	M0.02	0.14	M1.62	M0.82	16.89
1936	0.44		2.14	1.19		M0.04	0.01	0.02		2.24	0.08	6.89	13.05
1937	2.69	8.65	4.56	M0.31	0.19	T					T	4.49	20.89
1938	1.19	9.97	10.85	0.38	0.27	0.04		T	0.02	0.01		7.51	30.24
1939	3.64	1.41	1.04	0.24	0.07		T		M2.03	0.17	0.27	0.70	9.57
1940	6.55	7.05	1.05	1.32	0.02		T			1.36	0.28	8.35	25.98
1941			9.77		0.50	0.00	0.01	0.01	0.00	2.00	0.07	4.27	16.63
1942	0.48	1.49	1.50	3.36	0.00	0.00	0.00	0.32		0.75	T	1.74	9.64

1943	7.98	2.69	3.36	0.66	0.02	0.02	0.00			0.21	0.29	M6.61	21.84
1944	1.27	8.13	2.39	0.72	0.06	0.02	0.00	0.00	0.03	0.05	4.32	1.10	18.09
1945	0.05	4.48	4.80	0.04	T	0.03	T	0.01	0.00	0.74	0.31	5.59	16.05
1946	0.20	1.82	3.88	0.54	0.08	0.00	T	0.00	0.02	1.06	8.12	4.26	19.98
1947	0.70	0.90	0.98	0.02	0.05	0.01	0.00	0.02	0.03	0.04	0.13	1.50	4.38
1948	0.04	1.22	3.45	1.03	0.01	0.30	T	0.00	0.00	0.20	T	2.87	9.12
1949	3.61	1.94	2.03	0.05	0.82	T	T	0.01	T	T	1.63	3.96	14.05
1950	3.82	M0.40	1.17	0.56	0.01	0.03	T	0.00	0.26	0.68	1.35	M0.03	8.31
1951	3.70	0.84	0.59	2.11	0.03	0.01	T	M0.26	0.02	0.48	1.56	6.57	16.17
1952	11.71	0.35	9.35	1.91	T	T	T	0.00	0.02	0.00	4.14	3.81	31.29
1953	1.66	0.02	0.53	2.26	T	0.05	T	0.00	T	0.00	1.47	0.09	6.08
1954	5.91	6.35	3.97	0.21	0.03	0.02	T	T	T	0.00	1.88	1.54	19.91
1955	5.40	0.99	0.79	2.71	0.72	T	T	T	T	T	1.91	1.88	14.40
1956	8.90	1.42	T	3.49	0.56	0.00	0.00	T	0.00	0.17	0.00	0.28	14.82
1957	7.07	3.83	0.98	1.88	M0.59	0.12	T	0.00	0.00	1.42	0.53	3.41	19.83
1958	2.46	8.55	5.71	3.02	T	0.00	0.00	0.02	0.05	0.01	0.05	0.02	19.89
1959	1.98	5.48	0.00	0.86	T	0.03	T	T	MT	T	0.01	M1.34	9.70
1960	4.12	2.96	M0.25	2.50	T	T	T	M0.00	M0.00	T	3.30	M0.30	13.43
1961	1.47	0.00	0.77	0.28	MT	T	T	M0.23	0.05	T	2.61	1.83	7.24
1962	3.32	15.66	1.29	0.00	0.05	T	T	0.00	0.00	0.33	T	T	20.65
1963	0.39	3.30	3.26	1.78	0.01	0.15	0.00	0.29	0.86	0.65	3.35	0.03	14.07
1964	1.58	T	1.92	0.70	T	0.34	T	0.00	T	0.49	1.85	3.43	10.31
1965	0.86	0.49	1.73	4.86	T	0.09	0.02	0.16	0.18	0.00	11.30	4.82	24.51
1966	1.04	1.68	0.27	T	0.65	0.00	0.02	T	0.24	0.05	3.16	5.55	12.66
1967	5.09	0.08	2.95	3.90	0.13	T	0.00	0.00	0.90	0.00	8.63	2.53	24.21
1968	1.02	0.41	4.81	0.57	T	0.00	0.07	0.34	0.00	0.52	0.39	1.41	9.54
1969	M17.47	7.02	1.01	0.55	0.04	T	0.25	0.00	T	T	1.97	0.02	28.33
1970	2.05	3.11	1.86	T	0.00	0.02	T	0.00	0.00	0.03	6.32	5.58	18.97
1971	1.14	0.55	0.90	0.90	0.29	0.00	T	0.00	0.02	0.06	0.40	7.46	11.72
1972	T	0.13	0.00	0.04	0.02	0.19	T	0.15	T	0.29	3.89	1.96	6.67
1973	4.85	8.55	3.15	T	0.02	0.00	T	T	0.06	0.28	1.92	1.49	20.32
1974	9.86	0.16	4.04	0.07	0.03	0.00	T	0.00	0.00	0.51	0.01	5.21	19.89
1975	0.02	4.29	4.07	1.32	0.01	0.00	T	0.00	0.09	0.50	T	0.08	10.38
1976	0.00	2.82	1.25	0.63	T	0.19	T	0.04	2.33	0.03	0.45	1.39	9.13

1977	4.07	0.27	1.42	0.00	3.70	0.11	0.00	3.23	0.05	0.02	0.12		12.99
1978		10.40			T	0.00	0.00	0.09	0.58	0.09	1.89	1.35	14.40
1979	7.12	3.15	5.32	0.00	0.03	0.01	0.00	T	0.11	0.66	0.42	1.14	17.96
1980		18.37	4.80	0.92	0.19	T	0.01	T	0.00	0.00	0.00	2.05	26.34
1981	2.71	1.67	4.49	0.46	0.01	T	0.00	0.00	0.01	0.38	2.03	0.73	12.49
1982	2.57	0.52	5.93	2.25	0.06	0.01	0.00	0.07	1.16	0.29	4.83	1.61	19.30
1983	8.99	6.40	9.52	4.26	0.05	0.01	0.00	0.98	1.22	1.95	3.66	4.05	41.09
1984	0.04	T	0.27	0.47	T	0.03	0.00	0.03	0.19	0.21	1.82	4.19	7.25
1985	0.78	2.46	2.02	0.00	0.11	0.00	T	0.00	0.10	0.46	5.05	0.75	11.73
1986	2.77	8.78	5.17	0.46	0.00	T	0.03	0.00	2.81	0.21	1.39	0.34	21.96
1987	1.59	1.17	1.36	0.02	T	0.12	0.09	T	0.01	4.76	1.12	2.03	12.27
1988	2.27	2.45	0.54	2.93	0.00	T	0.00	0.04	0.01	T	1.13	4.84	14.21
1989	0.62	2.04	1.29	T	0.03	0.00	0.00	0.00	0.22	0.52	0.54	0.00	5.26
1990	1.20	5.92	0.16	0.68	1.13	0.00	0.00	0.04	0.00	0.00	0.72	0.03	9.88
1991	1.24	3.43	6.64	T	0.00	0.03	0.16	0.02	T	0.37	0.01	3.73	15.63
1992	2.51	9.20	6.97	0.10	0.04	0.00	0.16	0.00	0.00	1.25	0.00		20.23
1993	14.19	13.11	2.95	0.00	T	1.29	T	0.00	0.01	0.27	0.65	1.10	33.57
1994	0.28	5.37	1.34	0.53	0.19	0.00	0.00	0.00	0.00	0.24	0.86	1.68	10.49
1995	20.11	2.15	8.39	0.87	0.61	0.44	0.01	0.00	0.03	0.01	0.02	1.94	34.58
1996	2.17	5.94	2.56	0.88	0.09	0.00	T	0.00	0.00	1.79	2.08	6.82	22.33
1997	6.89	0.17	0.00	0.00	0.00	T	0.00	0.00	0.28	0.00	2.95	4.47	14.76
1998	4.56	20.51	5.28	1.66	3.68	0.16	T	0.00	0.08	0.01	1.98	0.59	38.51
1999	1.56	0.54	2.15	2.74	T	0.77	0.02	0.00	0.02	0.00	0.66	0.03	8.49
2000	1.28	7.60	3.00	1.85	0.01	0.00	0.00	0.11	0.15	1.84	0.00	0.02	15.86
2001	7.76	10.66	1.98	1.76	0.00	0.01	0.01	0.00	0.00	0.09	2.63	1.45	26.35
2002	1.47	0.31	0.31	0.10	0.09	0.01	0.00	T	0.03	0.03	2.35	4.42	9.12
2003	0.02	5.52	4.86	0.76	1.43	0.07	0.02	0.06	0.00	0.01	0.92	1.88	15.55
2004	0.83	6.96	0.81	0.05	0.00	0.00	0.00	0.00	0.00	5.24	0.24	7.54	21.67
2005	12.40	11.91	2.58	1.32	0.47	T	0.00	0.00	0.18	1.13	0.61	1.56	32.16
2006	2.78	2.86	3.63	3.26	0.86	0.01	0.00	0.00	T	0.06	0.14	0.67	14.27
2007	0.58	1.10	0.01	0.50	T	0.00	0.01	0.00	0.84	1.13	0.57	2.00	6.74
2008	8.89	2.48	0.04	0.07	0.21	0.00	0.00	0.00	0.00	0.01	1.25	3.57	16.52
2009	0.76	4.54	0.46	0.03	0.00	0.18	0.00	0.00	0.00	3.11	T	3.86	12.94
2010	5.89	6.33	0.51	1.18	0.18	0.01	0.03	0.00	0.00	1.87	0.69	11.23	27.92

2011	0.93	3.26	6.27	0.00	0.64	0.04	0.00	0.00	0.07	1.73	2.36	0.79	16.09
2012	1.53	0.24	2.27	1.82	0.01	0.00	0.03	0.00	T	0.07	1.77	2.69	10.43
2013	1.46	0.17	0.96	T	0.48	0.00	0.04	0.00	0.00	0.12	0.70	0.24	4.17
2014	0.04	3.74	0.95	0.22	0.00	0.00	0.00	0.02	0.00	0.00	0.50	4.33	9.80
2015	1.44	0.61	1.13	0.35	0.79	0.04	0.23	T	2.62	0.01	0.04	0.93	8.19
2016	3.28	0.69	2.23	0.31	0.05	0.01	0.00	0.00	T	0.32	1.27	5.02	13.18
2017	8.99	5.55	0.29	0.20	0.15	0.06	0.00	T	0.12	0.01	0.11	M0.00	15.48
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